



PONTIFICIA UNIVERSIDAD CATOLICA DE CHILE

Faculty of Social Sciences

School of Psychology

UNIVERSITÄT HEIDELBERG

Fakultät für Verhaltens-Und Empirische Kulturwissenschaften

UNIVERSIDAD DE CHILE

Faculty of Social Sciences

Department of Psychology

Doctoral Program in Psychotherapy

DOCTORAL DISSERTATION

**MULTILEVEL STUDY OF ATTACHMENT, BEHAVIORAL PROBLEMS AND
SOCIAL COGNITION IN ADOLESCENTS ADOPTED DURING CHILDHOOD
WITH EARLY SOCIAL DEPRIVATION BACKGROUND**

By

MARÍA JOSEFINA ESCOBAR

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A Dissertation submitted in partial fulfilment of the requirements for the degree Doctor of
Philosophy in Psychotherapy

By

MARÍA JOSEFINA ESCOBAR

Research Tutor : María Pía Santelices, PhD. Pontificia Universidad Católica de Chile

Co-tutor: Profesor Johanes Schöeder, PhD. Heidelberg University, Germany

Laura Moncada, PhD. Universidad de Chile

Thesis Committee: Vladimir López, PhD. Pontificia Universidad Católica de Chile

Blaise Pierrehumbert, PhD. Lausanne University, Suiza

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To Rodrigo, for their unconditional love and support

To my parents, my brother and my sisters, for joining me in every new adventure

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ABSTRACT

The experienced of early social deprivation has an impact at different levels of the cognitive, behavioral and physical development of adolescents. And some studies showed that a later age of adoption increases the risks of the impact on the child's development. These impacts sometimes continue during the adolescence and into adulthood. However, the researchers consider adolescence as a critical period especially for adopted adolescents. In Chile little is known about development of adopted adolescents since no control policies exist after adoption.

The current work assessed, from a multilevel approach, late adopted adolescents with a history of early deprivation compared with teenagers who grew up in their biological families. The present research has two levels of analysis. The first level responds to the reports of the adolescents and parents about the adolescent's behavior. At this level, the age at adoption, a scale of behavioral problems and the adolescent's attachment style were taken into consideration. The second level responds to an experimental study in social cognition with Event Related Potential (ERPs) studies. The first experiment assesses the emotion processing, and considered attachment style. And the second experiment evaluated moral sensitivity.

The findings showed that early social deprivation has an impact on the emotional, behavioral and neurophysiological development of the adolescent. Adopted adolescents showed more insecure attachment compared non-adopted adolescents. Besides, did not find differences in behavioral problems compared with their peers. Later age of adoption increased the risk for "social problems" and "insecure attachment". Furthermore, the results suggest that the impact of early deprivation produces a delay in neurodevelopmental maturation, and this has an impact on the behavioral level as well as on the development of moral cognition.

The study highlights the importance of post-adoption processes for timely intervention and support during the different periods of development. Also, the relevance to assess the neurodevelopment and detect early presence of problems in adopted children and adolescents.

INTRODUCTION

Many adopted children who have lived the first years of their lives in institutions or foster care have typically been associated with early deprivation, because during the first period they had no stable caregiver. Several longitudinal studies with adopted children after the age of 6 months and who experienced early deprivation showed an impact in different areas of child development: affective, cognitive, social and physiological (Habersaat, Tessier & Pierrehumbert, 2011; O'Connor & Zeanah, 2003; Rutter, Kreppner, & O'Connor, 2001; Zeanah, Smyke, Koga, & Carlson, 2005). It is considered a critical period for a child of 6 months to be adopted. At a later age it is considered to be a "late adoption" because the risk increases that it will have an impact on the child's development. Findings across time have shown that some of these negative impacts continue in adolescence and in adulthood (Feeney, Passmore, & Peterson, 2007; Habersaat, Tessier & Pierrehumbert, 2011; Hodges & Tizard, 1989; Hodges & Tizard, 1989b).

Researchers consider adolescence a critical period, especially for adopted adolescents. The adolescent goes through a lot of changes –biological and psychological- and that brings up a lot of questions about their identity -"who am I and where do I come from"- and this is more sensitive for an adopted adolescence (Bimmel, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2003; Mirabent Junyent & Ricart Carratalá, 2010). The adopted adolescents experience a rupture with their biological family. This first lost in their life sometimes goes hand in hand with a lot of doubts about their past and their origins. These topics are very important in identity construction (Mirabent Junyent & Ricart Carratalá, 2010).

