Chapter 11
Longitudinal Adolescent Mother-Infant Interactions: How Do They Happen Within Vulnerable Backgrounds?

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The present chapter aims to discuss the relationship between adolescent mothers, living in vulnerable backgrounds, and their infants throughout the first postpartum year. The subject is innovative because it presents some methodological procedures and challenges focused on capturing human development based on ecological background. It presents data about personal and contextual variables, as well as some methodological challenges related to the longitudinal research performed in naturalistic settings. The chapter addresses the impact of background resources on mother-infant interactions, which are the basis of human development.

Adolescent motherhood is broadly described as a challenging event to both the mother and the infant (e.g., Moore & Broonks-Gunn, 2002). However, as far as it is known, few research concern the adolescent mother-infant contextual background, which should be a central aspect to research involving human development. Understanding the developmental niches, particularly their influence on the quality of maternal behaviors and on the parenting culture, is the key information for human development research (e.g., Kärtner, Keller, & Yovsi, 2010; Seidl-de-Moura et al., 2012).

Most adolescent pregnancies happen within vulnerable backgrounds (WHO, 2009). The world prevalence of adolescent pregnancy is of approximately 11%. Ninety-five percent (95%) of the total births happen in middle-income countries, and 50% of them are recorded in Bangladesh, Brazil, Democratic Republic of Congo, Ethiopia, India, Nigeria, and the United States (WHO, 2016). In Brazil, 67 adolescents (under 18) per 1000 have, at least, one child (World Bank Data, 2016).

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The highest prevalence of adolescent pregnancy is found in rural areas (WHO, 2007), revealing that they come from impoverished backgrounds.

The aforementioned aspects must be taken into consideration when this population is assessed, because such impoverished backgrounds present particular features affecting individuals' development and the interactions established by them. Life in poverty is often associated with increasing distress factors such as overcrowded houses, bad housing and neighborhood conditions, increased parental conflicts, and parental harsh behaviors (e.g., McLoyd, 1998). Therefore, parental practices are influenced by such contextual fragilities (e.g., Belsky, Steinberg, & Draper, 1991; Lordelo, Fonseca, & Araujo, 2000; McLoyd, 1998).

Most researchers describe adolescent mothers as having more harsh parental practices (e.g., Cabrera, Fagan, Wight, & Schandler, 2011; Evans, Boxhill, & Pinkava, 2008; McLoyd, 1998). However, if one considers that most adolescent mothers come from disadvantaged backgrounds, it is possible stating that most of their negative behaviors derive from their developmental context, rather than from their age (e.g., Belsky, Houts, & Fearon, 2010; Duncan, 2007; Turley, 2003). Such perspective lies on the fact that most pregnant adolescents tend to face restricted access to school, information, and/or health care (e.g., UNPF, 2016).

Vulnerable backgrounds influence personal outcomes; for instance, maternal depression rates are higher among mothers living in impoverished contexts, particularly among adolescent mothers in such contexts (e.g., Brown, Harris, Woods, Buman, & Cox, 2012). The maternal depression average is higher among adolescent mothers than among adult mothers, and it is mainly associated with their impoverished developmental contexts, as well as with lack of social support (e.g., Brown et al., 2012; Gee & Rhodes, 2007). These data translate the impact of vulnerable backgrounds on the quality of mother and infant behaviors.

Assumingly, by taking this information into account, individual development and maternal behaviors are interconnected to the context where they take place (e.g., Bronfenbrenner, 2001; Cabrera et al., 2011; Keller, 2002). Environmental challenge assessments will affect infant caregiving strategies by influencing parental practices, which tend to be different depending on the background (e.g., Belsky et al., 1991; Cabrera et al., 2011; Lordelo et al., 2000). Mothers used to have distinct perceptions about infant development, as well as different expectations about developmental outcomes, which may influence their understanding about the acquired achievements or expected behaviors (e.g., Lordelo et al., 2000; Keller, 2002; Seidl-de-Moura et al., 2012). The needs of infants coming from vulnerable backgrounds (e.g., infant crying, for instance) are not considered a priority over the contextual needs (e.g., washing dishes or preparing meals), fact that typically does not happen in more wealthy backgrounds (e.g., Keller, 2002). The different behaviors may be easily seen as resulting from impoverished backgrounds that favor neglecting behaviors. However, the different behavioral patterns reflect distinct priority judgements: environmental vs. infant demands (Belsky et al., 1991; Keller, 2002; Lordelo et al., 2000). Mothers from disadvantaged backgrounds often need to conciliate multiple urgent tasks that influence the way they respond to infant signals (Keller, 2002). This fact highlights the importance of recognizing the environmental features in order to investigate populations living in vulnerable backgrounds.

