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University of Minho, June 2023

Lídia Carvalho

Qualidade do toque do Cuidador em díades cuidador-criança: desenvolvimento e validação preliminar de uma medida observacional

Vário estudo tem demonstrado a importância da qualidade do toque do cuidador durante o primeiro ano de vida do bebé, com estudos que documentam a sua importância nos anos posteriores à infância. Apesar da sua relevância, há falta de instrumentos de avaliação da qualidade do toque do cuidador na observação direta da interação criança-cuidador.

Descrevemos aqui o desenvolvimento e a validação preliminar de um instrumento de observação da interação criança-cuidador para utilização na observação diádica de crianças de 2-5 anos em tarefas semiestruturadas. O instrumento, *Caregiver-Child Affective Touch Assessment* (CCATA), é composto por 7 qualidades de toque que podem ser classificadas em três categorias: (1) *Positive*, (2) *Negative* e (3) *Neutral Affective Touch*. Os participantes foram 20 crianças de uma amostra de risco, com idades compreendidas entre os 2 e os 4 anos (M = 34,80 meses; DP = 7,84; 65% do sexo feminino) e os seus cuidadores.

Foi encontrada uma fiabilidade adequada para a medida observacional CCATA. A análise correlacional documentou a validade do constructo através de associações significativas positivas com a *Adult Sensitivity* e associações significativas negativas com a *Adult Non-Intrusiveness* e *Adult Structuring*, medidas pelas *Emotional Availability Scale* (EAS). Este estudo também encontrou uma associação negativa significativa com a *Harsh Discipline*. Com base nos resultados, sugere-se uma validação adicional da medida observacional CCATA com outras amostras, uma vez que esta se revelou um instrumento promissor para avaliar a qualidade do toque do cuidador em díades cuidador-criança.

Palavras-Chave: toque; qualidade; observação; validade; avaliação.

The quality of caregiver touch in caregiver-child dyads: developing and preliminary validation of an observational measure

A vast body of literature has shown the importance of caregiver touch quality during the first year of the infant's life, with studies documenting its importance in the years beyond infancy. Despite its relevance, there is a lack of assessment tools for caregiver touch quality on the direct observation of child-caregiver interaction.

Here we describe the development and preliminary validation of an observation of child-caregiver touch interaction tool for use in dyadic observation with 2-5-year-old children in semi-structured tasks. The tool, Caregiver-Child Affective Touch Assessment (CCATA) is comprised of 7 qualities of touch that can fall into three categories: (1) Positive, (2) Negative, and (3) Neutral Affective Touch. The participants were 20 children from an at-risk sample, with ages ranging from 2 to 4 years old (M = 34.80 months; SD = 7.84; 65% females) and their caregivers.

Adequate reliability was found for the CCATA observational measure. The correlational analysis documented the construct validity via positive significant associations with Adult Sensitivity and negative significant associations with Adult Non-Intrusiveness and Structuring, as measured by the Emotional Availability Scales (EAS). This study also found a negative significant association with Harsh Discipline. Based on the results, a further validation of the CCATA observational measure is suggested with other samples, as this proved to be a promising tool to assess the quality of caregiver touch in caregiver-child dyads.

Key Words: touch; quality; observation; validity; assessment.

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1. Introduction

From the moment that infants are born, mothers engage in typical maternal actions such as holding them in cradle positions, expressing positive affect, and providing affective touch (Feldman & Masalha, 2010). Constant and sustained tactile stimulation is seen as the most prevalent behavior in the maternal constellation (Feldman, 2011) occurring between 55% and 99% of the time (Stack & Muir, 1990, 1992) of mother-child interactions, making it an important channel of communication (de Château, 1976; Moszkowski & Stack, 2007) and facilitates the establishment of the social bond between the mother and the infant (Beebe et al., 2010; Weiss et al., 2001). There are studies reporting the importance of maternal touch in actively reducing infants´ stress (Feldman et al., 2009) and calming infants in situations of pain and discomfort (Bellieni et al., 2007; Maitre et al., 2017). Additionally, there is empirical evidence suggesting that is not the mere presence or absence of maternal touch that can impact the child, but also the quality of touch itself (e.g., Herrera et al., 2004; Weiss et al., 2004). For instance, a study exploring the relationship between maternal mind-mindedness and the practice of tactile behaviors at 12 months, revealed that the frequency of mother´s verbal comments that were not auto-tunned to their infant's mental states (e.g., feeling and desires) and forecasted maternal touch behaviors that were no-contingent with the infant´s emotional states and need (Crucianelli et al., 2019).

Hence, more negative, less frequent, and non-contingent touching may reflect disturbances in maternal sensitivity, which has been pointed out as one of the key indicators of mother-child interaction quality (Crittenden & Bonvillian, 1984). Maternal sensitivity can be translated by a clear perception of the emitted cues of the child and adequate responsiveness (Ainsworth et al., 1978; Bowlby, 1969, 1973). Indeed, a research investigation focusing on the connection between maternal sensitivity when the

infant is 7 months old and the neural reaction of the infant to affective touch at 12 months of age discovered that diminished maternal sensitivity correlated with heightened activation of the somatosensory region, which is responsible for receiving and processing input from various parts of the body. The authors suggest that infants whose mothers are less sensitive are probably more likely to be exposed to impoverished tactile experiences which may lead them to perceive the light touch as more novel, thus engaging in increased neural processing of that stimulus (Mateus et al., 2021).

