www.jpnim.com Open Access eISSN: 2281-0692
Journal of Pediatric and Neonatal Individualized Medicine 2023;12(1):e120125
doi: 10.7363/120125
Received: 2022 Mar 18; revised: 2023 Jan 07; rerevised: 2022 Jan 26; accepted: 2023 Jan 26; published online: 2023 Mar 23

Original article

A tool to observe the phenomenology and aesthetics of primary relationships: the "dance steps" of reciprocity between caregivers and infant/child – Pilot validity study

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Abstract

This study addresses the complexity of caregiver-infant/child interactions from the theoretical frame of Gestalt psychotherapy and the field of application of Pediatric Psychology. Based on a previous empirical study on the process of reciprocity in caregiver-infant/child interactions (Spagnuolo Lobb, 2016), the authors have worked on the construction of an observational tool to look at the co-creation of meaningful experiences, switching the focus from the child to the "dance" of reciprocity between caregiver and

infant/child. Considering the contextualization in the field of Pediatric Psychology, this pilot study aimed to test the tool's application with caregiver-preterm infant dyads, but exclusively referring to moderately preterm birth condition and with lack of disability or in any case serious evolutionary compromises.

The study measured: 1. the content/construct validity of the tool, 2. its internal reliability, 3. its "sensitivity" to grasp the changing of the relational "dance" in the transition from one developmental step of the infant to another, regarding the times considered (between 6-9-12 months of corrected age), 4. co-occurrences between the behavioral flows of the infant-caregiver dyad in the 3 developmental stages considered. 32 expert psychotherapists were involved in measuring the instrument's validity, and 13 caregiver-infant dyads were observed in their interactions at 6-9-12 months of corrected age of the infant. This pilot study promises to define – both for preventative and psychotherapeutic interventions – specific parental competencies for the infant's neurodevelopment in the first year of life.

Keywords

Gestalt therapy, Pediatric Psychology, caregiver-infant/child reciprocity, domains of relational intentionality, "dance steps" model.

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How to cite

Spagnuolo Lobb M, Perricone G, Iacono Isidoro S, Di Pasqua MM, Marotta S, Fontana V, Polizzi C. A tool to observe the phenomenology and aesthetics of primary relationships: the "dance steps" of reciprocity between caregivers and infant/child – Pilot validity study. J Pediatr Neonat Individual Med. 2023;12(1):e120125. doi: 10.7363/120125.

Background

This study emerges from the relational movement that, since the '70s, has brought evolutionary theories to address their attention to the complexity of caregiver-infant/child interactions. The theoretical frame is Gestalt psychotherapy, and the field of application is Pediatric Psychology.

During the '80s, Gestalt psychotherapy started to develop its relational theory of self, that considers the experience of contact-making between organism and its environment [1-3], therefore between infant and caregiver, as a procedural co-creation. This relational turn was influenced by infant research that, in the '70s, had shifted the focus from the infant's mind development to the mother-infant dyad, an interactive field with its peculiar structure [4-7].

The attachment theories (which stem from Harlow's, Bowlby's and Ainsworth's studies) place the "need for the other" at the core of the regulatory system of the infant. The infant learns "ways of being-with", rather than single behaviors. Daniel Stern has described how the infant actively engages in the search for stimuli and for the other, and the caregiver-infant dyad must maintain continuity of organization with regard to their self-regulation [6, 8]. In line with this perspective, Gestalt therapy describes "intentionality of contact" as the purpose of the self; and looks at the procedural mutual movements with which caregiver/infant engage themselves, co-creating a phenomenological field from where a sure sense of self can emerge [2, 9].

These studies on the emotional regulation of the caregiver-infant dyad are supported by neurobiology and, in particular, by Siegel's studies [10], according to whom the experiences of the infant's first 2 years are encoded with an implicit memory that involves specific brain structures.

In many studies, the idea of co-creation of the actual contact experience between infant and caregiver has become crucial [11]. In other words, we can see infant-caregiver interactions as a complex system of perceptions and movements in their phenomenological field. Therefore, to observe their interactions, we need to orient ourselves in a complex situation, where it is essential to look at reciprocity, the mutual act of moving towards the other in a reciprocal "dance".

In this co-creation of the experience of contact between caregiver and infant, movement is fundamental: it embodies the phenomenological perspective of intercorporeal experiencing [12] and of the intentionality [13], of the now-for-next, the being excited-towards [9]. Also, the concept of reciprocity is important: when we focus on the co-creation, we are interested in the "dance" between caregivers and infant, which includes the notion of

synchronicity [14]. We look at the co-regulation of movements, at how the one creatively adjusts to the other, a completely different paradigm than when we look at the individual infant/child [15].

This glance at co-creation and reciprocity has several implications both for clinics and for psychopathology. Infant/child disorder is a suffering of contact capacities, a mortification of the tension-towards the other, or a lack of recognition by the significant other, rather than the impossibility of fulfilling a physiological or psychological need. Consequently, the clinical intervention aims to support the undeveloped tension towards making contact with one another in the caregiver-infant dyad [9] and observe this tension in the bodily movements of both the infant and the caregiver, in their physiological being in contact (like in their posture and breath). Both assessment and psychotherapy work more efficiently if focused on the caregiver-infant dyad, on their contact system, as a self-regulating whole [16].

This study provides insights on a primary task of assessment and psychotherapy with children: to foster the processes of secure attachment or, in the here proposed language, to support the co-regulation between caregivers and infant, that is the spontaneity of creative adaptation.

While there are observational grids about the behavior of infant-mother dyad, there are not observational tools of the "intentional dance" between them, of the relational regulation of their intentional movements.

This study aims to validate an observational grid of the phenomenology and aesthetic of their reciprocity, useful for assessment and for clinical interventions.