Background features, such as cultural and personal aspects, must be taken into account in order to properly capture mother-infant interactions (e.g., Koller, Raffaelli, & Carlo, 2012). The relevance of this topic derives from the argument that culture, beliefs, and expectations about child development modulate maternal thoughts and caregiving behaviors (e.g., Belsky et al., 1991). Accordingly, it is helpful having in mind the theoretical backgrounds addressing individual development as an interchange between individual and context, such as the *Bioecological Theory of Human Development* (BTHD; Bronfenbrenner, 2001). Thus, according to the BTHD, human development happens, throughout time, as a continuous process affected by previously established relationships.

Bronfenbrenner (2001) suggests that the human development must be analyzed based on a particular background, where the individual establishes direct interactions with significant others, such as friends, parents, and teachers: microsystem. These interactions, known as proximal processes, trigger human development. The *mesosystem* is composed of the total of microsystems carried by a person throughout time. However, the *exosystem* is composed of interactions influenced by the external characteristics of environments not directly focused on the individual, such as the parent's job. All these systems form the *macrosystem*; they are adopted in a certain historical time and involve childhood, labor market, and laws that have an impact on individual outcomes.

If the aim of a research is to capture the human development phenomenon, it is worth understanding the influence from its characteristics. The ecological validity emerged as a way to achieve such aim by understanding the environmental context the research is conducted in, fact that requires observing the multiple-person systems. A person in constant transformation is affected by contextual and relational demands. Thus, each person is inserted in a particular background, in a certain temporal frame (Bronfenbrenner, 2001).

It is worth recognizing adolescent mothers' contextual demands in order to correctly analyze their interactions with their infants. This is a valuable information, since the negative outcomes of adolescent mothers, and of their children, were mainly associated with their disadvantaged developmental backgrounds. Scholars have been discussing the importance of research designs and observational measures focused on relational and contextual particularities (e.g., Koller, Rafaelli, & Carlo, 2012; Seidl-de-Moura & Mendes, 2010; Tudge, Mokrova, Hatfield, & Karnik, 2009) in order to assure the generalization validity (e.g., Henrich, Heine, & Norenzayan, 2010).

It is important having adequate methods to collect data about people living in impoverished backgrounds, because it assures that ecological aspects will be evaluated in data assessments and analyses. However, most researches come from *western, educated, industrialized, rich, democratic* (WEIRD) samples that do not represent the developmental contexts most infants belong to (Henrich et al., 2010). The WEIRD samples translate the reduced heterogeneity of developmental aspects – which is completely not true – and are far from the reality of most adolescent mothers, and of their infants, in Brazil. Therefore, a longitudinal observational research was performed to capture the individual and developmental aspects of adolescent mothers living in impoverished environments in Southern Brazil, Porto Alegre County, as well as of their infants.

Sociodemographic Characteristics of a Sample Comprising Adolescent Mothers in Southern Brazil

Forty-nine adolescents participated in a longitudinal research in four time-points: pregnancy (T1), at three (T2), six (T3), and 12 postpartum months (T4). Mothers were 16.49 years old (*SD* = 1.58), on average. They were invited to participate in the research when they were in the second or third gestational trimester. They were attending a public hospital in Porto Alegre for obstetric care and were approached by research assistants (*n* = 29). The other participants came from small cities around Porto Alegre (i.e., Ilhas, Arroio dos Ratos, and Butiá; *n* = 20). The participants from the neighbor cities were invited by local health agents to take part in the research. The *t-test* was applied to the independent samples in order to assess differences on demographic characteristics between the two groups. The participants presented similar demographic characteristics (see Table 11.1). Some sociodemographic aspects, such as marital status, family income, and occupational status (from pregnancy up to the time the infant turned 12 months old) are shown in Table 11.1.