However, when examining mother-child interactions, it is not only important to consider only maternal variables, but also co-occurring contextual factors (Casillas, 2011; Jones & Yarbrough, 2009). Numerous studies have indicated that the state of the environment, including economic hardship and the consequential stress it entails, stands as a prominent factor influencing parenting practices are one of the leading causes that influence parenting (Kiernan & Huerta, 2008; McLoyd, 1990). Consequently, these circumstances can contribute to the adoption of severe disciplinary approaches marked by physical, verbal and psychological control (Casillas, 2011; Straus, 2010). In particular, the use of harsh physical discipline, like hitting and spanking, has been found to have detrimental long-term effects on children, being linked with negative outcomes, including behavioral problems (Larzelere, 2000), diminished self-esteem (Gershoff, 2002) and adverse mental health outcomes (Chang et al., 2003). The way how socioeconomic adversity (i.e., low socioeconomic status (SES)) can influence parental caregiving and impact children is well established in the Family Stress Model, proposed by Conger et al., in 1990. This model represents a theoretical outline of how economic deprivation and external pressures can influence child and adolescent maladjustment, first through parental psychological distress, followed by interparental relationship

problems and disrupted parenting (Masarik & Conger, 2017). Moreover, recent research indicates that a low SES environment has a significant influence on maternal sensitivity (Neuhauser, 2016), which in turn leads to adverse consequences on mother-child dyads (Tamis-LeMonda, 1996).

The significance of mother-child interaction in offspring development, along with the various factors that define the dyad as mentioned earlier, has prompted the development and subsequent validation of observational measures aimed at assessing the quality of maternal behaviors during dyadic interactions. For example, the Emotional Scale (EAS) serves as a relationship-centered assessment tool that enables the examination of caregiver-child interactions across a wide range of adult-child relationships, developmental stages, spanning from infancy to adolescence, and various contexts such as naturalistic settings, and semi-structured or structured play (Biringen et al., 2014). Although capturing important aspects of mother-child interactions, the assessment of the maternal touch in these dyads is rarely a target of evaluation. Indeed, the quality of maternal touch has also been shown to be important in mother-child interactions (e.g., Herrera et al., 2004), although the observational measures for assessing touch are rarely operationalized or measured in mother-infant interactions paradigms or clinical interventions (for a review see Botero et al., 2020).

This becomes even more prominent in later stages of childhood, as studies exploring the effects of maternal touch quality on the child are limited (Scott et al., 2022). Nonetheless, there´s evidence that suggests that maternal touch continues to have an important role even after infancy (e.g., Leonard et al., 2014). For instance, Reece et al. (2016) have shown that maternal touch in 4-6 years old predicted better accuracy in a social orienting task when compared to other maternal behaviors such as vocalizations. This study also suggested that providing intentional contact from the mother, that is

when the touch is purposefully directed at the child, as opposed to incidental touch and pushing, had a stronger association with the social orientation of the child, that is, children displayed a greater level of attention towards social (i.e., faces) as opposed to non-social (i.e., houses) information. In the same line, Scott and colleagues in 2022, studying preschoolers, have shown that children receiving higher levels of positive touches (e.g., hugs, caresses, kisses) during a conversation about an emotionally negative event, had lower physiological reactivity in response to laboratory stressors, as opposed to those receiving higher levels of negative touches (e.g., restrain, maneuver).

Taking into account that maternal touch continues to play an important role in children´s life post infancy and that, to the best of our knowledge, there are no available observational measures to assess the quality of maternal touch during this developmental period (for a review see Serra et al., 2023), in this study, we will present preliminary validity and psychometric properties of a new observational measure – the Caregiver-Child Affective Touch Assessment (CCATA), by analyzing preliminary data on a sample coming from a low SES environment (Pereira et al., 2014). This observational measure was developed to capture the quality of parental touch patterns in interaction with children from 2-5 years old emphasizing two key components of the interaction (a) maternal affective touch, and (b) the response of the child towards the touch. We predict that CCATA observational measure would present reliability, validity, and internal consistency.

Concerning validity, we will evaluate construct validity, based on the premise that a new measure to assess the quality of maternal touch should be associated with other behavioral parental measures since touch is the core of parental behavior (for a review see Feldman, 2011). Given that the quality of parental touch is central to the CCATA observational measure, we expect that this will be associated with other

observational validated measures to measure the quality of the caregiver's behavior. Considering that economic deprivation (i.e., low SES) may influence parental behavior (Deater-Deckard et al., 2012; Pereira et al., 2015), as it is associated with parental stress and family conflict and the use of more harsh discipline methods characterized by physical, verbal and psychological control (Casillas, 2011; Straus, 2010), we hypothesize that higher levels of *Harsh Discipline* (as used by Joosen et al., 2012), will be correlated with a higher frequency of Negative Affective Touch (defined in the CCATA observational measure as *Intrusive* and *Harsh/Rough Touch*). Studies show that higher levels of harshness are negatively associated with maternal warmth (Hubbs-Tait, McDonald Culp, et al., 2002; Marfo, 1992; Rafferty & Griffin, 2010). Thus, we hypothesize that lower levels of observed maternal warmth, as measured by *Adult Sensitivity* of the EAS will be associated with a higher frequency of Negative Affective Touch in the CCATA observational measure (as measured by *Intrusive* and *Rush/Rough Touch*).

We also expect that a higher frequency of the Negative Affective Touch defined in the CCATA observational measure will be associated with lower scores of *Adult Non-Intrusiveness*, measured by the Emotional Availability Scales (EAS) (Biringen, 2008). In addition, and considering that mothers from families with low SES tend to be less supportive in observed dyadic tasks (Weinfield et al., 2002), we expect that higher levels of observed supportiveness during mother-child interactions as measured by *Adult Structuring* of the EAS will be correlated with a higher frequency of the touch defined in the CCATA observational measure as *Orienting/Utilitarian Touch* since this touch is supposed to be associated with goal-oriented behaviors concerning the task at hand.

In sum, we hypothesize that a higher frequency of Negative Affective Touch in

the CCATA observational measure will be correlated with higher scores on the variables of *Harsh Discipline* and lower scores of *Adult Non-Intrusiveness* (EAS). We also expect that higher levels of Negative Affective Touch in the CCATA observational measure will be correlated with lower punctations of *Adult Sensitivity* (EAS) and that higher observed supportiveness coded in dyads as measured by *Adult Structuring* (EAS) will be associated with a higher display of the touch defined on the CCATA observational measure as *Orienting/Utilitarian*.