The contribution of Pediatric Psychology among reference models

In continuity with the frame of the here mentioned theories and models about the relevance of the co-construction of a primary relationship based on reciprocity, intentionality, stability, and safety (and one may add protection) [17], the contribution of Pediatric Psychology [18-25] has been a crucial part of this work. This disciplinary approach – whose object of study is the development of infant/child's health, both in typical and atypical conditions – identifies in the "dance steps" model [2, 26, 27] a potential for transitions [28] or evolutionary transformations and changes by making use of an evolutionary/clinical expertise. These changes are transverse to a relationship (such as the one activated by "dance steps") which may evolve as a contact relationship (as commonly referred to in the reference models of the clinical approach). Indeed, Pediatric Psychology pinpoints and employs models such as "dance steps" of reciprocity. These allow us to diagnose relational phenomena functional to evolutionary transformations and also promote such transformations. In this sense, the "dance steps" of the reciprocity model become one of the conditions guaranteeing the well-being of the evolutionary trajectory on the neuropsychological plan of the domains [29]. The domains which appear to be involved in the model of "dance steps" are: identity, emotions, and relationships [30-33], and are considered in their specific modularity. The domains' multidimension refers to cognitive factors, development of routine, specific scripts, such as those related to the construction of self-image, exchanges, associations between primary emotions and events; furthermore, factors related to the specific reference conduct of single domains have to be found in such modularity. It is noteworthy that, on the level of maturation and development, some brain structures' functions are involved by such modularity in terms of multi-modularity and interconnections: the amygdala, with its sentinel function – which finds and directs the traces of the experience of threat and danger in the primary relationship; the frontoparietal and hippocampal networks mapping the experiences; and, finally, the medial cerebral structures associated with attachment, self-awareness, empathy towards others, and insights [32]. These domains, activated by "dance steps", orient the contact experience in the primary relationship as an experiential condition. This experience becomes, in Pediatric Psychology, the infant/child's possibility of finding cognitive, emotional and relational nourishment; protection for being "that" infant/child; hiding, as a strategic withdrawal; spirituality, as the possibility of living an internalized intimate dimension; of going beyond the here and now; of living experiences of producing new discoveries, but also of tuning in with the other/others [34]; and, an experiential condition that allows us to contain the risk posed by adverse experiences [35].

Thus, "dance steps" become opportunities functional to the development [36, 37] of mentalizing and internalizing positive experiences of the self and the other, as well as of the

relationship itself. Such mentalizations are then tools to go through potential evolutionary crises [38-40]. These can be regulatory, as often expected during growth, but also non-regulatory, as caused by critical events – in this case, mentalizations allow the infant/child to answer the evolutionary transformation tasks that such a crisis may present. Last but not least, the role of prevention played by "dance steps" concerning specific disorders must be considered.

The co-construction of the primary relationship via the 8 "dance steps" seems to construct, in Pediatric Psychology, that flow of contact experiences functional to the development of an experiential self [41], a self without self, not in the sense of a lack of early identity factors such as self-image; but a self which, thanks to that cognitive, emotional and relational movement brought about by "dance steps", creates a primary condition for the dynamics of evolutionary transformations in early childhood. Therefore, Pediatric Psychology sees, in the contact experience promoted by "dance steps", a superordinate strategic motivational system between predisposition, phenomenological experience, epigenetic contribution and, also, possible exposure to environmental factors likely to have caused a mutation in the gene functions' expression [42]. For example, when the co-creation of a contact experience becomes reparative, rehabilitative [22], concerning adverse conditions brought about by specific genes (e.g., the existence of a rare or chronic condition, etc.).

The "dance steps" model

Based on a previous empirical study on the process of reciprocity in caregiver-infant/child interactions [2], we have worked on the construction of an observational tool to look at the co-creation of meaningful experiences, switching the focus from the infant/child to the "dance" of reciprocity between caregiver and infant/child.

Referring the reader to the publication mentioned above for a more exhaustive knowledge of the study, we want to outline just two aspects that are relevant to this research. One is the idea of "dance" (the model is called the "dance steps"): in line with contemporary studies of neurosciences [43], intersubjective and relational psychoanalysis [7, 8], the "dance" includes the feelings and the movements of both members of the dyad (caregiver and infant/child). The other important concept is that of "dance steps", described as mutual procedural spontaneous actions of contact between the infant/child and their caregivers, every time aimed at fulfilling a specific intentionality of contact [2]. They ideally show a sequence of contact [1], but that does not mean that all the steps are always present in contact-making, nor that they always appear in the same order. Each "dance" is unique; it might even be a "dance" with no recognition of each other or no sense of reaching each other, but it is nonetheless a "dance" that can be observed or lived.

The criteria that have led us to describe contact in "dance steps" are of an aesthetic and phenomenological nature: the spontaneity, sensitivity, vitality, grace, and brilliance of the contact between caregivers and infant/child [1, 44, 45]. The observation focus switches from the infant/child to the phenomenological field s/he is in, and to the reciprocity, in other words the reciprocal act of moving-towards-the-other that characterizes development. Our focus is not on the infant/child's feelings *per se*, but on how the infant/child and the caregiver experience their being with the other and modulate their contact-making. "Dance" is the most appropriate concept for a phenomenological and aesthetic approach toward contact, like Gestalt therapy. The "dance steps" model has been developed by Spagnuolo Lobb [2, 26, 27] as a phenomenological (based on experience as it is intentioned in the immediate future), aesthetic (based on the knowledge given by senses) and a field-oriented way to look at caregiver-infant/child reciprocal movements in meaningful interactions. In accordance with this perspective, the following criteria have been used: grace (good form), rhythm (emotional regulation), and fluidity (movements) [44]. Thanks to these criteria, we can observe how much spontaneity or anxiety the infant/child and their caregivers experience in their contact-making.

