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Exploring sensitivity and initiative in a mother-baby dyad with Video Intervention Therapy (VIT): a case study in a high-risk population

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Abstract
This preliminary report is a single case study aiming to evaluate the feasibility of Video Intervention Therapy (VIT) in difficult scenarios involving high-risk mother-infant dyads in a housing program for homeless families. The study conducted in Clermont-Ferrand, France, used the Coding Interactive Behavior (CIB) system. Ruth Feldman's framework and Stuart et al.'s 4-EFA model was applied. Three VIT sessions showcased personalized interventions, aided by the CIB's role in observing and detailing changes. The results showed in this case that maternal insensitivity, characterized by high scores in intrusiveness, interference and directiveness, goes parallel to infant's affective disconnection and social withdrawal. The VIT and CIB mutually reinforce the team's analysis and intervention perspectives pointing towards the feasibility of the video-intervention. The findings are discussed in relation to the design of future research and the need to include video intervention (VIT) work within the service's team of direct care professionals.

Keywords Mother-infant interactions · Video feedback intervention · Video intervention therapy · Coding interactive behavior · High-risk mothers

Scientific evidence has established a strong link between the quality of the infant- caregiver interactions during the early years of life and the child's well-being and development in various dimensions (World Health Organization, 2020). Conversely, maternal trauma or depression in the early stages of a child's life can have long-lasting effects on the child's psychological, cognitive and physical health (Cooke et al., 2021; Liu et al., 2017; Surkan et al., 2011). Parenting interventions focusing on interactions during the first three years of life have shown to be effective in improving early child developmental outcomes (Fukkink, 2008; Jeong et al., 2021).

Communicative exchanges between traumatized and depressed mothers and their infants show a lack of maternal sensitivity; that is restrictions, intrusions, unpredictability, discontinuity, or recurring unresolved micro-ruptures (Beebe & Steele, 2013; Burtchen et al., 2022; Field, 1995; Lyons-Ruth et al., 1999; Schechter & Willheim, 2009; Tronick & Reck, 2009). These features inhibit the development of active capabilities and the baby's initiative in interactions, restricting (skewing) the child's intersubjective matrix, a key factor in development (Schechter, 2017; Stern, 2004; Trevarthen, 2011).

The use of video in psychotherapy

With its roots from research in early emotional development (Beebe, 2003; Stern, 1995; Tronick, 2007), the use of video as a psychoeducational and psychotherapeutic tool (or video feedback) is a practice that has been greatly extended and protocolized and has been used in different settings, besides parent- infant psychotherapy such as family therapy, couples

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therapy including organizations (Balldin et al., 2016; Fukkink, 2008; Guedeney & Guedeney, 2010; Steele & Steele, 2018).

One of these video feedback therapeutic methods is Downing´s Video Intervention Therapy (VIT). The VIT has proven effective and cost efficient, furthermore, it has been conceptualized as a flexible way of treatment, making it an ideal tool for working in harsh conditions such as those presented in this case study (Crugnola et al., 2016; Downing et al., 2008, 2013; Lacasa & Downing, 2021; Leyton et al., 2019; Pérez-Burriel, 2018; Sadurní et al., 2018).

VIT focuses on (a) promoting maternal sensitivity (Ainsworth et al., 1974); (b) enhancing positive affection and fostering the development of mutually rewarding relationships (Bowlby, 1988); and (c) reducing disruptions in interaction and communication that affect the baby's initiative and sense of competence (Tronick & Beeghly, 2011). These conditions enable the intersubjective dialogue and the development of a motivation to cooperate among the participants (Tomasello, 2009; Trevarthen & Aitken, 2001) and highlight the importance of building a good therapeutic alliance exploring the implicit and explicit interactions between the mother, the infant and the therapist. with an approach based on attachment and mentalization (Downing et al., 2013; Fonagy et al., 1991b).

Changes in behavior and the development of new relational skills are aimed at through the analysis of everyday situations. VIT is a manualized therapy but at the same time allows a personalized approach, adapting to the specific situation where it is used..

The use of VIT in parent-infant dyads facilitates the development of parental skills. It is through the joint analysis of certain significant moments of the interaction that the caregiver might become aware of the dynamics established in the relationship. This opens the possibility of enhancing parental sensitivity to the needs of the child as well as fostering changes in their mentalizing capacities and in their interactive behavior by asking concrete questions about what is being seen in the screen, that is, being able to reflect on what is being observed (Fonagy et al., 1991a, 1991b).

VIT has been found to be a useful clinical tool for different populations, age groups and settings, for example in contexts with mothers with psychiatric disorders (Downing et al., 2008, 2013), in pediatric consultations (Facchini et al., 2016; Sacchi et al., 2020), or in child and adolescent mental health consultations (Lacasa & Downing, 2021) and has demonstrated its effectiveness in young mothers (Crugnola et al., 2018) and in the context of a children's psychiatric hospital (Leyton et al., 2019). Although all of the studies reviewed show that VIT is an efficient and effective intervention that consistently improves maternal sensitivity and parenting skills, the majority of them are preliminary, single-case, feasibility, or pilot studies with limitations such as a small number of subjects, clinical or non-validated instruments, and an incomplete experimental design. As a result, one of the most significant gaps in VIT-published research is that the majority of the findings have not been validated using external tools. Furthermore, these tools would ideally be validated for a variety of cultural settings, not just W.E.I.R.D. (western, educated, industrialized, rich, and democratic) contexts (Carlsson et al., 2020).