2. Methods

2.1. Participants

The participants are part of a wider research project regarding the intervention study on the efficacy of the Video-Feedback Intervention to promote Positive Parenting and Sensitive Discipline in a low SES sample (Pereira et al., 2014). Participants were recruited through contacts with health and social work agencies, for concerns regarding the quality of the child's caregiving environment (for more details on sample selection see Pereira et al., 2014). For the present study, we have used only data from the pretest assessment. To be included in our sample, the participants had to meet the following criteria: 1) the age of the child should be between 24-60 months at the moment when the reference was made by the social and health service agencies in the Northern region of Portugal. This selection resulted in the exclusion of 15 cases, leaving a selected sample of 29 mothers and their 24-60-month-old children. Two cases had to be excluded due to technical issues regarding the videotaped interactions, leaving a target sample of 27 mothers and their children. Due to human time constraints in coding the entire selected sample, a final sample consisting of 20 children and their mothers was randomly selected by writing the number corresponding to each participant on a piece of paper and placed in an opaque bag for random removal by the author of this

dissertation thesis.

The final sample consisted of 20 Portuguese children and their mothers from Northern Portugal. Most of the participants were females (65%) with a mean age of 34.80 (SD = 7.84, range = 24-48) months, and the mean age of mothers and fathers was 29.30 (SD = 5.83, range = 18-39) and 31.88 (SD = 5.74, range = 23-43, n = 17) years, respectively. Relatively to sociodemographic attributes, the data shows a high-risk sample: low educational attainment (65% of mothers and 70.58% (n = 17) of the fathers did not complete the 9 school years mandatory in Portugal to finish school). Furthermore, many of the parents were unemployed (68.42% of the mothers (n = 19)) or received welfare assistance (50% of the families).

At the variable age and educational attainment of the fathers, two of the cases of data not reported can be explained by the fact that the family is a single parent. There is also a case of a missing value regarding the age and the job of the mother due to unknown reasons. Finally, the job of the fathers is not reported due to the high number of missing data (more than 10%) which according to Miot (2019) is sufficient to not retain the variable in the study. In that sense, that variable is not reported.

2.2. General Procedure

Participants' families were visited at home due to the reduced mobility and accessibility of the at-risk sample. The first visit was concerned with the presentation and explanation of the research procedures and the signing of the informed consent form. Two weeks after that first visit, participant families were visited again to videotape several mother-child interaction tasks (1 hour).

This study was approved by the Portugal National Commission for data protection, an independent Portuguese organization concerned with the supervision of the respect and commitment to human rights established by the Constitution and the law

in personal data protection (for more details see Pereira et al., 2014).

2.3. Measures

2.3.1. Mother-Child Interaction

In the present study, we have used mother-child dyads videotape while participating in two tasks. In the "Clean-Up Task", the mother was instructed to help and support the child as she would normally do, although the child should help as much as possible. This task ended after all the toys were inside the box or after a maximum of 4 minutes. The other task, a "Don´t Touch Task", was presented with a box full of interesting toys to the mother, and she was instructed to remove them from the box and put them in front of the child, not allowing she/he to touch them. After two minutes, the child was allowed to play with the least interesting one (a stuffed animal). The task ended after another two minutes.

2.3.2. Caregiver-Child Affective Touch Assessment – Observational Measure - CCATA

CCATA was developed to assess the quality of affective touch of the caregiver towards a child between 2-5 years old. The CCATA observational measure was developed at *Grupo de Estudos de Vinculação* (Cipsi/University of Minho) (Silvestrini et al., 2022), and was based on Beebe et al., 2010; Crucianelli et al., 2019; Jean & Stack, 2009; Reece et al., 2016 and Serra et al., 2020. This observational measure aims to emphasize two key components of the interaction (a) maternal affective touch, and (b) the response of the child towards the touch. Concerning the first, it´s been proven by the literature that the maternal affective touch is an important channel of communication and brings benefits to infants and children (for a review see Stack & Jean, 2011)

Maternal affective touch cannot be understood except in relation to the child, due to its dyadic nature. In that sense, the child's response to the touch performed by the

parent it´s important to understand if the parent was successful in correctly interpreting the moment of the interaction to perform a given touch (e.g., Bornstein et al., 2007; Kochanska & Aksan, 2004).

Six investigators had received training. The first stage of practice included reunions via Zoom where we coded the maternal touch at the same, using the manual to dissipate eventual doubts and to expand it with examples of different types of touch that fall into the seven categories above mentioned. In the second stage, each investigator independently coded 12 videos from 11 participants in different tasks. For maternal touch, the coders recorded the video timestamp and coded it on an Excel® file, until good inter-observer reliability was reached. Because multiple touches can happen simultaneously, maternal touch was coded in three separate columns: one for each hand, and a third for touches made with the face (e.g., kissing). In the third and last stage of training, 6 videos were rated to calculate the inter-observer reliability rate among all the coders in the group – 0.82 (intraclass correlation coefficient (ICC) ranged between 0.80 and 0.90). In all stages, the training group was blind to other information about the families, including knowledge of responses to other measures.

This observational measure defines an occurrence of touch in two different cases: (1) when a part of the body of the caregiver touches a part of the body of the child or (2) when the caregiver uses an object as an intermediary to touch the child. In the CCATA observational measure, the type of touch established by the caregiver with the child can be indexed by categories within two dimensions: quality and frequency of the touch. The affective touch quality index refers to the specific touch or movement used, and it can fall into one of three major categories: Positive Affective Touch, Negative Affective Touch, and Neutral Affective Touch. The frequency index refers to the touch´s temporal length (from onset to cessation) and is coded every time the

interaction is initiated by the caregiver. The cessation of contact by the part of the body of the caregiver or the object defines the ending of the touch. The following description includes the categories, as well as some examples of aspects coded.