Previous publications have extensively described the "dance steps" [2, 26, 27, 46]. We summarize here very briefly the definitions of the 8 steps.

A. *Building together the sense of the ground*: this step has no expressive movement yet: it is the pre-defined feeling of the other and the situation.
B. *Perceiving one another*: it describes the activation of relational energy given by mutual perceptions created by the contact senses.
C. *Acknowledging one another*: this step consists of recognizing and acknowledging the intentionality

of contact in the other that brings any movement to the relational sense of that contact-making.

D. *Adjusting to one another*: the ability to adjust to each other implies both being attuned to one another (feeling what the other feels) and resonating (responding with one's presence and creative differentness).

E. *Taking bold steps together*: these are times when caregiver and infant/child do something together which unlocks a fixed gestalt and directs them towards a third element, thus releasing them from an impasse.

F. *Having fun*: caregiver and infant/child can have good moments together, enjoy being in one another's presence, and experience moments of light-heartedness.

G. *Connecting*: this kind of interaction provides both infant/child and caregiver with the feeling of being reachable and able to reach the other. It also provides both with a sense of agency.

H. *Entrusting oneself to the other/Taking care of the other*: the infant/child can let oneself go to the caregiver, and the caregiver feels able to take care of the situation spontaneously. There is a shared sense of intimacy and deep trust in the other.

During the research, further theoretical reflection on the "dance steps" was carried out, highlighting aspects of similarity and temporal proximity between specific steps; this led us to hypothesise a pattern of reciprocal interaction.

Specifically, it has been pointed out that "dance steps" A and B ("Building together the sense of the ground" and "Perceiving one another") refer to a pattern that can be defined as "Co-creating the ground". Steps C and D ("Acknowledging one another" and "Adjusting to one another") seem instead to refer to the moment of activation of the interaction; we have called it "Activating interaction". Steps E and F ("Taking bold steps together" and "Having fun") suggest a dyad that experiences a novelty together; we have called it "Going 'beyond' together". Steps G and H ("Connecting" and "Entrusting oneself to the other/Taking care of the other") seem to indicate a condition in which caregiver and infant/child are immersed in the fullness of the relationship, and we have called it "Being in the fullness of the relationship" (**Tab. 1**).

Table 1. Interactive patterns, factors/steps, caregiver and infant/child's behaviors/items in the "dance steps" model.

Patterns	Factors/steps	Caregiver and infant/child's behaviors/items	
		Examples of caregiver's behaviors [a]	Examples of infant/child's behaviors [a]
Co-creating the ground	A. Building together the sense of the ground	A1. S/he holds the baby in a secure and natural way	A1. S/he is quiet during interactions with the caregiver
		A2. S/he addresses the child with peace of mind	A2. S/he lets him/herself be calmed by the caregiver when s/he has moments of irritation or discomfort
	B. Perceiving one another	B2. S/he is focused on the child	B2. S/he is focused on the caregiver
		B3. S/he orients his/her glance toward the child's movement	B3. S/he orients his/her glance toward the caregiver's movement
Activating interaction	C. Acknowledging one another	C1. S/he offers the child the possibility to choose the game freely	C1. S/he takes into account the facial expressions and words of the caregiver during an action
		C3. S/he anticipates the play that the child wishes to do (providing explanations, making examples of the game or pieces of the game)	C3. S/he observes the caregiver to understand how s/he wants to join the game
	D. Adjusting to one another	D1. S/he changes her/his movements and actions following the child's requests	D1. S/he changes his/her movements and actions following the caregiver's requests
		D3. S/he moves in a complementary way with the child	D3. S/he moves in a complementary way with the caregiver
Going "beyond" together	E. Taking bold steps together	E1. S/he proposes something new for the child to take part in	E1. S/he proposes something new for the caregiver to take part in
		E2. S/he changes the play, leaving the previous pattern, keeping the child's desire into account	E2. S/he changes the play, leaving the previous pattern, keeping the caregiver's desire into account
	F. Having fun	F2. S/he is amused while interacting with the child	F2. S/he shows pleasure and fun while interacting with the caregiver
		F3. S/he includes amusing elements in the game (e.g., peekaboo, funny gestures, etc.)	F3. S/he includes amusing elements in the game (e.g., verses, raspberries, etc.)
Being in the fullness of the relationship	G. Connecting	G1. S/he comments with the child on the game they have done	G1. After the interaction, s/he reaches out to the caregiver by touching and/or caressing her/him
		G3. S/he shows satisfaction on the result s/he has reached together with the child	G3. S/he shows satisfaction on the result s/he has reached together with the caregiver
	H. Entrusting oneself to the other/Taking care of the other	H1. After the interaction, s/he cuddles the child lulling and caressing him/her	H1. After the interaction, s/he lets himself/herself be cuddled by the caregiver
		H2. After the interaction, s/he gently embraces the child	H2. After the interaction, s/he snuggles up next to the caregiver

[a] These are only some examples: 4 caregiver behaviors and 4 related behaviors of the infant/child have been identified, obtaining the first version of the tool organized into 32 behaviors to be observed in the caregiver and 32 behaviors in the infant/child.

Relevance for Pediatric Psychology

The study, both in its first part of the operationalized description of steps of interaction and the observation of aesthetic qualities of the dyad's reciprocity, is relevant to the field of Pediatric Psychology.