The current study seeks to contribute to addressing some of these gaps by using the CIB, which allows for the measurement of interactions and the identification of changes throughout the therapy process. Various research programs, using the CIB tool, have evaluated the impact of interventions on mother-infant interactions across different populations, showing that maternal sensitivity and infant involvement improve following these interventions (Feldman, 2012; Schwartz et al., 2024). Besides, the CIB appears to be sensitive to diversity from an intercultural perspective (Feldman et al., 2001). In this sense, there is a current discussion about the factor structure of the composites or group of CIB categories that conflated in a common feature, so we selected two composite proposals and evaluated the pros and drawbacks of each. According to Stuart et al. (2023) and Fahrer et al. (2024), selecting a more appropriate "composite" will become increasingly important due to sample characteristics such as culture or child age, and they advise CIB users to consider the challenges of using such an instrument in both cross-cultural and longitudinal studies.

This paper is part of a pilot study for the design of a research project on the process of change using a video feedback intervention in high-risk mother-infant dyads within a housing program for homeless families. The scope of our work at this stage is to test the feasibility of the Video Intervention Therapy (VIT) in complex situations with vulnerable and traumatized mothers, to enhance maternal sensitivity through changing interactional patterns, to improve the child's initiative and sense of agency. Furthermore, we are interested in measuring therapeutic change by using a standardized and reliable instrument. For this purpose, we have chosen Ruth Feldman´s Coding Interactive Behavior system (CIB; Feldman, 1998).

Context

This preliminary study report project on the'Use of Video Intervention Therapy (VIT) within the HAUME (Emergency Shelter for Mothers and Babies) program, is carried out in the City of Clermont-Ferrand (France). It takes advantage of the fact that the Collectif Partage et Projets (CPP) has since 2021 incorporated methodologies based on attachment

theory and mentalization to better serve both users and the team. The launch of the HAUME project coincides with the French government's initiative to meet the needs of children following the guidelines of the'first 1000 days of life' report (Cyrulnik et al., 2020). The HAUME program provides multidisciplinary accompaniment to at risk mothers and their babies. The work with VIT is a complement to the regular accompaniment offered to the users of the program. The recording sessions and video feedback sessions are special in the sense that something different is done during the visit. But the visits always address, as far as possible, the aspects of upbringing and emotional exchange of the dyad. Therefore, each visit makes it possible to work to improve the mother-and-child relationship and their overall wellbeing.

Presentation of the case

Initial assessment

The first contact the psychotherapist (CH; the second author) had with Aisha was at the end of January 2022. Aisha, 38, was about 6 months pregnant. Despite being kind, Aisha was visibly depressed. The social worker informed that she was from a country in sub-Saharan Africa and had to flee for safety, leaving behind a daughter. The story was very vague, but no further information is usually required from the applicants because of the urgency of their claim and a consideration of the trauma of many of their stories. During the time leading up to the birth of her son, despite being cared for by the psychiatric team, the HAUME program team was concerned about the severity of her depression. She expressed death wishes, but said she would never carry them out, because her baby needed her.

Matthew was born in April 2022. His arrival had a very positive effect on Aisha. Although depressed, the ideas of death disappeared, and she was more active.

Most visits were done weekly, at home, but they also could be done outside in a park or in the library. Cancellations were not rare, due to illness, overlapping appointments, or forgetfulness. At home, the visits could be combined with any activity that was being carried out: bathing the baby, cooking, cleaning the house. Aisha "carried on with her life" even though the psychotherapist (CH) was there. It is during the "brief moments" in which, little by little, they settled down that they could talk about how Aisha had spent the week, her life, and her progress in the administrative procedures that occupied a good part of her time and were a constant source of stress. It is only after this trusting relationship was established that working with video was proposed, which Aisha accepted without hesitation.

Before doing the first video, we asked Aisha to sign the written consent the following tests adapted to this psychosocial context were administered, which are intended to gather some basic information about her adverse childhood experiences and monitor some changes in relation to her well-being and anxious or depressive symptoms: ACE Questionnaire, WHO-5 and PANAS.

Through the Adverse Childhood Experiences (ACEs) Questionnaire (Felitti et al., 1998) Aisha reported the following five traumatic experiences in her childhood: physical and emotional abuse from their parents, emotional neglect, substance abuse and divorce of their caregivers. Aisha's score on the Five Well-Being Index (WHO-5; Topp et al., 2015), a short self-reported measure of current mental wellbeing, was 68, which could be interpreted as apparent good current well-being given that the minimum punctuation is 0 and the maximum is 100. We also studied both positive and negative affect using the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), which revealed unexpected normal scores (Positive affect: 37; Negative affect: 32) in light of Aisha's difficult situation. We must be cautious about interpreting these findings because, aside from the biases of social desirability and context, we doubt Aisha fully engaged in answering the tests.

Throughout the present study, Aisha applied with the assistance of the team's Social Worker for a long stay permit in France. This is in fact a source of chronic uncertainty, since, despite doing everything in their power, the process can take months and the result is unpredictable.