In the Positive Affective Touch, there is the *Affectionate Touch* which is coded when the caregiver's touch toward the child is intentional and tranquilizing. It shows affection or regulates the child's negative affect. It is coded when, for instance, during the interaction when the caregiver kisses the child affectionately and not abruptly, in a way that does not interrupt the flow of the activity, and as long as there is an obvious reaction of emotional reciprocation from the child. There is also the *Orienting/Utilitarian Touch*, which is coded when the caregiver's touch toward the child is intentional and dynamic, directed toward a specific goal during the task by providing care, protection, prevention, comfort, support, and cooperation/aid, offering guidance or instruction for the child to perform the task. It is coded when, for instance, during the interaction the caregiver takes the child by the hand in an optimal moment of the interaction to bring him/her back to the toy box, thus facilitating the accomplishment of the task. Finally, in this category, there is the *Playful Touch* The caregiver's touch towards the child is intentional and very active, playful, and dynamic, appropriate to the moment of interaction, with an obvious reaction of emotional reciprocity from the child. It is coded when, for instance, during the interaction, the caregiver tickles the child with the intention that he/she is laughing, taking advantage of the optimal moments of interaction for this.

In Negative Affective Touch, there is *Intrusive Touch* which is coded when the caregiver's touch towards the child is intentional, and its main objective is to control the child's behavior by interrupting and interfering with the child's movements in an intrusive way, without taking in consideration the desire of the child. It is coded when,

for instance, during the interaction, the caregiver puts his/her hand under the child's arm to try to make it difficult for the child to move, which causes the child to give up his/her intention. Finally, in this category, we have the *Rush/Rough Touch* which is coded when during the interaction the caregiver's touch is intentional and aims to control the child's behavior in a disruptive and aggressive manner. The caregiver's touch seems to have no apparent motive other than aggressively restricting the child's behavior, disregarding the child's wishes and the activities in which the child is involved. It is coded when, for instance, the caregiver restrains the child by grabbing him/her by the belly with one hand so that he/she cannot continue the activity in which he/she is involved, which causes the child to scream, cry and/or squirm.

In Neutral Affective Touch, there is *Accidental Touch* which is coded when the caregiver's touch toward the child is unintentional and physical contact occurs, but where the target is not the child. It is coded, for instance, when putting a toy in the box, the caregiver unintentionally touches the child's arm. Finally, in this category, there is the *Static Touch,* which is coded when the caregiver's touch toward the child occurs and is maintained, remains aimless, unintentional, and automatic with no benefit or harm to the child. It is coded when, for instance, the caregiver places his/her hand on the child's arm, without moving it, while the child is putting away the toys (cf. Table 1).

The codification of quality and the frequency analysis were independently made by the author of this study (primary encoder) and a second encoder (master in Neuroscience and Education) after familiarization and concerted discussion of the codification manual previously built. The primary encoder codified all videos in integral form, while the second encoder analyzed 50% of the material, corresponding to half of the mother-child dyads. The dyads selected for being analyzed by the second encoder are referent to both tasks (the Clean-Up and Don´t Touch Task) to cover all the maternal

behavioral specific to each task. When the independent agreement was not achieved, there was a revision of the classification of types of touch in question to obtain a consensus between coders.

Table 1

Descriptions of maternal touch quality from CCATA observational measure

CCATA	Description
Positive Affective Touch	
Affectionate Touch	Intentional and tranquilizing touch. It shows affection or regulates the child's negative affect.
Orienting/Utilitarian Touch	Intentional and dynamic touch. It provides care, protection, prevention, comfort, support, and cooperation/aid, offering guidance or instruction for the child.
Playful Touch	Is intentional and very active, playful, and dynamic, with an obvious reaction of emotional reciprocity from the child.
Negative Affective Touch	
Intrusive Touch	Is intentional, and its main objective is to control the child's behavior.
Harsh/Rough Touch	Is intentional and aims to control the child's behavior in a disruptive and aggressive manner.
Neutral Affective Touch	
Accidental Touch	Is unintentional, however, physical contact occurs, but the target is not the child.
CCATA	Description
Static Touch	Is unintentional, remains aimless, and automatic with no benefit or harm to the child.

2.3.3. Emotional Availability Scales (EAS)

The same two tasks were coded with the 4th edition of the Emotional Availability Scales (EAS) (Biringer, 2008), which was designed to assess the quality of the interactive behavior between a child and an adult. This codification system involves 6 dimensions, both from the adult toward the child as well as the child toward the adult.

The dimensions of the adult are 1) *Sensitivity* referent to the adult's ability to establish an emotional connection with the child, which is shown through the positive affect, accurate perceptions, and appropriate responsiveness to the child, as well as conflict negotiation, 2) *Structuring* referent to the adults attempts to structure and scaffold the child´s environmental play adequately and effectively, 3) *Non-Intrusiveness* referent to the ability of the adult to follow the child lead during the dyad and to wait for an optimal moment to enter the interaction and 4) *Non-Hostility* referent to the covert and overt hostility, and it's indicative of the adult capacity to interact without threatening impatient or frightening behaviors; the dimensions of the child are 5) *Responsiveness to the Adult* and 6) *Child´s Involvement of the Adult.* All the dimensions are evaluated on a continuous scale of 1 to 7 points, where 7 constitutes the ideal quality in each dimension. Each dimension is composed of 7 sub-scales, two of which with scores that range from 1-7 and 5 with scores that range from 1-3 (that makes a total potential score that ranges 7-29, which can then be translated from 1–7-point scale according to a standardized table). A different team of raters coded the mother scales (Negrão et al., 2015). The average ICC (single rater, absolute agreement) for inter-observer reliability for all separate pairs of three coders on the mother's variables was 0.87 (range = 0.72-0.95; n = 7). Given the focus of the present work, we only use the dimensions related to the adult (for more details, see Negrão et al., 2015). For this study, each scale of interest was averaged across the two tasks.