The study refers to an early caregiver-infant relationship assessment tool that can become a great resource in the neonatal/pediatric setting. In fact, the tool can be a valuable support to clinicians to monitor one of the most important early relationships (caregiver-infant) that define the relational field of a pediatric condition, particularly in the first year of life; a relationship, the one with the caregiver, critical in promoting the health of the infant/child's developmental trajectory. Among the possible neonatal/pediatric conditions with respect to which the reading of "dance steps" may be important is that of children born preterm, choosing, however, to focus attention exclusively on moderately preterm birth conditions and this reduce the differences with full-term birth conditions. In fact, if it is true that preterm birth is a risk condition that can orient difficulties/fragility in the relationship between caregiver and infant/child [47-50], however, it is important to emphasise, regarding premature birth, that there is a heterogeneity of risk factors that may impact differently on early caregiver-infant interactions; among these factors should be remembered: the presence of complications during pregnancy or hospitalization, low gestational age and birth weight [51-53]. In our sample of children born moderately preterm, only healthy preterms were considered in this sense, this ensuring a greater resemblance to the full term; in this sense, the "dance steps" tool can help to catch early, from the first months of the infant's life, possible dysfunctional interactions, suggesting targeted interventions to clinicians. This is the fundamental reason why this first pilot study wanted to focus on dyads with infants born preterm.

The description of "dance steps" seems to set specific functions on which parental competence is based, from scaffolding [54], to cognitive and emotional coping [38, 55], to caregiving [56], to the creation of a contact relationship, and concerning the specific transitions of the child's developmental path. By sequencing the different evolutionary transformations to which the various evolutionary patterns of this study and their related factors refer to, these transformations can be linked to general objectives of development [57]; this means stabilizing, strengthening and transforming skills, abilities, etc. The factors of these patterns make us grasp significant changes that pertain to the domains mentioned above, so much so that it can be affirmed that the sequence of behaviors indicated, according to the patterns, traces a path for the child's development, as well as for parental competence. Furthermore, it may be interesting, considering the impact of "dance steps" on the health of the infant/child's developmental trajectory, to underline how the interactive patterns, indicated by the heuristic path presented here, delimit the conditions of the infant/child's psychological functioning and parental competence according to an evolutionary/clinical perspective. Indeed, the processes involved seem to refer to the construction of the self, to the orientation of the self, and therefore to the domain of identity and the future development of empathy, prosocial skills, and, therefore, the domain of relationships. In addition, references to the processes of the emotional domain and, therefore, self-regulation, control, etc. can be found in the patterns and the related factors. This study identifies the strategic skill of redefining the gestalts among all of these processes.

In a perspective of mirroring between the infant/child and the caregiver, Pediatric Psychology helps us to grasp in these interactive patterns specific specularities at the basis of the caregiver-infant/child contact relationship. In this sense, the "co-created ground" seems to promote the stability given by the ground/world and by being in the world, which in Pediatric Psychology represents the "field" condition [23]. This pattern, therefore, refers to the representation of the self within a defined reality, and in this way, the infant/child perceives that they are not the world, but that they are in the world and that the caregiver is in that same world; it is the moment when the infant/child pays attention and activates the story of this world (the infant/child indicates, associates sounds and objects, movements and objects, etc.). The infant tells, with gestures and mimicked expressions in the form of a "slice of life", a story without a plot, with an open ending; and conversely, the parent strengthens their scaffolding function and finds themselves to be a reference in the common basis ground/world. About the infant/child's evolutionary plan, this represents the beginning of overcoming cognitive egocentrism [58] and a condition of renewed energy of parental competence.

Regarding the interaction pattern, this seems to orient the development of the perspective-taking [59] of the attribution of states and decisions to the other – the possibility that the other may do something for them as an infant – and also self-regulation. The fabula gives place to the discourse, in the sense of beginning to attribute relationships, interweaving between games, and telling oneself and the caregiver a sort of short story, as an exercise of self-regulation and, therefore, of strengthening of executive functions. The reference condition of the interaction pattern sees the intense exercise of the caregiver's emotional coping, coping with the emotions arising from the interaction.

Regarding the "Going 'beyond' together" pattern, the relevant evolutionary steps must be traced in the activation of the very early stages of problem-solving, insight, and intuitive thinking, while, by telling parallel stories, the story becomes a sort of spin-off. Furthermore, it should be emphasized how this pattern leads us to observe the development, not only of adaptive behaviors but also the way the infant/child manages the turnover through requests and other gestures. Thus, the infant/child maintains the reference to a previously present character (e.g., in a game) and constructs another story or a reference to a new object. In the meantime, the caregiver uses cognitive coping, looks for solutions to be shared, responds to the expectations of the resolution, and, together with the infant/child, manages the implementation of these solutions, aimed at exploring, researching, and trying new possibilities.

The pattern that concludes the "dance steps", "Being in the fullness of the relationship", tells us about important evolutionary steps, leading us back to social development. Interactions and exchanges are colored with bonds (the infant/child trusts; the contact experience leads them to be guided because of this trust). The story becomes the possibility of listening to the other; in this sense, the infant/child can get in contact with the meanings of the words in the story and the emotional resonances (fear, joy, etc.) within a more intimate relationship, which creates a critical passage of the attachment bond [37, 60]; meanwhile, the caregiving exercise of parental competence is identified by this pattern.

The aesthetic focus on primary relationships of this study

The possibilities given by the aesthetic glance to understand primary relationships [2] are therefore of great value for this discipline.

The need for a tool to observe the caregiver-infant relational "dance" during the first year of life stems from the consideration of the complexity that the reading of the mutual interaction of the dyad entails [46]. Almost always, the instruments relating to this field of investigation take into consideration the behavior of the two subjects individually then look at their possible relationships. Therefore, this instrument's strength is the possibility of detecting the reciprocity of this interaction in the here and now of the interaction.