Formulation of the case

The general objectives of our psychotherapeutic work with Aisha and Matthew coincide with those proposed in this study, that is, to promote maternal sensitivity, infant's initiative, as well as shared enjoyment (Bowlby, 1969).

VIT interventions

First video

- *Date: May 18th, 2022. Matthew aged 1 month. Duration: 03 min, 48 s.*

General context

Aisha baths one month-old Matthew in a tub. The environment is suitable, tidy and clean. Aisha shows mastery in bathing Matthew, it seems that she is focused in cleaning

the baby, handling him roughly, and seemingly unaware of the baby´s increasing signs of discomfort.

Key video moments

0:00–0:50– During the first minute we highlight the safe handling that Aisha has and the confidence that in this way she can transmit to her baby. In addition, we acknowledge how she talks to him and explains what is happening. Towards the 0:50 s, we capture an image of what we chose as showing a "good moment": a gaze exchange between Aisha and Matthew that suggests a good intersubjective connection.

00:50–02:30– Matthew begins to weep, and we notice a change in Aisha's responsiveness. Matthew cries vigorously and she doesn´t respond to his cry, Aisha she remains concentrated on washing her son, withdrawing from the interaction. She stops smiling and makes no expression. She doesn't speak either.

02:30–03:48– While Aisha puts Matthew in a face down posture to rinse the soap off him, he seems to feel a certain relief from tension. At minute 02:40 Aisha resumes her vocalization. Her participation continues for the rest of the video, while Matthew participates less.

Analysis of the video

The analysis of the video was done by the whole team (MP; EM; CH; JS) using the VIT's categories as a common frame. In this first video, in which CIB was not used, we can see that the lack of response of Aisha in the moment of distress as she leaves Matthew alone to deal with a difficult situation (Beebe, 2003; Mazet et al., 2002). This lack of interpersonal contingency could be explained in two ways. It may be either a cultural parenting style in which mothers seek not to attend to infant's cries or behaviors they find unsuitable (Johnson et al., 2013), or it could be Aisha's difficulty in regulating her own stress response in face of her son's distress, withdrawing from the interaction (Beebe et al., 2020; Downing, 2015; Fraiberg et al., 1975; Liotti, 1992). We can hypothesize that, as many victims of trauma, Aisha can be easily pushed off balance by certain stimuli, as the cry of her baby. The baby's crying can trigger in her a particular withdrawal behavior that we observed only in this situation That might be understood as a dissociative response because of unprocessed previous experiences that we can relate to her adverse and traumatized childhood experiences, showed by her ACE score (Porges, 2011; van der Kolk, 2014). The stressing experience of the bath activates Matthew' attachment system, an inborn system designed to produce behaviors that call for help in moments of distress. The washing behavioral routine of the caregiver did not change, but the mother lost the emotional and intersubjective contact with the baby.

Video intervention

This first video allowed us to show her all the good things she did. Two weeks after making the video, we showed it to Aisha from beginning to end and ask for her impressions. CH: What do you think of the video? E: Nothing, good…. I think he doesn't like bathing very much… CH: Yes, Matthew cried, anything else? E: No, it's all…, CH: We saw some things I would like to share with you. For example, this image (CH showed the captured image). Aisha is clearly surprised and says, "*we are happy*". In this way we try to reinforce the shared positive experience and provide a positive image to Aisha that can be used as an alternative to the more negative one of her depressive states. The experience she has handling Matthew is evident and we also pointed it out to her. Although culturally speaking, it is a handling of the Baby that might seem rough from a western perspective, validating the confidence with which she manipulates Matthew gives Aisha a "success" and "validation" that lowers her anxiety. We also pointed out the good contact they have at the beginning, how they "talk" to each other and how she explains what is happening. Showing this sensible and coordinated sequence between them, together with the image in which they looked into each other, is our first objective, since it is what we consider a "good moment". As a team we decided not to make explicit the moment of disconnection between them. While of paramount importance, we consider that reinforcing the importance and enjoyment of connections would be a better strategy. Aisha was clearly motivated after seeing the video and listening to the positive remarks. Working with the positive exceptions or "good moments" and reinforcing the therapeutic alliance instead of treating the signs of trauma in this case, shows how VIT can be personalized. In this way we were able to continue exploring her present and previous history and her own upbringing in the following visits.

Second video

- *Date: June 28th, 2022. Matthew aged 2 months. Duration: 02 min., 00 s.*

General context

The second video takes place in Aisha's bedroom, just over a month after the first video. Matthew is lying in bed and his mother is sitting right in front of him. Her posture is optimal for an exchange and there is a clear interaction between

them. The general atmosphere is positive and Aisha's enjoyment with her baby is clear.

Key video moments

0:00–0:50 – Matthew seems to be more interested in seeing the psychotherapist (CH) than interacting with his mother. His gaze is directed at me. However, Aisha speaks affectionately to him and seeks to attract his attention, to the point of turning his face with her left index finger (0:11). She manipulates him, kisses him, and settles him back on the bed paying little attention to the infant's rhythm.

00:50–01:22 – Aisha continues to manipulate and direct Matthew' attention, but she has taken more distance. She is sitting and not leaning over him. The exchange provokes smiles in Matthew and Aisha looks more relaxed in this new arrangement.