2.3.4. Harsh Discipline

Maternal discipline was measured utilizing standardized observations during the two tasks mentioned above. Different aspects of harsh discipline were measured using standardized procedures for coding discipline rating scales (adapted from Verschueren et al., 2006), including physical and verbal harsh discipline (as used by Joosen et al.,

2012). The same two tasks were coded using standardized procedures for coding the discipline rating and were used to measure different aspects of harsh discipline (adapted from Verschueren et al., 2006). *Harsh physical discipline* was coded when mothers showed unnecessary physical force (e.g., slapping, grabbing/holding, the face of the child, pulling an arm too hard to grab toys from the child) that led to a clear physical impact on the child (e.g., body movement, facial/verbal expression of shock and discomfort). It used a rating scale ranging from 1-5 (subtle to severe harsh acts), which included frequency criteria. *Psychological control* was also coded on a scale ranging from 1-5 which signaled the harshness of the content, rather than the tone, of maternal assertations. Criteria of this variable included the extent to which mother statements made the child feel guilty, ashamed, or responsible for mishaps and/or the mother showed: 1) disregard for the child´s feelings, 2) disregard for what the child is saying, 3) withholding of affection, 4) inconsistent emotional behavior (changing between showing warmth and attacking the child). *Harsh verbal discipline* is a variable referent to the way that the mother addresses the child by displaying emotions such as irritation and anger in her voice tone (e.g., irritated/impatient/unfriendly voice, screaming). This variable was also rated on a scale ranging from 1-5 which is based on the intensity and frequency of these acts.

A different team of raters coded the mother scales *Harsh Discipline* variable (Pereira et al., 2014) The average ICC (single rater, absolute agreement) for inter-observer reliability was 0.80 (range = 0.70-0.91, n = 24). Pretest observations were independently coded by different coders who were unaware of relevant information regarding the families (for more details see Pereira et al., 2014).

2.4. Analytic Strategy

Statistical analyses were conducted using IBM Statistical Package for Social

Sciences (SPSS), version 29.

The inter-observer reliability was calculated using the ICC. Attending to the high inter-rater reliability for the concordant items, the main coder's coding will be presented in the analyses.

The maternal touch quality variable (as measured by the CCATA observational measure) was the proportion of interaction frequency per touch category. This data was obtained through the division of the absolute frequency of touches per category by the total frequency number of touches performed by the mother across the two tasks.

All the measures used in this study were tested for normality using the Shapiro-Wilk test(Mohd Razali & Bee Wah, 2011). Descriptive statistics were presented for all variables.

To assess the association among all CCATA variables, a Bivariate Spearman´s Rank Order Correlation was performed. The strength of the relationship was classified according to Cohen´s criteria (Schmidt & Bohannon, 1988): 0.10 = weak or small association; 0.30 = moderate correlation; and 0.50 = strong or large correlation.

To preliminary evaluate the construct validity of the CCATA observational measure, the relative frequency of maternal quality touch variable was correlated with EAS, including the *Adult Non-Hostility*. The correlation used was the Bivariate Spearman´s Rank Order Correlation, due to the nature of the variables. A Bivariate Spearman´s Rank Order Correlation between the CCATA observational measure and the *Harsh Discipline* variable was also used, as assumptions of normality were not met.

Finally, an exploratory analysis to evaluate whether existing gender and age-related differences regarding the relative frequency of touches measured by the CCATA observational measure was performed, with a Bivariate Spearman´s Rank Order Correlation.

Results were considered a statistically significant difference when $p \leq 0.05$ (Pallant, 2016).

3. Results

Descriptive statistics for sociodemographic variables and frequency of touches as measured by the CCATA observational measure, EAS, and *Harsh Discipline* are reported in the tables below. Normality tests for all variables of interest are reported in Appendix A.

Table 2

Descriptive Statistics for Sociodemographic Variables

Baseline Characteristics	N	%
Gender		
Female	13	65
Male	7	35
Mother´s Highest Educational Level		
1st cycle education	5	25
2nd cycle education	8	40
3rd cycle education or Mandatory Professional	6	30
Secondary Education or Professional Level 4	1	5
Father´s Highest Educational Level		
1st cycle education	6	35.29
2nd cycle education	6	35.29
3rd cycle education or Mandatory Professional	5	29.42
Mother´s Job		
Unemployed	13	68.43
GRAFFAR 5	6	31.57

Table 3

Descriptive Statistics for the CCATA Observational Measure

CCATA	N	%
Positive Affect		
Affectionate Touch	11	1.0
Orienting/Utilitarian Touch	176	23.0
Playful Touch	34	4.0
Negative Affect		
Intrusive Touch	347	45.0
Harsh/Rough Touch	130	17.0
Neutral Affect		
Accidental Touch	50	7.0
Static Touch	20	3.0

Table 4

Descriptive Statistics properties of sociodemographic variables, CCATA Observational Measure, EAS, and Harsh Discipline

Variables	M	SD	Range
Child´s age (months)	64.5	43.3	24-48
Mother´s age (years)	29.3	5.83	18-39
Father´s age (years)	31.8	5.74	23-43
CCATA (relative frequencies)			
Positive Affective Touch			
Affectionate Touch	.02	.03	.00 - .13
Orienting/Utilitarian Touch	.26	.18	.03 - .75
Playful Touch	.04	.07	.00 - .25
Negative Affective Touch			
Intrusive Touch	.44	.09	.25 - .63
Harsh/Rough Touch	.15	.16	.00 - .57
Neutral Affective Touch			

Variables	M	SD	Range
Accidental Touch	.07	.06	.00 - .22
Static Touch	.03	.03	.00 - .11
Emotional Availability Scales (scores)			
Adult Sensitivity	4.55	1.08	2.00 - 6.25
Adult Structuring	4.48	1.18	2.25 - 7.00
Adult Non-Intrusiveness	4.59	1.12	2.50 - 7.00
Adult Non-Hostility	5.33	1.00	2.50 – 6.50
Variable (scores)			
Harsh Discipline	5.31	1.25	3.50 - 8.00

3.1. Psychometrics

Inter-observer reliability was assessed with Cohen´s Kappa Coefficient. The resulting ICC was .93 for the total CCATA observational measure (range = .78-1.00; n = 10), 1.00 for the *Affectionate Touch*, .78 for the *Orienting/Utilitarian Touch*, *Playful Touch* and *Harsh/Rough Touch*, .74 for the *Intrusive Touch*, .81 for the *Accidental Touch* and .67 for the *Static Touch*, indicating that maternal touch quality was coded with good to high ICC among observers.