Forty-one out of the 49 participants comprising T1 took part in T2 (3 postpartum months) data collection (15% dropout). Thirty-nine participants remained engaged with research in T3, and this number decreased to 35, in T4. Thus, 71% of the total of participants enrolled in the research remained engaged to it throughout the four time-points. The analyses applied to the dropouts showed that participants and dropouts were not significantly different in the assessed dimensions (See Table 11.2). Most dropouts happened between T1 and T2. The main reason for the quitting at this point was the fact that the participants gave up or because they moved out and their contact with the research team was lost; one participant moved out from the state. In addition, two infants were taken away from their families because of maltreatment/neglect: one between T1 and T2 and the other between T3 and T4.

Most participants in T1 have declared they were married or living with their infant's father (65.3%; Fig. 11.1). Interestingly, the couples were living together for 7.55 months (*SD* = 10.58), on average, which means that some of them were living together before the pregnancy. However, as time goes by, the infants' fathers tend to

Table 11.1 Demographic Information about participants living in the capital area and surroundings (*N* = 49)

	Porto Alegre (*n* = 29) *M (SD)*	Surroundings (*n* = 20) *M (SD)*	*p*
Age	16.31 (1.54)	16.75 (1.65)	.35
Family income	830.60 (244.74)	1009.90 (254.29)	.07
Years attending school	6.77 (2.14)	7.35 (2.62)	.41
When they left school (months)	11.29 (17.47)	11.90 (22.89)	.92
Married[a] (%; *n*)[b]	44.9 (22)	20.4 (10)	.08
Studying[a] (%; *n*)[b]	26.5 (13)	16.3 (8)	.78

[a]"Yes" answers
[b]Qui-square results

Table 11.2 Descriptive characteristics, social support, and maternal depression measures comparing the final sample (n = 35) to the dropouts (n = 14)

	Sample *M (SD)*	Dropout *M (SD)*	*p*
Age	16.55 (1.63)	16.38 (1.58)	.73
Family income	863.38 (216.98)	953.33 (343.11)	.39
Years of education	7.00 (2.37)	7.08 (2.39)	.92
When they left school (months)	9.73 (17.73)	15.53 (24.25)	.35
Married[a] (%; *n*)[b]	44.9 (22)	20.4 (10)	.09
Studying[a] (%; *n*)[b]	26.5 (13)	16.3 (8)	.48
Social support	69.78 (11.82)	74.42 (8.33)	.22
Maternal depression	9.35 (5.06)	8.50 (5.36	.62

[a]"Yes" answers
[b]Qui-square results

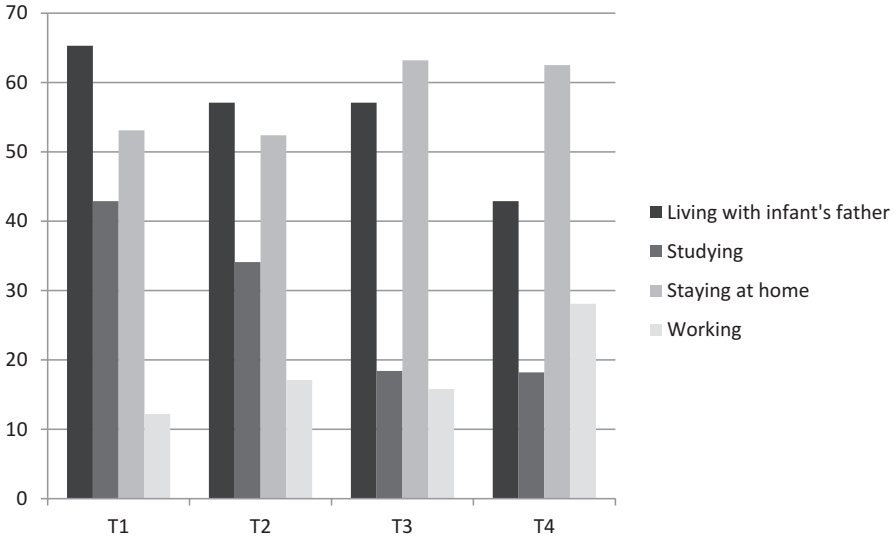

Fig. 11.1 Mother's demographic characteristics across the four time-points

leave; at the last time-point (T4), just 42.9% of the participants remained in their initial relationships. Seventy-three-point five percent of the participating mothers declared that the fathers were present during pregnancy, even when they did not live together. Nevertheless, father involvement rates fluctuated throughout time. At the last time-point (T4), 75% of the mothers reported the infant's father presence, even when they did not live together.