In the light of the "dance steps" model described above and the outlined considerations, the aims of the study were:

- *Aim 1.* Initiate a first pilot study with conditions of moderately preterm birth to have the first data on the applicability of the instrument in the pediatric setting, functional to start the validation process of the observation tool on the caregiver-infant relational "dance" in some crucial developmental stages of the first year of life (6-9-12 months), built through the operationalization of the theoretical model described:
  - *Goal 1.1.* To have first measurements of the content/construct validity of the relational "dance" observation tool, built according to the indicated model.
  - *Goal 1.2.* To have first reliability of the instrument as the ability to provide the same results with different observers, at all development times considered (6-9-12 months).
- *Aim 2.* To explore how relational "dance" takes shape in the 3 developmental stages considered:
  - *Goal 2.1.* To explore first data on the "sensitivity" of the instrument as an ability to grasp the changing of the relational "dance" in the transition from one developmental step of the infant to another, regarding the times considered (between 6-9-12 months).
  - *Goal 2.2.* To explore co-occurrences between the behavioral flows of the infant-caregiver dyad in the 3 developmental stages considered.

Methods

Study design

The study was defined in the terms of a pilot study, thus functional to initiate preliminary analyses to have initial data regarding the application and feasibility of the tool in a health care setting, in particular the field of neonatology in the developmental follow-up of children born

preterm, and then to validate the tool on a large and consistent sample. It should be pointed out that the study was carried out at a neonatal outpatient follow-up clinic based on integrated neonatologist-pediatric psychologist work; therefore, it refers to a context in which caregivers were constantly accompanied and supported by both professionals in recognizing the infant's developmental characteristics at the different steps of follow-up and then helped in managing the caregiving, scaffolding and coping functions that define parenting competence.

Participants

The study involved the following participants:

1. 32 expert psychotherapists, all licensed and post-graduated in the clinical approach of Gestalt therapy, with at least 8 years of Gestalt psychotherapy training and 8 years of private practice, who measured the content validity of the instrument (goal 1.1);
2. the group on which the relational "dance" observation was conducted consisted of 13 caregiver-infant dyads (all mothers) (please note that in the text we will continue to use the term "caregiver" because the tool can be used with any significant caregiver figure of the infant/child [mother, father, or other substitute caregiver in the absence of parents]) who met the following criteria: a) caregivers' Italian nationality, considering that the measurement of caregiver-infant relational "dance" cannot be considered as a culture-free variable; b) children born moderately preterm (gestational age > 32 weeks) without any severe developmental impairment due to preterm birth, with levels of competence similar to those observed in children of the same age born at term. Therefore, all dyads related to very or extremely preterm birth were excluded, as well as those with children born preterm who had disabilities/deformities/severe organic diseases. It should also be pointed out that 20 caregivers had initially given consent for participation, corresponding to half of the moderately preterm births followed at the outpatient clinic during the study period (8 months); however, 7 of the 20 dyads who had signed up the consent did not complete the 3 steps of videotaping required by the study, so they were excluded;
3. 3 raters, skilled psychotherapists, with at least 8 years of training in Gestalt psychotherapy and 8 years of private practice, with knowledge of the "dance steps" model, previously trained in the use of the instrument. The raters have observed the video to measure the reliability of the instrument (goal 1.2) and its sensitivity to capture the dynamism of the relational "dance" (goal 2.1 and goal 2.2).

Procedure

The observational tool has been developed in the following way: the group of authors has operationalized each step, assigning specific behaviors of the caregiver and the infant/child. A phenomenological group consensus method has been used [61]. Four caregiver behaviors and 4 related behaviors of the infant/child have been identified, obtaining the first version of the tool organized into 32 behaviors to be observed in the caregiver and 32 behaviors in the infant/child (see some examples in **Tab. 1**). These behaviors are referred to as relational and nonverbal processes between caregiver and infant/child. They do not refer to infant/child developmental achievements, as is the case with specific developmental scales (for example, the Griffiths Scales of Mental Development [62]), nor to caregiver's best practices.

To validate the theoretical coherence between these behaviors and the previously described steps, we have used the method of blind judges, involving experienced psychotherapists who were asked to attribute each item (listed in a random list) to one step. The instrument's reliability was measured by checking whether different observers detected the same behaviors on the same subjects. A group of 3 skilled Gestalt psychotherapists and trainers (at least 8 years of Gestalt psychotherapy training and 8 years of private practice) have scored the presence of behaviors related to each "dance step", using the last validated grid of observation.

The observation was conducted on video recordings of caregiver-infant interactions during the neonatal follow-up steps (6-9-12 months) of children born moderately preterm (gestational age > 32 weeks).

Caregivers who have participated have signed release for video recordings and informed consent to processing sensitive data, including their own and their infant's state of health. This information was necessary to evaluate children's development.

All videos have been recorded inside the hospital (length 3/5 minutes; face-to-face inter-

actions during free play). In order to analyze the interactions between caregiver and infant, the camera captured both, side by side or in a way that both are visible. The caregiver-baby pairs observed had previously been involved in the outpatient follow-up clinic for babies born prematurely, set up by the Neonatology Unit of a hospital in Palermo. The couples were participating in a national research project (PRIN 2010-2011, MIUR funding) on maternal and paternal perinatal depression and its effects on the newborn's development.

Specifically, 42 observational units were analyzed by 3 observers.

The verification of the internal reliability of the instrument also included the measurement of the correlation between the different factors and between the individual items that make up the factors; this is to analyze the degree of coherence between factors and between items in investigating the complexity of the reference construct.

The instrument's sensitivity was also assessed for its ability to detect not the stability of the relational "dance", but its dynamism in the transition from one age of the infant to the next (6-9-12 months – T1-T2-T3). The reference construct, in fact, clearly indicates that relational behaviors between caregiver and infant at an early age change in relation to the developmental stage reached by the infant. Such variation is desirable as an expression of the infant's developmental changes and the flexibility of the reciprocal "dance" with the caregiver, i.e., the capacity for mutual adaptation as the infant grows.