3.2. Associations among the CCATA observational measure

The results revealed a statistically significant positive association between *Affectionate Touch* and *Intrusive Touch* (r_s = .46, p = .04). That is, mothers who perform more *Affective Touch* are more likely to perform *Intrusive Touch*. There was also a significant negative association between the *Orienting/Utilitarian Touch* and the *Intrusive Touch* (r_s = -.50, p = .02), *Harsh/Rough Touch* (r_s = -.61, p = .01), and *Static Touch* (r_s = -.52, p = .02). That is, mothers who perform more of the *Orienting/Utilitarian Touch*, are less likely to perform the *Intrusive*, *Harsh/Rough* and the *Static Touch.* A significant negative association between the *Playful Touch* and the *Accidental Touch* (r_s = -.57, p = .01) was also observed. That is mothers who perform

more

the *Playful Touch*, are less likely to perform the *Accidental Touch*.

Finally, the results revealed a statistically significant positive association between the *Intrusive Touch* and the *Static Touch* (r_s = .69, p = < .00). That is, mothers who perform more *Intrusive Touch* are more likely to perform *Static Touch*. The remaining correlations were not statistically significant.

Table 5

Bivariate Spearman´s Rank Order Correlation Among the CCATA Observational Measure Variables

Variable							
	1	2	3	4	5	6	7
1. Affectionate Touch	-						
2.Orienting/Utilitarian Touch	-.15	-					
3. Playful Touch	.37	-.10	-				
4. Intrusive Touch	.46*	-.50*	.18	-			
5. Harsh/Rough Touch	-.44	-.61**	-.18	-.04	-		
6. Accidental Touch	-.20	.15	-.57**	.04	-.05	-	
7. Static Touch	.42	-.52*	.09	.69**	-.02	-.17	-

* *p < 0.05.* ** *p < 0.01.*

3.3. Construct Validity

3.3.1. Associations of the CCATA observational measure with Adult Non-Intrusiveness (EAS)

Results revealed a significant negative association between Adult Non-Intrusiveness and *Harsh/Rough Touch* (r_s = -.48, p = .04). That is, mothers who perform more *Harsh/Rough Touch* are more likely to have lower scores on the Adult Non-Intrusiveness variable. There were no correlations between the other variables of CCATA and Adult Non-Intrusiveness (EAS) (cf. Table 6).

3.3.2. Associations of the CCATA observational measure with Adult Sensitivity (EAS)

The results revealed a significant positive association between *Affectionate Touch* and Adult Sensitivity (r_s = .48, p = .03). That is, mothers who perform more *Affectionate Touch* are more likely to have higher scores on the Adult Sensitivity variable as measured by EAS. The remaining correlations were not significant (cf. Table 6).

3.3.3. Associations of the CCATA observational measure with Adult Structuring (EAS)

The results revealed a significant negative association between the Adult Structuring and the *Harsh/Rough Touch* (r_s = -.53, p = .02). That is, mothers who perform more *Harsh/Rough Touch* are more likely to have a lower score on the Adult Structuring variable as measured by EAS. The remaining correlations were not statistically significant (cf. Table 6).

3.3.4. Associations of the CCATA observational measure with Harsh Discipline

The results revealed a significant positive association between the *Harsh/Rough Touch* and *Harsh Discipline* (r_s = .52, p = .02). That is mothers who perform more *Harsh/Rough Touch* are more likely to have a higher score on the *Harsh Discipline* variable. The remaining correlations were not statistically significant (cf. Table 6).

Table 6

Bivariate Spearman´s Rank Order Correlation between the CCATA Observational Measure Variables and Adult Non-Intrusiveness, Adult Structuring, Adult Sensitivity (EAS) and Harsh Discipline

Variable	Affectionate Touch	Orienting/Utilitarian Touch	Playful Touch	Intrusive Touch	Harsh/Rough Touch	Accidental Touch	Static Touch

Adult Non-Intrusiveness	.41	-.13	-.13	-.31	-.48*	.24	.40
Adult Sensitivity	.48*	.05	.31	.22	-.42	.03	.34
Variable	Affectionate Touch	Orienting/Utilitarian Touch	Playful Touch	Intrusive Touch	Harsh/Rough Touch	Accidental Touch	Static Touch
Adult Structuring	.32	.12	.10	.09	-.53*	.07	.28
Harsh Discipline	-.02	-.44	-.03	.30	.52*	.02	.27

* $p < 0.05$. ** $p < 0.01$.

3.4. Exploratory Analysis

3.4.1. Associations of the CCATA observational measure with Adult Non-Hostility (EAS)

The results revealed a significant positive association between Adult Non-Hostility and *Affectionate Touch* (r_s = 0.47, p = .04), *Intrusive Touch* (r_s = .50, p = .02), and *Static Touch* (r_s = .60, p = .01). That is, mothers who have higher scores are more likely to perform *Affectionate, Intrusive* and *Static Touch*. A significant negative association between this subscale and the *Harsh/Rough Touc*h was also found (r_s = -.49, p = .03). That is, mothers who have higher scores on the Adult Non-Hostility subscale are less likely to perform *Harsh/Rough Touch* (cf. table 7).

3.4.2. Associations of the CCATA observational measure with Child´s Age and Gender

In this study, we have also explored the role of age and gender in relation to the CCATA observational measure variables. Results revealed a significant negative association between the child´s age and the *Orienting/Utilitarian Touch*. That is, mothers are more likely to perform the *Orienting/Utilitarian Touch* the younger the children are

(cf. Table 7). No other correlations between CCATA observational measure and the child´s age and gender were observed (cf. Table 7).