Most participants have already dropped out school at the first time-point (T1) and described themselves as "staying home." Although "staying home" was the main status presented by our participants, it is possible seeing that school attendance decreased after the baby was born, whereas the number of employed mothers increased. These

mothers attended school for 7 years (*SD* = 2.35; range 1–11), on average. Short school attendance was perceived over time (T1vs. T2, χ^2 (1, n = 41) = 13.25, $p < 0.001$; T1 vs. T3, χ^2(1, n = 39) = 5.82, $p < 0.05$; T1 *vs*. T4, χ^2(1, n = 35) = 4.82, *ns*).

The socioeconomic status (SES) of the sample characterized low-income families, approximately R$ 890.37[1] (*SD* = 258.27) in the T1 group. Most adolescent mothers declared to be living with their partners (33.3%), only. The others reported to live with their mothers (19.4%) and with their mothers and partners, all together (11.1%). However, 13.9% of the adolescents declared to live with other relatives, such as grandmothers or aunts. Just 8.3% of the total sample declared to live with both parents, and the same percentage declared to live with their parents and other relatives in the same house. Finally, 5.6% of the participants declared to live together with their parents and the infant's father.

The herein presented data evidences the social vulnerability. It was surprising that part of the sample was already living with a partner when they got pregnant, fact that allows wandering about these adolescents and their families' expectations for the future. Apparently, most of these pregnancies happened in a context of little future attractiveness (Daly & Wilson, 2005), with emphasis on the absence of a formal occupation. These aspects meet those in previous researches (e.g., Cerqueira-Santos et al., 2010; Duncan, 2007; Turley, 2003) addressing adolescent pregnancy in association with the absence of a personal life-project. Although most participants have reported to be living together with the infant's fathers or to be married at recruitment time, such rates have decreased over time. The instability in adolescent marital relationships has been broadly discussed (e.g., Flouri & Buchanan, 2003; Howard et al., 2006). Adolescents' age and maturity to deal with changes, such as caregiving, may influence their relationships and the father's involvement with the baby (e.g., Howard, 2006). In addition, adolescent mothers described some disappointment with the behavior of the infant's fathers, who did not get involved with the baby as they expected (Kaye, 2008).

Observational Data Design

Mother and infant behaviors were coded at 3rd, 6th, and 12th postpartum months. At each time-point, the appointment with the mothers was previously scheduled for times when the babies were expected to be awake. Two trained researchers conducted the home visits and provided explanations about the study and the purpose of the visit. Mothers were informed that they were free to respond to any requests from the infants whenever necessary, as well as to move around as they pleased. However, the mothers were asked to be alone with the infant and to be the only person interacting with the baby. These requests were not met in some occasion, because of the small dimensions of the houses, as well as of the number of relatives

[1] It is equivalent to a little more than one minimum wage, approximately US$ 399,44.

living in them. Both the mother and the infant were videotaped throughout the whole interview.

Each videotaped mother-infant interaction was coded according to the mother (e.g., holding the baby, smiling to him/her, talking to him/her, intrusiveness) and infant's behaviors (e.g., gazing the mother, smiling, playing, crying) by using a 15-s interval sampling for analyses, according to previous research (e.g., Fouts et al., 2012; Isabella, 1993). Ideally, mother and infant should have been videotaped together, but it was not always possible (i.e., other people interacted with the infant; infant or mother moved away). In those cases, their behaviors were not coded. The inter-rater reliability of the wave corresponding to the 3rd month was .90 in mother's behavior and .91 in infant's behavior; at the 6th month, these values were .89 and .92, respectively. At the 12th postpartum month, an agreement of .90 was obtained to both mother and infant's behaviors. Improved positive behaviors were observed between T2 and T3 (3rd and 6th postpartum months, respectively), but an unexpected decrease in them was recorded between T3 and T4.