01:22–02:00 – During this part of the video, we can see a change of pace in the mother-baby exchange. Aisha speaks to Matthew more slowly, and he responds to the movements that his mother offers him, but there is little that the mother follows. Matthew has few opportunities to initiate the exchange. Aisha seems to be able to be sensitive to the baby's signals, but she has a hard time respecting his initiatives.

Analysis of the session

We noticed the marked exchange of smiles and coordinated movements between Matthew and his mother as part of the positive exchange, but we also perceived a bit of intrusion on the part of Aisha, leaving little "space" for Matthew and "saturating" his field of attention. Aisha seemed to be doing "excessively" some of the recommendations we had talked about from the first video. The analysis of Matthew's initiative was done using the Autonomy category, showing in Aisha some difficulties in acknowledging her son's exploratory, intersubjective contact and play needs. Although Aisha makes explicit efforts to establish contact with her son, she seems to have a hard time noticing the small gestures Matthew makes to regulate or establish a "good fit" between them. Matthew seems quite capable of connecting his gaze and his gestures with his mother, but is overridden by her need for contact thus lowering the contingency of the exchange. We recognize this could be an example of a shared intentionality disruption, since Matthew' early signs of initiative to connect and disconnect are seen but overridden by Aisha's own interests and agenda.

Video intervention

The second video allowed us to continue reinforcing the positive moments as well as drawing attention to the negative patterns, although indirectly.

A frozen image (01:35) showing an exchange of smiles between Matthew and Aisha, allowed us to reinforce the positive connection Aisha was favoring between herself and Matthew. Then we saw the video from beginning to end. Aisha didn't comment much upon watching the video, but the therapist (CH) was able to highlight how important it was for Matthew to see how happy his mother was with him, as well as how pleasant it was to hear the "musicality" with which she explained what they were doing or were going to do. This continued to reinforce Aisha's continuous participation in the exchange not only with her "doing" but also with their "musical presence". The negative pattern, in this case, Aisha's "intrusive" behavior, was addressed indirectly, that is, by exploring Aisha's perception of her son's autonomy and initiative, and also reinforced in subsequent visits: CH: Look, that seems to call Matthew' attention…; CH: Although he doesn't speak yet, Matthew does seem to tell us what he wants!

During these visits, other aspects "suggested" by the VIT analysis of the video are also explored, such as how cultural parenting practices and aspects of Aisha's personal life influence her interactive behavioral patterns. As mentioned above, this is done little by little, in a very delicate manner, since Aisha is very refractory in her communications.

Third video

- *Date: August 3rd, 2022. Matthew aged 3 months Duration: 01 min., 49 s.*

General context

The third video takes place in the bedroom of Aisha, who is lying with Matthew on top of her. The overall exchange between them is playful, both Matthew and Aisha show signs of shared joy and Aisha seems to take more into account Matthew' responses to adapt subsequent interactions.

Key video moments

00:00–01:15 – The first part of the video shows Aisha and Matthew interacting in different ways. First Aisha "assists" him to walk on top of her, then sitting him and supporting him on her thighs. She then tickles his legs before making him walk again. Both show signs of shared joy.

01:15–01:49 – At minute 01:00 approximately, Aisha makes Matthew walk again, who accepts the activity, but towards minute 01:05 he begins to arch and make noises of displeasure. Aisha continues to stimulate him but suddenly (min 01:11) puts him down on her chest and changes the rhythm and intensity of the interaction (min 01:14). Once Matthew is down on her chest, she sings a song while patting him on the back.

Analysis of the video

This session offered us many opportunities to show Aisha the exchanges and shared enjoyment between her and her baby. We also noticed the subtle signs that might indicate to Aisha when Matthew was enjoying the activity and when he did not.

It is worth noting that in this video we could explore some important changes regarding Aisha's connection with Matthew. She seems to better notice some of Matthew' subtle changes in response to her interventions, some of which he enjoyed better than others, and adapting her own response accordingly.

Video intervention

The third video allowed us to focus on Aisha's ability to notice some of the signs of discomfort of Matthew in the interaction. We could argue that Matthew's withdrawal behavior suggests his need to be an agentic participant who may modify the interaction.

This time it has a positive resolution because Aisha changes the way she was doing the interaction. From the directive way of acting to a more intersubjective way of interacting.

Following the model proposed by Downing, we reinforce the positive moments of interaction, but we also invite explicit mentalizing.

By asking Aisha CH: "what was going through your mind at the time of changing the activity with Matthew?" (min 01.14). She replied.

E: "Oh, I just noticed that Matthew wasn't liking that, and perhaps he wanted to get some rest".

CH: Oh, great! How did you realize?

In this way, the third video allowed Aisha to practice turning "the inner movie" outward, that is, to explicitly mentalize both her baby and her own behavior, as well as better noticing the moment-to-moment changes in the ongoing relationship and highlighting the "good moments".

In other words, we are back to the positive exception, a moment in which the mother's mentalizing activity is chosen to highlight maternal competence, noticing its emergence. This paves the way to unravel the stalled process and repair the mismatch, allowing for the emergence of new ways of interacting (Tronick & Beeghly, 2011).

Furthermore, this mother, although she is not explicit in her comments, nevertheless, her behavior shows signs that she is beginning to make hers what she has been working with the therapist.