In Chile there are no post-adoption policies. The different adoption agencies have their own policies and in most of the cases there is no post-adoption work with families. Little is known about the development of the adopted child in the adolescence period. There are no studies about late national adoption and adolescence in Chile. According to the national adoption law, adopted people have a right to know about their origins. Adolescents at the age of 18 can look for their origins (Art. 27, Adoption Law Nr.

19.620) and this is one of the reasons about why it is necessary to find a good way to accompany the parties in this process. We need to know more about the development of the adopted children.

With the aforementioned background information, the current study assessed the impact of early deprivation in late adopted adolescents and compared it with a group of non-adopted adolescents who grew up in their biological families. The present research has two levels of analysis. The first level responds to the reports of the adolescents and parents about the adolescent's behavior. At this level, the age at adoption, a scale of behavioral problems (a report of the adolescent him/herself and a report from the parents) and the adolescent's attachment style were taken into consideration. The second level responds to an experimental study in social cognition with Event Related Potential (ERPs) studies. The first experiment assesses the emotion processing, and considered attachment style. And the second experiment evaluated moral sensitivity.

This study is part of the Attachment Adoption Adolescents Research Network (AAARN, see Appendix 11), which is an international project focusing on attachment representation in adopted adolescents and their parents. One of the articles of the presented study was developed with a cross-cultural sample, and is part of the first level of analysis. The topic is ADHD symptoms and early attachment deprivation.

First the theoretical and empirical backgrounds are presented in order to contextualize the studies and problems to be researched. Second are six articles by the author and these are followed by a general discussion and a conclusion in order to integrate and ponder the main results. There is also an appendix for complementary information.

1. EMPIRICAL AND THEORETICAL BACKGROUND

Early deprivation regards the lack of individualized attention and the lack of a stable and responsive caregiver and most of the time it is associated with different deficiency situations (Nelson, 2007; Tarullo, Bruce, & Gunnar, 2007; Tarullo & Gunnar, 2005). These have an impact at different levels of the adopted child's development. This chapter will present the theoretical and empirical background of early deprivation and adoption. And because the common experience of the adopted child is breaking with the biological parents, all the concepts developed in this chapter explore the contributions of the attachment theory and attachment researchers.

First, the relevance of studying adoption in adolescence in Chile will be presented with studies about attachment, adoption and adolescence, followed by previous research on behavioral problems in adopted adolescents and previous studies about attachment styles and behavioral problems. Finally, some background about the neuroscience approach: social-cognition and early deprivation, and some studies about attachment and processing emotional information. This first chapter closes with the problem to be researched.

1.1. Adoption and adolescence

Before reaching adolescence the child has to go through several experiences. The way in which he/she spent childhood will have an impact as well facing the changes of adolescence. In all adolescents there are great changes at different levels (physical and socio-emotional). The physical changes often highlight the physical differences from their adoptive parents and become a much more present genetic weight, which leads them to wonder about their origins (Berastegui et al., 2010; Myrabent et al., 2010).

At an emotional level, adolescence is a transitional stage where the adolescent seeks to achieve greater independence and differentiation from primary caregivers and begins to form significant relationships with peers as well as romantic relationships (Allen, 2008). The changes have an emotional, cognitive and behavioral effect in the adolescent and

they are linked to attachment relationships and allow going from being a subject receiving care to being self-sufficient and having the potential to care for another (Allen, 2008). At this stage the adolescents have the meta-cognitive ability to revise their mental state, and the ability to recognize positive and negative aspects of their relationship with their parents (Allen, 2008). At the basis of the search for differentiation and autonomy, the main developmental task, is the construction of identity (Erikson, 1968; Marcia, 1980). For adopted teens these questions, at the same time, lead them to wonder even more about their origins, about their biological parents, the reasons why they were abandoned, their own-worth (Berastegui et al., 2010; Myrabent et al., 2010). This makes the task for adopted adolescents to construct their identities even more difficult.

Because of these changes adolescence is considered a stage of life of profound transformation. In the adopted adolescents these changes trigger doubts and questions that complicate the task. These are the reasons why it is relevant to study what happens in these adolescents at the different levels.