Mother-Infant Behavior Analysis in a Daily Context: Reflecting About the Research Challenges

The mother and infant behaviors have shown a concurrent positive association at the 3rd and 6th months, but such relation vanished at the 12th month. There was correlation in infants' behavior between the 6th and 12th months. The infant's behavior at the 3rd month was not correlated with the subsequent time-points (Table 11.3). These results were interpreted according to the observational data expressing the infant's developmental aspects. For instance, infants at the 6th postpartum month evidenced more interactive behaviors, which were expressed through gazing, smiling, and vocalization longer than in the previous time-point. Infants were less demanding or had more interactive behaviors at the 3rd postpartum

Table 11.3 Bivariate correlations between mother and infant behaviors at the 3rd, 6th, and 12th postpartum month ($N = 41$)

	1	2	3	4	5	6
3rd postpartum month						
1. Maternal behaviors						
2. Infant behaviors	.40*					
6th postpartum month						
3. Maternal behaviors	.59**	.37†				
4. Infant behaviors	.36†	.07	.41*			
12th postpartum month						
5. Maternal behaviors	.17	.01	.18	.16		
6. Infant behaviors	.16	.12	.30	.44*	−.07	

Note. †$p < 0.10$; *$p < 0.05$; **$p < 0.01$

month; they tended to gaze their mothers and to smile occasionally, but they were quiet in the mother's arms/close to her, and/or sucking, most of the time. These distinct behavior patterns explain the absence of correlations with subsequent time-points, wherein infants were much more demanding, as well as were expressing more wishes and interactive behaviors. Then, infants' behaviors at the 6th month were positively correlated with their behavior at the 12th month. This positive association translated the developmental process in which the personal and environmental resources affect the infants' behavior (e.g., Isabella, 1993; McElwain & Volling, 2004).

The continuity of the maternal behaviors throughout time was expected due to results shown in previous studies (e.g., Isabella, 1993; McElwain & Volling, 2004), but such behaviors were recorded at the 3rd and 6th months, only. Surprisingly, concurrent mother and infant behaviors were uncorrelated at the 12th postpartum month, since the same did not happen in previous times. These unexpected results led to reflections about what might have generated them. Discussions addressed by the research team, data observation, and research notes have evidenced that the developmental outcomes of infants have challenged the research design and impaired the capture of mother and infant interactions, because the infant requests were behind them. Infants were able to move around the room requesting the attention of other family members, such as the grandparents, who were often home, but not in the same room.

Although these background features were also seen in the previous time-points, their interference was much lighter at this point, because of the infant's developmental stage, when the baby tends to be closer to and focused on the mother. However, in the last time-point (the 12th postpartum month), the infants were already moving around, so it was much harder to keep them in the same room during the whole interview. Such scenario has impaired the obtainment of an accurate mother and infant behavior coding, as well as has decreased the infant's requests to the mother. In the previous time-points (3rd and 6th postpartum months), the infant tended to be together with the mother (in her arms or lying next to her); however, at the 12th month, the baby would rather move around to see what was going on and to seek for others after hearing noises or talks outside the room. At this point, infants seemed more engaged with outside activities than with their mothers; they had less requests to their mothers and, consequently, diminished the maternal response frequency. Besides, the contingent mother's response was out of the present paradigm in some cases. For instance, mothers realized that the infant wanted to leave the room in order to see someone outside. Such behavior translated mothers' recognition about the infant's request and their sensitive response to it, but it has impaired the mother-infant behavior coding. Therefore, assumingly, the absence of correlation between maternal behavior at the 12th month and previous time measurements, and with the infant behaviors, is mainly associated with background features in which the mother-infant interactions are established – small houses, with many residents the infant can interact with – thus diminishing the frequency of maternal direct responses.

The faced research conflicts were (a) imposing an external agenda to mothers and infants, stopping the baby from moving around in order to collect the required data, or (b) allowing infants to leave the room to seek for others, since the mother was not the only caregiver, in order to respect the house's daily organization. This "conflict" was later analyzed in research meetings, when it was found that the coding system based on observations worked well up to the 6th month, but at the 12th month, it became difficult observing the mother and the infant, simultaneously. On the one hand, there was the advantage of accessing the real background where interactions were established and of acquiring information about the adolescents and infants' developmental contexts. On the other hand, the "immersion" in a natural setting has brought some limitations: the infants were not interacting only with the mothers; consequently, they did not request the mothers' attention, fact that decreased the mothers' need to respond to them. Thus, it was possible discussing the challenges of specific research designs (e.g., structured vs. naturalistic observation), as well as its gains and limitations.