Measuring changes in the interaction

The recordings of the sessions were analyzed using the Coding Interactive Behavior system (CIB; Feldman, 1998). The CIB is a widely used instrument to assess social interactions between two or more partners. CIB uses a variety of social contexts and observational paradigms (e.g., free play, meal time, school assignments) and has been used in several published studies of healthy and high-risk populations as well as in clinical trials (for a review of the results from studies using the CIB, see Feldman, 2012). We have codified the 2nd and the 3rd video. The first video's results were not analyzed since Matthew was only one month old, and the version of the CIB for neonates (Newborn) has various characteristics that make comparison problematic. For the comparison of the results of the second and third sessions we used the CIB for infants. Of the 33 codes that are evaluated at these ages (between 2 and 12 months), 18 evaluate the parent, 8 the baby, and 7 evaluate the dyad.

Ruth Feldman's Lab Center for Developmental Social Neuroscience trained and certified the CIB's primary coder (MP) as a reliable coder. The first coder (JS) trained a second coder (JS), who codified the same videos. In 87% of the cases, the two coders agreed. They found four differences greater than one point and came to an agreement.

Before grouping the items categorized into constructs or composites, we have chosen eight categories that show the most important changes of the dyad from the second to the third video. As shown in Fig. 1, the category "parent-led interaction" dropped from 4.5, almost the maximum score of 5, to 3.5; and conversely, the category "infant-led interaction" increased from 1.5, almost the minimum of 1 point of punctuation, to 2.5 points. These tiny but significant changes in these two categories, that can be related to the maternal directiveness, goes parallel to the reduction of "parent overriding—intrusiveness" from a 4 to a 3 score, matched with an improvement of the parent acknowledging (from 2 to 3) and the reduction of the parental anxiety (from 2.5 to 1).

Focusing on the child's categories, it is interesting to attend to the reduction of "child withdrawal" (from 4.5 to 2) that goes together with an improvement of "child's gaze" (from 2 to 4) and "child positive affect" (from 1.5 to 2.5).

Following the recommendations of Stuart et al. (2023) recent work, we aggregated the CIB items using both Ruth

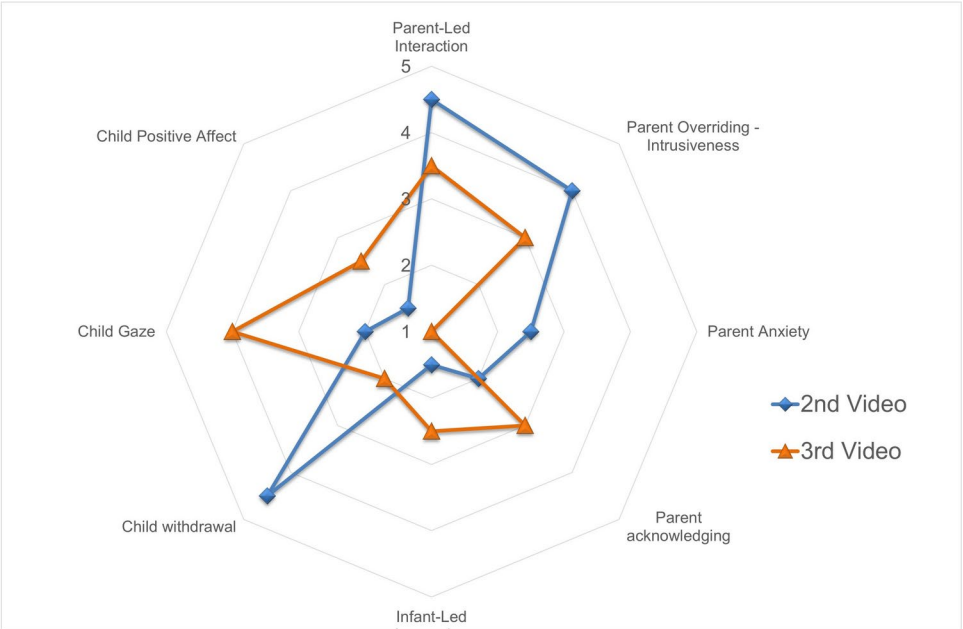

Fig. 1 Categories that show the interactional changes from the 2nd to the 3rd video

Feldman's theoretical model for composites and their study's data-driven 4-factor Exploratory Factor Analysis (EFA) model (see Table 1). This allowed us to test our hypotheses and visualize the progress of the changes in the interaction made during the sessions from these two models, as well as compare the outcomes.

Results from the theoretical model

As seen in Fig. 2, the first three composites from the Ruth Feldman Theoretical Model, which we may associate with an improvement in interaction, show a positive evolution from the second to the third video. The following three composites, on the other hand, which would respond to issues and negative elements of interaction, see a decrease in their ratings. These overall results taking all precautions, would suggest that the video intervention (VIT) had a positive effect on the interaction in this case. Let's take a closer look at these scores.

Focusing on the priorities set by the VIT objectives discussed in the previous section, we can check how (a) maternal sensitivity, which we can relate to the results obtained from the "Parental Sensitivity" composite, has a small change from an average score of 2.9 to one of 3.3 (from a range were the minimum punctuation is 1 and the maximum 5); (b) positive affection, that could be related inversely with the “Dyadic Negative State” had a slight increase too, from the average punctuation of 3.3 to the 2.8 obtained in the 3rd video (from 2 to 2.3 average point); and (c) the “Child involvement”, which might be connected to the infant’s initiative and sense of competence, improves considerably, rising from 2.4 to 3.2.