We also wanted to further investigate the dynamicity of the interactions and the specificity at each time.

Statistical analysis

The following analyses were conducted:

- Calculating the degree of agreement among the evaluators to relate the individual items (behaviors) belonging to a specific "dance step". The inter-rater agreement has been tested with Fleiss' K [63]. Values of k can range from -1.0 to 1.0, with -1.0 indicating perfect disagreement below chance, 0.0 indicating agreement equal to chance, and 1.0 indicating perfect agreement above chance (these are the specific values: $k < 0$ [poor agreement]; $k = 0.01$-0.20 [slight agreement]; $k = 0.21$-0.40 [fair agreement]; $k = 0.41$-0.60 [moderate agreement]; $k = 0.61$-0.80 [substantial agreement]; $k = 0.81$-1.00 [almost perfect agreement]). Acceptable values of concordance were represented by $k > 0.40$ [64].
- Measuring the reliability of the instrument as the ability to give the same readings with different observers at all developmental times considered (6-9-12 months) (inter-rater reliability, Fleiss' K).
- Analysis of frequency distribution of single behaviors and single "dance step" (internal consistency, Cronbach's alpha for every "dance step"), through the correlation between each factor (A to H) and all steps/factors (total), and between the single item/behavior and the reference step/factor, in order to check reliability, to test how much shared variance between factors is attributable to the researched construct (level of intercorrelation between steps) and the proportion of variance shared by the items that are attributable to the reference factor. These correlation indices were calculated on 42 observational units concerning the 3 developmental moments considered (T1-T2-T3).
- Test-retest reliability (relating 3 video registrations for the same caregiver-infant couple – at 6-9-12 months), calculating Pearson correlation coefficient, between factors and between items.
- Exploring tool sensitivity using the Friedman test for every "dance step".
- Exploring co-occurrences between behavioral flows of the caregiver and the infant using the Spearman test.

A $p < 0.05$ was considered significant. Statistical analysis was performed by commercial software (IBM® SPSS® Statistics).

Results

The results of reliability obtained show a good to excellent agreement between the observers, obtaining values between 0.62 and 1.00, therefore these early results seem to indicate a high reliability of the instrument. In some cases, however, the agreement between observers was moderate. Specifically, item C3 caregiver at time 1 (6 months), items C1 and F3 infant at time 2 (9 months) obtain respectively 0.43 and 0.42. And again, the G3 items for both caregiver and infant at time 2 (9 months) show an agreement between the observers of 0.51 (moderate agreement). These results suggested that these are probably complex behaviors to detect and/or require more training.

In the analysis between each factor and all steps/factors, the tool was reliable. Cronbach's alpha showed a high degree of internal consistency and a high level of scale reliability (reliability cut off 0.70, good values between 0.70 and 0.80, very good values between 0.80 and 0.90) [65].

In the analysis between the single item/behavior and the reference step/factor, some items were not found to be representative of the total factors. Some fragility has been detected in a few items of the tool, which is probably due to problems of the item formulation.

Test-retest reliability calculated by the Pearson correlation coefficient, between factors and between items. "Dance steps" for both caregiver and infant show several correlations between factors during 3 times analyzed.

Furthermore, regarding the correlations between the items, regarding both caregiver and infant, several statistically significant correlations emerged in the 3 time periods assessed (6-9-12 months). A non-parametric analysis of variance was carried out the 3 times regarding each "dance step", applying the Friedman test. As far as the caregiver is concerned, the following factors present a statistically significant increase during the 3 times: factor A "Building together the sense of the ground", which decreases in the 3 times, and factor C "Acknowledging one another", which presents a significant increase in the 3 times; all the other factors are stable. The following statistically significant changes are noted for the infant: factor C "Acknowledging one another" and factor D "Adjusting to one another", which increase over the 3 times considered. The other factors are stable.

Considering the correlation coefficient (Spearman's Rho) between the caregiver's behavioral flow and the infant's behavioral flow in the 3 times considered, at 6 months, the correlations between the following factors were significant: Bch with Bca ($p = 0.019$), Cca ($p = 0.028$), and Fca ($p = 0.044$); Ech with Aca ($p = 0.007$), Dca ($p = 0.04$), Fca ($p = 0.005$), Gca ($p = 0.001$). At 9 months, the following correlations are significant: Cch ($p = 0.048$), Dch ($p = 0.006$), Fch ($p = 0.001$), Gch ($p = 0.008$) of the infant correlate significantly with the caregiver's F; Hch and Hca ($p = 0.015$). Finally, at 12 months, the only statistically significant correlations were the negative correlation between Bch and Aca ($p = 0.014$) and the positive correlation between Fch and Fca ($p = 0.013$).

For the caregiver the following things are noted:

- A factor significant, decreases over the 3 times (as the infant grows, the ground, the style with which they relate becomes taken for granted, familiar to the dyad, whereas at the beginning it is being built up and the mother invests a lot);
- B factor not significant, but with a decreasing trend;
- C factor significant, increases in the 3 times (the infant improves and enhances motor skills and thus the possibility for the mother to recognize him/her in his/her more dynamic aspects);
- D factor not significant, stable (small decrease at 9 months) (for the mother the attempt to adapt to the infant is always there, even more so if small, for the mother the attempt to adapt to the infant is constant);
- E factor not significant, stable (small decrease at 9 months) (taking bold steps together, mother gives baby more space);
- F factor not significant, but decreasing trend (having fun: mum tries to go in the background to allow the infant to be a figure);
- G factor not significant, stable (connecting: the caregiver must continue to give security and continuity to the infant, show enjoyment, reinforcing the infant in his/her bold steps);
- H factor not significant, but tendency to decrease (letting go of intimacy: takes a longer time than the 3 minutes video, caregiver is still busy playing, having fun).