Table 7

Bivariate Spearman´s Rank Order Correlation between the CCATA Observational Measure Variables and Adult Non-Hostility (EAS) and Child´s Age and Gender

Variable	Affectionate Touch	Orienting/Utilitarian Touch	Playful Touch	Intrusive Touch	Harsh/Rough Touch	Accidental Touch	Static Touch
Adult Non-Hostility	.47*	-.06	.15	.50*	-.49*	.08	.60**
Child´s Age	-.03	-.48*	-.02	.04	.24	.11	.24
Child´s Gender	.13	-.26	.21	.22	.06	-.19	.38

* $p < 0.05$. ** $p < 0.01$.

4. Discussion

The quality of maternal touch plays an important role in infancy and beyond (e.g., Reece et al., 2016; Scott et al., 2022), although observational measures to assess the quality of maternal touch are rarely operationalized in mother-child interactions, especially in years beyond infancy. in the present work, we developed the CCATA observational measure to assess the quality of affective touch on dyadic interactions with children 2-5 years old. Our goal was preliminary to evaluate the validity of the psychometric properties of the CCATA observational measure meaning internal consistency, inter-observer reliability, and construct validity. In the main, the CCATA observational measure presented a high degree of inter-observer reliability. The inter-observer reliability presented in this work is superior to other observational measures developed to assess the quality of maternal touch (e.g., The Mother-Infant Touch Scale (MITS) from Crucianelli et al., 2019), however, one must be aware that this scale was

not a target of validation.

In the present work, we also analyzed the association of the CCATA observational measure with other measures of sensitivity (EAS) to evaluate construct validity. Our primary hypothesis was that a higher frequency of Negative Affective Touch in the CCATA observational measure would be correlated with lower scores of *Adult Non-Intrusiveness* (EAS). It was found a negative association between Adult Non-Intrusiveness and *Harsh/Rough Touch*, but not with *Intrusive Touch*. This variable of EAS measure the adult´s ability to be available without intrusions on the child´s autonomy, like doing too much for the child that the child can do himself/herself (Biringen et al., 2014). This finding is consistent with literature that suggests that a low-income environment can lead to an increment in maternal harshness (Clincy & Mills-Koonce, 2013). However, further study is needed to explore replicability.

Our second hypothesis was that higher levels of Negative Affective Touch in the CCATA observational measure would be correlated with lower punctations of *Adult Sensitivity* (EAS). Contrary to our hypothesis, higher scores on Adult Sensitivity didn´t reveal a negative association with the Negative Affective Touch. This could be explained by studies suggesting that the relation between maternal sensitivity (as measured by Adult Sensitivity from EAS) and harshness (as measured by the Negative Affective Touch from CCATA observational measure) is partially mediated through self-control (Bradley & Corwyn, 2007). As in the present work, this factor was not controlled, it could be explaining the lack of results. It would be interesting if future research explored this association with maternal self-control. However, it was found a positive association between this subscale and the *Affectionate Touch*. In that sense, it´s congruent that higher scores of Adult Sensitivity are positively associated with a higher relative frequency of *Affectionate Touch*. This association is consistent with research

findings that suggest that mothers coming from a low-income environment show less sensitivity during dyadic interactions, so mothers who display more sensitive behaviors would be more prone to perform more *Affectionate Touch* (Crittenden & Bonvillian, 1984). However, further investigation is recommended.

Our third hypothesis was that higher observed supportiveness coded in dyads as measured by *Adult Structuring* (EAS) would be associated with a higher display of the touch defined on the CCATA observational measure as *Orienting/Utilitarian*. Contrary to our hypothesis, Adult Structuring didn´t present a positive correlation between the *Orienting/Utilitarian Touch*. This could be explained by studies suggesting that mothers who come from a low-income environment tend to be less supportive in observed dyads (Weinfield et al., 2002). So, it could mean that in my sample it wasn't performed enough touches of this category to be statistically significant. However, it was found a negative association between this sub-scale and *Harsh/Rough Touch*. This means that mothers who have higher punctuation on the Adult Structuring tend to perform less *Harsh/Rough Touch*. This finding is consistent with literature suggesting that harsh mothering is negatively associated with supportive mothering (Berlin et al., 2009; Hubbs-Tait, Culp, et al., 2002). However, further study is recommended to see the replicability.

Our fourth and last hypothesis was that a higher frequency of Negative Affective Touch in the CCATA observational measure would be correlated with higher scores of *Harsh Discipline*. As expected, a positive association was found between this variable and *Harsh/Rough Touch*. This is consistent with literature that states that parental behaviors can be influenced by economic deprivation (i.e., low SES) (Deater-Deckard et al., 2012; Pereira et al., 2015), which through parental stress and family conflict that are associated with it can lead to the use of more harsh discipline methods characterized by

physical, verbal and psychological control (Casillas, 2011; Straus, 2010). In that sense, it would be congruent that higher punctuation on this variable was associated with the performance of more *Harsh/Rough Touch*. However, further study is needed to confirm this finding.

The present work also performed an exploratory analysis to explore the association between the Adult Non-Hostility subscale and CCATA observational measure variables. This analysis revealed a positive association between Adult Non-Hostility and *Affectionate*, *Intrusive* and *Static Touch*. Adult Non-Hostility is referent to the way that the mother interacts or talks with the child that is not abrasive, impatient, or antagonistic. Regarding the positive association between *Affectionate* and *Intrusive Touch*, it would be expected that higher scores on this scale would lead to a higher performance of the first and a lower performance of the second. However, this seems not to be the case in the present study. This lack of consistency could be explained by a study suggesting that Adult Non-Hostility doesn´t differ between mothers coming from a low and a non-low-income environment, advancing an explanation that mothers can modulate their aggressive impulses during the relatively short videotaped interactions (Biringen, 2000). So, this could mean that this subscale is not adequate to do this kind of comparison. However, it's important to further explore this possible explanation in future research. The positive association between Adult Non-Hostility and *Static Touch* means that mothers who are punctuated as being less hostile when interacting with their child tend to perform less the *Static Touch*. This result is not reported in the literature, so it needs further investigation. Finally, it was found a negative association between Adult Non-Hostility and *Harsh/Rough Touch*. This finding is consistent with literature suggesting that contexts, where high levels of parental hostile behaviors are prevalent, tend to lead to an increase in harsh parental behaviors (Xing & Wang, 2017). Although

consistent with what is found in the literature, it would be interesting to explore if this association is maintained when controlling for maternal impulsivity. In that sense, further study is warranted.