Moreover, the "child withdrawal" does make a significant change, and it drops from 3.3 to 2 (although it is not in the desirable score, which would be 1), and that opens the possibility of an intersubjective exchange, therefore "Dyadic reciprocity" goes up a little (from 2 to 2.3), although “Dyadic negative states” is still very high having lowered its intensity from a score of 3.3 to 2.8.

Results from the 4-EFA model

Figure 3 depicts the 4-EFA model, which likewise produced the positive findings stated above. Let us therefore look at the details. “Child Engagement” has a similar increase as we found in “Child Involvement” composite, from 2.3 to 3 score. In a similar vein, “Maternal Sensitivity” also increased from 2.3 to 3.2, akin to “Parental sensitivity”.

We could also find similarities between “Maternal controlling behavior” from this 4-EFA model and “Parental intrusiveness” that decrease in both cases. The former from a very high punctuation 4.3 (0.7 points of the maximum) to 3.3, and the theoretical composite from a 2.5 to 1.8. The differing punctuations are due to the fact that in the Theoretical model, the "overriding" and "forcing" high scored items are in conflict with the "Parent Negative Affect", "Hostility" items, which are all rated with a minimum of 1 in this case. Furthermore, it should be noted that in the 4-EFA model, the Parent-led and, more importantly, the Child-led (reversed) components are loading in this composite. Aside from that, it is worth noting that the "Maternal social withdrawal” remains low and does not differ between the two sessions. We have to bear in mind that this composite looks

Table 1 Comparative and suggested correspondence of the CIB composites with the items that weighted each factor from the original theoretical model proposed by Ruth Feldman (2012) and the Exploratory Factor Analysis Model projected by Stuart et al. (2023)

Theoretical model		4-Factor EFA Model	
Parental sensitivity (10 items)	Acknowledging (core item), Imitating, Elaborating, Parent Gaze, Positive Affect, Vocal Appropriateness, Clarity, Appropriate Range of Affect, Resourcefulness, Affectionate Touch and Parent Supportive Presence	Factor 1, "Maternal Sensitivity" (9 items)	Dyadic Adaptation, Resourcefulness, Consistency of Style, Parent Supportive Presence, Overriding-Intrusiveness (reversed), Acknowledging, Appropriate Range of Affect, Anxiety (reversed), and Tension (reversed)
Child involvement (6 items)	Child Initiation (core item), Child gaze, Child Positive Affect, Alert, Fatigue (reversed), and Child Vocalization	Factor 2, "Child Engagement" (13 items)	Dyadic Reciprocity, Child Positive Affect, Child Gaze, Constriction (reversed), Alert, Initiation, Fluency, Child Vocalization, Withdrawal (reversed), Imitating, Negative Emotionality (reversed), Elaborating, and Fatigue (reversed)
		Factor 3, "Maternal Social Withdrawal" (5 items)	Parent Depressed Mood, Parent Positive Affect (reversed), Enthusiasm (reversed), Vocal Appropriateness (reversed), and Parent Gaze (reversed)
Parent intrusiveness (5 items)	Overriding (core item), Forcing, Parent Negative Affect, Hostility and Parent Anxiety	Factor 4, "Maternal Controlling Behaviour" (3 items)	Parent-led, Child-led (reversed), and Forcing
Dyadic reciprocity (3 items)	Reciprocity (core item), Adaptation-Regulation, and Fluency		
Child withdrawal (2 items)	Negative Emotionality and Withdrawal		
Dyadic negative states (2 items)	Constriction and Tension		

into negative characteristics of maternal interaction that did not appear in the sessions analyzed of this dyad.

Discussion and further directions

The purpose of this single-case exploratory study was to investigate the feasibility of using VIT in the context of psychosocial interventions in complex high-risk settings through the use of CIB system as a tool to evaluate mother infant interaction (changes). Based on this first experience, the VIT appears to be a feasible therapeutic module for treatment in complex situations.

The VIT implementation showed us that the video feedback allows the articulation of both the psychotherapeutic and psychosocial interventions. That is, not only the use of video informed the psychologist direct work with the patient in the video intervention sessions, but also the other interventions that the psychologist did between the different VIT sessions were based unintentionally on the clinical research team's video analysis work (MP, CH, EM & JS). Therefore, we consider that the information provided by VIT has an impact on the entire process, that is, it adds a "framework" to the therapeutic process, which in this case suppose the whole psychotherapeutic and psychosocial support and interventions process.

Additionally, we find that VIT has had an indirect impact on the attention of other direct care professionals who have been involved in this case. This intervention modified the direct care staff's attention and awareness of the implicit social signals and relational bonds set not only between Aisha and Matthew, but also with other families they assisted. However, since it was not part of the initial research design its effect has not been assessed, so we understand that it would be necessary to include it in the future design of the research project. That is, we believe that it is necessary to explicitly and systematically incorporate VIT inputs and reflections with the multidisciplinary team involved in the case into the intervention design (e.g. by incorporating a team work session with the video).