For the infant the following things are noted:

- A factor not significant, stable (slight tendency to decrease) (in line with the mother's tendency, as the infant grows up the ground becomes familiar, taken for granted, whereas in the beginning it needs to be built up);
- B factor not significant, stable;
- C factor significant, increases (in line with the mother, seeing the movement of the other, the infant enhances motor skills, thus increasing the mother's ability to recognize him/her in his/her more dynamic aspects);
- D factor significant, increases (adjusting: the infant becomes active in adjusting to the other, takes more initiative and sees more of the other);
- E factor not significant, increases (opposite movement to the caregiver and consistent: the infant becomes more active in taking bold steps);
- F factor not significant, increases (opposite movement to mother and consistent: the infant has more room to have fun);

- G factor not significant, increases from 6 to 9, stable from 9 to 12 (evolutionary step: the infant is more competent to show pleasantness);
- H factor not significant, but decreasing trend (letting go of intimacy: takes a longer time than the 3 minutes video, infant is busy playing, having fun).

Additional material

Additional material can be consulted at the following link provided by the Authors: https://drive.google.com/file/d/1m1v2U0yfyhH8ujPQQFwCeO0IdwWsRXvf/view?usp = sharing (last access: February 2023).

Discussion and conclusion

The "dance steps" tool described here is a phenomenological and aesthetic observation grid of the primary caregiver-infant relationship in the first year of life; it is a functional tool for developmental assessment in the first months of life.

As expressed in the first aim with the first referral goal (goal 1.1), this pilot study aimed to test the applicability of this observational tool with reference to the caregiver-infant pair in preterm birth conditions, contributing to the initiation of the content validation process. In evaluating the reference of the items to the individual "dance step", the indixes of good concordance – among the expert judges involved – seem to suggest the construct validity of the tool, which clearly will need to be explored further with a larger sample. In addition, in relation to the second goal of the first aim (goal 1.2), the study suggests the presence of the internal reliability of the instrument, and thus its ability to achieve the same behavioral observations, even when different observers apply the grid. Furthermore, these early data indicate the presence of adequate internal consistency of the tool, insofar as acceptable correlations were found between factors/steps and between items that make up the grid.

A further interesting fact about the instrument's psychometric properties is its sensitivity, understood as the ability to detect changes in the relational "dance" through the developmental times considered (6, 9 and 12 months of the infant) which was the focus of the second aim (goal 2.1). This capacity of the instrument is significant, considering the model that has guided its construction, insofar as the "health" of the caregiver-infant/child relational "dance" does not coincide with the presence of stable interactive patterns during the first months of the infant's life, but, on the contrary, with its dynamism. This dynamism goes hand in hand with the infant's growth and, therefore, the increase in his or her cognitive, emotional, and relational skills implemented in the interaction with the caregiver. Moreover, the specific dynamism of relational "dance" turns out to be functional in the process of building the infant's self-image and thus in the developmental momentum in early childhood [48].

Just about the dynamism of the relational "dance" concerning the single factors, highlighted by the study, it is possible to make some interesting reflections. The trend of the factor "Building together the sense of the ground" corresponds to a consistent decreasing trend in the infant, although not significant. This finding is meaningful because the ground and the relational style of the dyad changes according to the level of familiarity between caregiver and infant; therefore, in the transition among the 3 developmental times considered, the infant's tendency to engage less in this step indicates that a known, safe, and reassuring relational space has already been created between him/her and the caregiver, from which to make further discoveries.

Interesting the increase in the "Acknowledging one another" step; this change can certainly be attributed to the increase in the infant's motor and perceptual skills and in his/her ability to recognize caregiver's intentionality. This enables the caregiver to recognize the infant with respect to his/her developmental changes and to grasp the dynamism of the developmental trajectory. The caregiver is thus oriented to maintain a constant attitude of adjustment to the infant, who may become more active in the relationship, as reflected in the results related to the step "Adjusting to one another".

This dynamic aspect of the relational "dance" also appears fundamental when referring to the steps "Taking bold steps together" and "Having fun": again, the opposite trend between caregiver and child points us toward a mutual relational movement, functional for developmental health; the child takes more and more space and the parent goes more and more to the background of the relational field, to enhance his/her skills with respect to his/her greater capacity to take new initiatives and to activate fun moments in which s/he involves the caregiver.

Further compelling appears the caregiver's tendency to maintain an attunement (the step

"Connecting") that expresses his/her attempt to give security to the infant by reinforcing him/her in bold steps and in his/her ability to propose new actions. The infant's active behaviors in reference to this stage, evidenced only after the age of 6 months, are in line with developmental milestones that make the infant more competent in showing the pleasantness of activities performed by the caregiver. This result is particularly interesting if we consider our group's specificity (infants moderately preterm). Recent studies [66-68], in fact, calling previous findings, highlighted that these interactions patterns, characterized by a more active stimulation of the infant, could be appropriate for preterm infants, during the first months, to compensate the weakness of infant's communicative signs, and eliciting infant attention.

A final consideration concerns the data relating to the calculation of the co-occurrences between the behavioral flows of the caregiver and the infant, as stated in goal 2.2 (second aim). These data highlighted the ability of the instrument to provide detailed and precise information on how the caregiver's and infant's behaviors tend to associate in narrow time segments that could be drawn upon and explored further.