Although the results found in the last time-point were, somehow, unexpected, they were important. The used design helped in understanding the context where interactions have happened. This last time-point was extremely important to help understand how the infants interacted with the contexts they were inserted in and how the environment triggered their curiosity and will to move around. It was possible identifying the contextual features affecting the present observational work, and it allowed thinking about the prospect steps to be incorporated to future researches.

In addition, the herein established natural setting was different from that reported in other researches worldwide, wherein families lived in nuclear groups without the presence of others. The houses in the present research tended to be crowded, with many relatives around. The presence of other kin showed the need of adapting the research setting in order to respect participants' wishes and daily routines.

In some cases, it was difficult to be alone with the participants and their infants because of the permanent presence of some relative to assure the adolescent's safety, to avoid their presence alone with an unfamiliar person, as well as because of the curiosity to know what was happening. The research team found out that relatives' presence tends to diminish with time, because they develop a relational trust with the researchers (Diniz, Pante, Ozorio, Araldi, & Barcellos, 2014). Although the presence of others, besides the participant, in the research setting was out of the researcher's control, it allowed better understanding of the developmental context the participants were inserted in and the relationships established from it. The researchers could see the number of people moving around these houses, the rush in and out the house. It was also possible observing that the mothers were not the only caregivers; other kin or neighbors helped in taking care of the infants. Such scenario confronted the real natural setting of each dyad because it was not the planned "natural setting": mother and infant in a quiet room, along with the research team, without external requests during the interview.

Thus, a permanent research conflict emerged within the research team: whether the collected data represented the real context, how rigorous the researchers were in

data collection, and if it contributed to improve knowledge about the topic. Therefore, the continuous balance between environmental resources and the data representativeness became a constant. Some contextual limitations, such as the lack of privacy during the interviews or the presence of others, were an aspect of the participants' developmental context, and it should be understood according to the BTHD perspective (Bronfenbrenner, 2001).

Thus, the BTHD was an important theoretical tool allowing the present researchers to deal with challenges faced throughout the data collection process. It supported some methodological options that may be finally understood as "lack of rigor." The herein adopted developmental perspective allowed accessing the direct environment where the participants' development took place (Diniz et al., 2014). Thus, it was possible gathering usual information to be used in future research involving the population assessed in the current one, namely, the multiple proximal processes it established and how such processes can influence its development.

Despite some unexpected limitations found during the data collection process, the methodological design (collecting data about the interaction between the person and the developmental context) allowed accomplishing the research objectives. The study was successful, because the background features of a particular population were integrated in the present analysis in order to assure the ecological validity proposed by Bronfenbrenner (2001). Therefore, the mother-infant interaction reflects the personal and contextual variables enhancing the quality of maternal behaviors. In addition, although parental practices are universal, they may change depending on the developmental context (e.g., Keller et al., 2004). It is worth dealing with background features (e.g., Koller et al., 2012; Tudge et al., 2009), particularly when infant development and maternal behaviors are under investigation, because parental practices are influenced by the context where they happen (e.g., Belsky et al., 1991; Bornstein et al., 2012; Keller et al., 2004; Lordelo et al., 2000; Seidl-de-Moura & Mendes, 2010).

This chapter is innovative because of the methodological approach it addresses. Such methodology is useful to investigate and understand human development within the ecological background, as well as to investigate people living in vulnerable backgrounds in Brazil and in other Latin American countries. In addition, this methodological approach allowed understanding the challenges associated with infant-mother interaction and with their individual development. This understanding may be helpful to national public policy makers supporting adolescent mothers and their families in developing social support networks to help adolescents with their life achievements and expectations.

Take-Home Message Although maternal behaviors and parental practices tend to be similar all around the world, they are influenced by environmental aspects. Thus, the methodological procedures should be focused on these aspects. Research designs applied to this study field must have the research's aim into account in order to adopt the best data collection method.

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