Based on the previous research discussed in the introduction (Mazet et al., 2002; Daniel S. Schechter, 2017; Trevarthen & Aitken, 2001), the research team was interested in looking into the constraint on the infant´s (inter)subjectivity and the compromise of the infant´s initiative as a key element to understanding and intervening with these mothers overwhelmed by their current situation of extreme social vulnerability and their personal and family history full of suffering and trauma (Burtchen et al., 2022). This preliminary study would add to what we are seeing in other cases in that specialized service. Although no hostile behaviors or a clear and sustained affective flattening or clear signs of

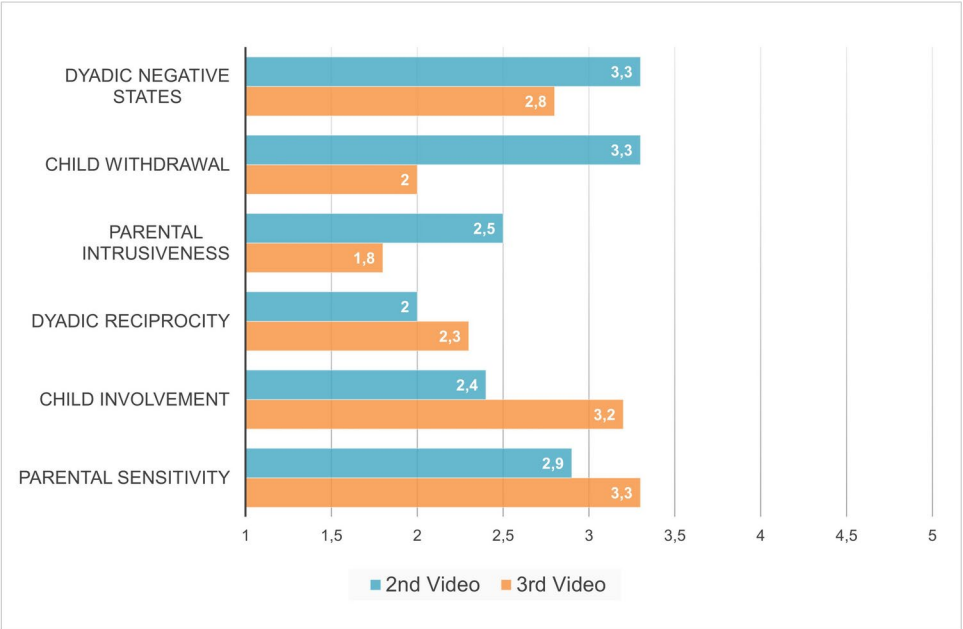

Fig. 2 Composites original theoretical model from Ruth Feldman

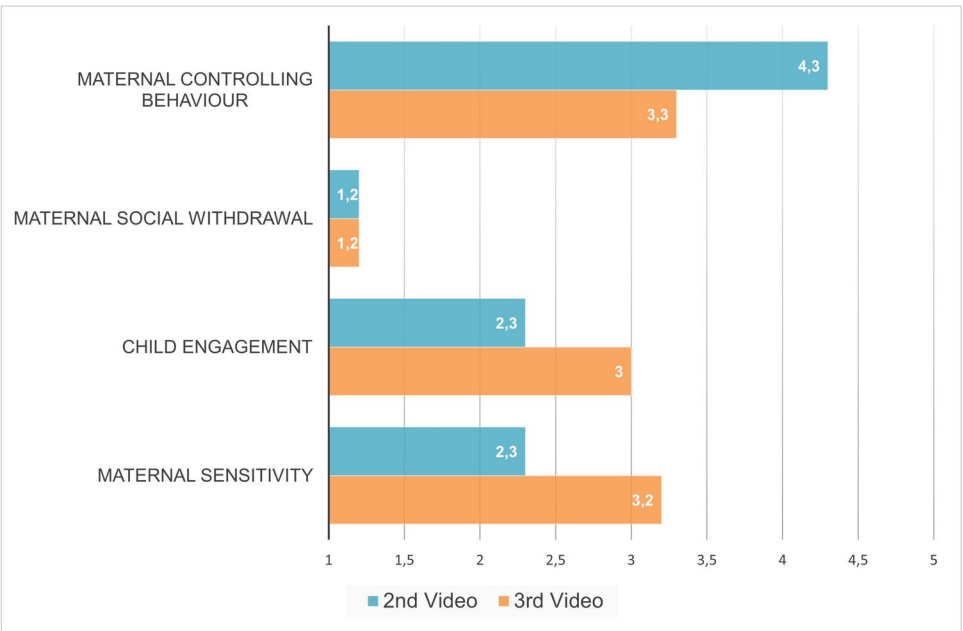

Fig. 3 Results from the 4-EFA model

anxiety appear in the analyzed videos of Aisha, the lack of maternal sensitivity and the need to control the interaction with the baby, causes high levels of directiveness and intrusiveness that result in affective disconnection and avoidant behaviors in Matthew. Furthermore, it should be noted that this situation prevents the emergence of any initiative or self-agency on the part of Matthew, inhibiting his motivation to explore both the physical and the intersubjective world, and preventing him from learning from these experiences.

This case study may illustrate how interventions that focus on changes in interaction, such as those proposed by VIT, allow us to see how when maternal intrusion decreases, the baby's autonomy and initiative increase, avoidant behaviors decrease, and in turn, the intersubjective connection grows. The intervention's challenge is to achieve these changes in the baby's autonomy without affecting mother's self-confidence (her parental competence as a mother) considering that they are suffering from several psychological distress (untreated trauma, anxiety and/or depression) and feeling overwhelmed by her vulnerable and uncertain social and administrative situation.