For instance: at 6 months, the infant is more capable of perceiving the other when the caregiver activates behaviors of recognizing the infant, perceiving the other, and trying to have fun together. Moreover, always at 6 months, the infant takes courageous steps when the caregiver creates a solid ground, when s/he shows to adapt his/her behavior to the infant, when s/he stimulates fun and plays with the infant. These first data show us how, in the case of a very young child, a caregiver who plays and recognizes him/her seems to promote and facilitate in the infant behaviors of connection, recognition and search for the other, and "innovative" attempts to be with the other.

At 9 months, co-occurrences show that if the caregiver takes courageous steps by promoting novelty, the infant can recognise the other, take bold steps as well and connect to the other, just as the caregiver's relaxed surrender seems to stimulate the infant's relaxation as well.

As far as interaction at 12 months is concerned, the analysis of co-occurrences shows that, if the caregiver carries out many behaviors of construction of the sense of the ground, the infant shows difficulties in recognising the other; on the contrary, if the caregiver launches into proposals of novelties to be experimented in the relationship (e.g., new games) the infant does the same. This finding seems to clearly show the infant's need for more and more autonomy. In other words, at 12 months doing more active things between caregiver and infant produces a good tuning, and a more harmonic interaction, producing a greater autonomy in the infant.

These data, which seem to relate to a relational "dance" that is being shaped from 6 to 12 months of the infant's age according to patterns that are mostly appropriate and functional to his/her development, appear even more interesting insofar as reference is made to an application of the instrument with dyads of caregiver and infant born preterm. While some studies in the field [47-50] have always emphasized that the interaction between caregiver (almost always the mother) and the infant born preterm is defined by interactive patterns that could be more dysregulated compared to those of full-term dyads, our study, albeit with the limitations of the sample size, does not seem to highlight relevant aspects of fragility. This finding clearly orients a wider study in the preterm birth conditions. Moreover, it could be mainly traced to the organization of the context in which the dyads were enrolled: indeed, we should recall that this was a neonatal outpatient follow-up clinic grounded in integrated neonatologist-pediatric psychologist work.

Strengths

A strength of the contribution lies in the very nature of the observation tool of the caregiver-infant relational "dance" presented here. The observation grid, in fact, is an important tool in both clinical and research settings. It constitutes a valuable aid for the early assessment and monitoring of the quality of the progress of the caregiver-infant/child interactive process and, therefore, for directing possible support and/or psychotherapy interventions aimed at the relationship and parenting competence; a possibility of early intervention that becomes fundamental in the accompaniment of parenting competence in preterm birth conditions. In fact, one of the aims of this study was to provide insights on a primary task of psychological and psychotherapeutic interventions with parents and children: to foster the processes of secure attachment or, in the here proposed language, to support the co-regulation between caregivers and infant, that is the spontaneity of creative adaptation.

Also, it should be emphasized that the developmental steps in which the grid was evaluated are particularly significant concerning the developmental process in the first year of life, as 6-9-12 months correspond to "critical" time frames, crucial passages in terms of cognitive and relational learning; during these steps, the infant shows fundamental evolutionary changes [69-71], especially when referring to children born preterm.

In this sense, it should be remembered that at 6/7 months, the infant develops a greater ability to move in space and new skills in the spheres of communication, relationships, play, feeding, and sleep; around 9 months, the infant uses the adult's signals for his or her own decisions, and the parent faces additional challenges in adapting to his or her new motor and cognitive skills; and at 12 months, the new motor and relational skills allow the infant to be more autonomous and independent, becoming a true explorer of the world [69-71].

This instrument responds to the need to focus the observation of the infant's development and his/her significant relationships in the first months of life, thus anticipating as far as possible any interventions to promote and support development.

Further significant instrument's strength is its ability to detect the reciprocal interaction of the dyad in the here and now of its development, unlike many instruments in the field that individually detect the behavior of the two subjects of the interaction, reading only subsequently the observed behavior in terms of reciprocity. In this sense, it offers the opportunity to measure and monitor how the behaviors of the dyad tend to be associated. Information on co-occurrences between the two behavioral streams caregiver/infant can suggest hypotheses concerning the interdependence between the behaviors and/or the predictivity of some behaviors concerning others.

Limits and future prospects

A limitation of this study is the small number of participating caregiver-infant pairs and the enrollment of only mothers. In this sense, to improve the knowledge and potential of the tool, it is necessary to continue the research by involving other dyads, particularly father-infant, and considering the overall conditions of typical infant development. Along these lines, the involvement of family pediatricians will be important.

The involvement of the father is undoubtedly a significant step insofar, as pointed out by numerous research contributions of the last decade, the father-infant relationship, although often underestimated, has a great value for the health of the developmental trajectory of the infant [72-76].

As a further prospect for the future, the research group believes in proceeding with verifying the predictive validity of the instrument, identifying as possible criteria/outcomes the parental competence and the neurodevelopment of the infant in the first year of life. Precisely, therefore, we intend to verify: the correlation between the configuration of relational "dance" in the first months of life of the infant and the management of parental competence, assuming that the management with the infant of an interaction marked by contact, co-regulation, mutual recognition and appreciation of the other (adequacy of relational "dance"), may predict management of parental competence in terms of a balanced activation of parental functions [77, 78]. In this sense, intercepting early a difficulty in the relational "dance" means being able to immediately activate preventive interventions in the sense of support to parental competence that improves the caregiver-infant/child relationship, reducing, moreover, the risk of dysregulation that can also give rise to conditions of child neglect [79-82]. Again, concerning the predictive validity of the grid we intend to test, we hypothesize that the health of the relational "dance" directs the quality of early child development in several domains (cognitive, emotional, and social).

Finally, a further future perspective on the methodological level regards the investigation of the discriminant validity of the instrument with respect to which it is intended to compare with the Child-Adult Relationship Experimental Index [83].

Declaration of interest

The Authors declare that there is no conflict of interest.

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