Finally, our exploratory analysis between the child´s age and CCATA observational measure variable revealed a negative association between the child´s age and the *Orienting/Utilitarian Touch* significant associations. This finding is consistent with literature that suggests that there are differences in the quality of maternal touch according to a child´s developmental phase, during the first year of life (Ferber et al., 2008). In that sense, these exploratory analyses aimed to test whether the differences in mother-child interaction regarding a child´s age existed beyond infancy. The present finding seems to point in that direction, being consistent with a study showing that younger children tend to receive more instruction (Rogoff et al., 1984). However, more research is needed to better explore this association. Concerning the associations with child´s gender, it wasn´t found significant associations. This finding is inconsistent with literature showing that mothers tend to be warmer with daughters than with sons (Mandara et al., 2012; Shanahan et al., 2007). However, in the present study, this seemed not to be the case. This lack of results could be explained by our reduced sample size, which could not be sufficient for statistically significant results to appear. In that sense, further study with a bigger sample size is warranted to explore these associations.

In the present work, was performed associations among the CCATA observational measure. This revealed a negative association between *Orienting/Utilitarian Touch* and *Harsh/Rough* and *Static Touch* was observed. Considering the negative association between the *Orienting/Utilitarian Touch* and the *Harsh/Rough Touch*, as they belong to opposed categories on the CCATA observational

measure, it would be expected that mothers who have a higher tendency to perform one, have a lower tendency to perform the other. This finding is consistent with studies showing that mothers coming from a low-income environment have a lower supportiveness tendency toward their child (Brophy-Herb et al., 2013; Weinfield et al., 2002) and are more prone to the use of harsh physical discipline methods (Bordin et al., 2006; Dietz, 2000; Runyan et al., 2010). It was also found a negative association between the *Orienting/Utilitarian* and *Static Touch.* This result is not reported in literature, so further is necessary to better explore it. However, is needed further exploration in future research to see if it´s replicable.

It also found a positive association between *Intrusive, Affectionate,* and *Static Touch*. Regarding the positive association between *Intrusive* and *Affectionate Touch*, since these two types of touches belong to opposed categories, we would expect that mothers who have a higher tendency to perform one, have a lower tendency to perform the other. This finding is inconsistent with previous literature suggesting that a low-income environment is prone to lead to a decrease in maternal warmth (Hubbs-Tait, McDonald Culp, et al., 2002; Marfo, 1992; Rafferty & Griffin, 2010) and an increment in maternal intrusiveness (Clincy & Mills-Koonce, 2013). In that sense, further study is warranted to better understand this result. Finally, the positive association between *Intrusive* and *Static Touch* is not identified in the literature, so it needs further exploration in future research.

Some limitations of the present work should be acknowledged. First, the reduced sample size limits the generalization of the findings of the present to the population being studied. It is also important to keep in mind that the CCATA observational measure was developed to be used with children from 2-to-5 years old, however on the sample of this dissertation thesis, the maximum age is 4. In that sense, expanding the

sample size to explore the validation for that age would be important. Second, it is necessary not to forget that the sample population with which we work in this dissertation thesis comes from an environment of low economic status which can imply high levels of stress that were not controlled, but that literature is shown to be important when examining mother-child interactions (e.g., St-Laurent et al., 2019; Wilhoit et al., 2021). In that sense, it would be important to conduct further studies that control for this variable. Thirdly, the literature is not consistent in the way that evaluates touch and its mostly done in the first year of life (for a review see Serra et al., 2023), which difficult comparisons with the present dissertation thesis. Fourthly and lastly, it is important to acknowledge that the CCATA observational is still a work in development, so further adjustments can still be warranted.

The CCATA showed promise as an observational measure that can be used with older children. Nevertheless, additional work is necessary to validate the measure more fully. First, future work should evaluate the internal consistency of this observational measure, with a bigger sample. It would be interesting to do a longitudinal study to explore differences in mother-child dyads according to age. It would also be interesting to analyze whether child involvement and responsiveness towards the adult have any association with the quality of maternal touch during dyadic interaction. Equally important would be to explore how the CCATA observational measure diverges from self-report inventory such as the Brief Symptom Inventory (BSI). It would also be important to explore why some associations that appear on one, but not in another task. This may be due to the different nature of the tasks, however, it would be important to further explore. Further, this is the first time that it was attempted to develop and validate an observational measure for children older than one-year-old, the coding system may require adjustments.

In summary, the present thesis expands the current literature by exploring maternal touch quality in older children and by taking the first step into developing and validating an observational measure to assess this variable on mother-child dyads. Thus, the CCATA observational measure opens new grounds for assessing continuity and change of maternal touch quality across childhood and for expanding our understanding of touch and its outcomes in the child from toddlerhood to school age.

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Appendix A

Normality Tests

Table A1

Normality tests for CCATA Observational Measure, EAS, Harsh Discipline and Child´s Age

CCATA	Shapiro-Wilk		
	Statistic	DF	P
Positive Affective Touch			
Affectionate Touch	.53	20	< .001
Orienting/Utilitarian Touch	.92	20	.087
Playful Touch	.66	20	< .001
Negative Affective Touch			
Intrusive Touch	.97	20	.838
Harsh/Rough Touch	.88	20	.015
Neutral Affective Touch			
Accidental Touch	.92	20	.103
Static Touch	.90	20	< .001
Emotional Availability Scales			
Adult Sensitivity	.97	20	.724
Adult Structuring	.99	20	.993
Adult Non-Intrusiveness	.98	20	.927
Adult Non-Hostility	.88	20	.018
Variable			
Harsh Discipline	.94	20	.238
Sociodemographic Variable			
Child´s age	0.93	20	0.176