One way to achieve this is to personalize the intervention. In this case, the personalization of the VIT has given preference to the consolidation of the therapeutic alliance

and, instead of treating the signs of trauma, to work with the positive exceptions. VIT allows the psychotherapist or therapeutic team to consider the priorities to be addressed in each session, adapting the method to the case and the context of intervention.

Concerning the second goal, we agree with other studies on the usefulness of the CIB as a reliable and accurate tool that allows to measure and analyze changes produced in the interaction (Feldman, 2012). It should be mentioned that in this study we have used two grouping models of the CIB categories, the original theoretical model of Ruth Feldman (2012) and the proposal based on data from Stuart et al. (2023). Both models have showed the existence of maternal sensitivity improvements that can be attributed to the use of video intervention, and both are useful for "summarizing" the changes produced. Although both models provide this concordant information, we can highlight some differences in this paper. The "Child Withdrawal" and "Dyadic reciprocity" composites in Feldman's theoretical model provide us with information that we believe is very important to consider in cases like Aisha, but these composites don´t form part of the second model. On the one hand the composites "maternal sensitivity" and "maternal controlling behavior" of Stuart et al.'s (2023) 4-F model provide more precision than analogous composites in Feldman´s theoretical model, but on the other hand "maternal social withdrawal" does not provide any relevant information in this case. As suggested by Feldman (2012) and Stuart et al. (2023), this leads us to the conclusion that it could be important to design composites that are more suitable for the specific population we serve. In this preliminary study, CIB not only offered the systematization required for research, but was also used as a clinical tool, providing insights that had been integrated into the interventions.

Moreover, the videofeedback technique (VIT) and the interaction measurement system (CIB) seem to complement and reinforce each other, improving the team's view of the video analysis and intervention.

Daniel Stern (1995) proposed that the clinically significant aspects of mother-infant interactions are the co-regulatory events as described in this report. VIT techniques enhance the understanding of these dynamics by focusing on the intricate details and nuances of the ongoing interactive behaviors. Furthermore, this study is in line with a growing body of research evidence concerning early interaction (e.g., Beebe & Steele, 2013; Crugnola et al., 2018; Downing et al., 2008; Feldman, 2007; Tronick & Reck, 2009). In our case we were able to see measurable improvements in the interaction, assessed with the Coding Interactive Behavior (CIB) scale, in a therapy context marked by overlapping challenges such as trauma, mental health disorders (e.g., depression, anxiety), limited education, linguistic barriers, and socioeconomic disadvantages. Notably, these improvements can occur even when significant changes in other adverse conditions do not take place.

On a practical level, frontline workers find themselves in great need of accessible and cost-efficient methodologies that allow work with multicultural and/or high-risk populations. This study shows VIT can not only provide a benefit to the parents and their children, but can also play a crucial role in promoting the team's rapport, for example by ensuring the use of shared linguistic terms related to the case. This can also enhance the effectiveness of intervention.

From an educational point of view, the focus on motion imagery of mother-infant interactions encourages reflective practice among frontline workers, enabling them to move beyond potential misconceptions about their patients' capabilities or attitudes and adopt a more nuanced and empathetic perspective.

This feasibility study constitutes a preliminary effort to provide data to support decision-making in complex scenarios involving high-risk mother–child dyads. Nevertheless, as a single case study it only offers limited progress toward addressing the broader objective set at the outset of this research. Questions remain regarding the mechanisms of change, as well as how better to understand and sustain these improvements. Further research is needed to examine a wider range of cases, as well as a wider range of treatment.

Future investigations could focus on case series and delve into the processes that break cycles of inadequate interactional patterns, emphasizing both successful and unsuccessful outcomes of psychotherapeutic video interventions. Such research should of course also be evaluated using external, objective tools, such as CIB, in order to ensure the development of robust guidelines for best practices.

Conclusions

- Video Intervention Therapy appears to be a feasible intervention and seems to be a therapeutic module that is suitable for treatment in complex situations
- In this case study we see that a lack of maternal sensitivity and the need to control the baby's interaction, expressed as an elevated amount of directiveness and intrusiveness, ultimately results in affective disconnection and avoidant behaviors in the baby. This situation diminishes the baby´s capacity to express initiative, constraining its motivation to explore both the physical and intersubjective worlds and interfering with its development and attachment bond formation.

- In this case study we observe how interventions that focus on interaction, such as VIT, can change the course of these interactive behavior patterns.
- The CIB, on the other hand, was a useful tool for analysis of the interactions because it allows a precise and reliable measurement of changes.
- Moreover, the use of the CIB complements the observation and therapeutic planning capabilities that are usually used in VIT

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Data availability CIB raw data are available on request to the first author. Video recordings are not publicly available to preserve individuals' privacy under the European General Data Protection Regulation.

Declarations

Ethics approval and consent to participate This pilot study was conducted in accordance with the ethical standards set forth by the American Psychological Association (APA) Code. As a preliminary exploration preceding a larger investigation, all aspects of this study were guided by the ethical principles of the APA. Upholding the well-being, confidentiality, and autonomy of participants was paramount throughout the research process. Strict adherence to ethical guidelines ensured participants' informed consent.

Competing interests The authors have no relevant financial or non-financial interests to disclose.

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