1.1.1. Adopted adolescents in Chile

Currently in Chile there are no post-adoption monitoring policies. There is no standardized monitoring program for the adoptive family. Programs are either short or don't exist. To date, there is just one study in Chile about adopted adolescents. This study was about adolescents who were adopted at an early age (before 6 months of life). The study was carried out in 2006, by the "*Fundación Chilena para la adopción*" and published in an official document of the National Youth Services of the Government of Chile (SENAME). The study involved 40 adopted adolescents who were adopted between 1986 and 1990. The main conclusions of this study were that early adoption facilitated the establishment of deep and stable relationships between adoptive parents and their children. This is in agreement with what the literature says about early adoptions (Chisholm, 1998; O'Connor & Zeanah, 2003; Rutter et al., 2007). For most of the teens, the adoptive mother is the figure who represents emotional closeness and confidence. Moreover, the teens showed good social adjustment and felt that their peer

group gave them emotional support. Nevertheless, a high percentage of these teens had educational achievement problems associated with the Attention Deficit Disorder and specific learning (Fundación Chilena para la Adopción, 2006).

On the other hand, there are no studies about late adopted teens (adoption at a later age) in Chile and this is a matter that should be explored. In Chile, a lot of adoptions are after the first year of life and before being adopted the children remain in institutions or foster care. In 2011, 67% of adoptions were children older than one year according to the National Youth Service of Chile, SENAME (for more details on figures see Appendix 4). Many international studies stated that the age of adoption is a risk factor causing different problems (Gunnar et al., 2007; Habersaat, Tessier & Pierrehumbert, 2011; Mehta et al., 2009; Rutter et al., 2006). It is important to do research into the late adopted adolescents as there is a lack of information regarding this group in Chile, and because the age of adoption is closely related with other problems in the child's development.

1.2. Attachment and adopted adolescents

The attachment theory emerged from the observations of orphaned children from the Second World War. That is why the early deprivation experience has always been associated with the attachment theory. The attachment system is based on a basic need for security and protection (Bowlby, 1980). Individuals develop a secure attachment if they have had the presence of an available, predictable and responsive caregiver (Bretherton & Munholland, 2008). On the other hand, in early deprivation experiences most of the children lack a stable, predictive and responsive caregiver.

The first year in the life of a child is a special period to build up bonds with the main caregiver. Many studies on adopted children have showed more insecure or disorganized attachment than their peers who grew up in their biological families (Chisholm, 1998; Rutter, et al., 2006; Vorria, et al., 2006). There are few studies on adopted adolescent's attachment patterns, most of them are about children. A longitudinal study compared 61 children that spent their first two years of life in

institutions with another group of 39 children who grew up with their biological family. The main results showed that when the adopted children were 4 years old they had a less secure attachment than the children of the control group (Vorria, et al., 2006). Another relevant study on children compared children who lived for at least 8 months in orphanages in Romania (OR), a second group of early adopted children (before the age of 4 months (EA)), and a third group of children without a background of institutionalization (NI) (Chisholm, 1998). The findings showed that there were no differences in attachment between the EA and NI groups. It reaffirms that the impact on attachment is related to the age of adoption (Chisholm, 1998), and that the group of early adopted children is less vulnerable (O'Connor & Zeanah, 2003; Rutter, et al., 2007). However, the OR group showed more insecure attachment patterns and more indiscriminately friendly behavior than the other two groups (Chisholm, 1998; Chisholm, Carter, Ames, & Morison, 1995). In the OR group, tested twice – adopted at 11 months and later at 26 months –they found a higher score of secure attachment in the second test. The studies with adoptive children suggest that while early deprivation increases the risk of insecure attachment, it is also possible for children to eventually develop a secure attachment with their adoptive parents.

Even though the origin of the attachment theory focused on the early stages of life, the attachment theory supports the idea of the tendency of stability of the attachment pattern through the vital cycle. Adolescence is a transitional stage when people seek more independence from their primary caregivers and look for significant and romantic relationships with their peers (Allen, 2008; Casulla & Fernandez, 2005). The adolescent has new cognitive capabilities to identify positive or negative aspects in his/her relationship with his/her parents (Allen, 2008). That is why the attachment takes on new characteristics and is important in the adolescent's narrative in order to assess the attachment relationships.

Studies with adopted adolescents suggest that the difficulties in relationships persist (Habersaat, Tessier & Pierrehumbert, 2011; Hodges & Tizard, 1989b). Recently, a study has been published with a sample of 116 internationally adopted children, aged between 8 and 11 years ($M=8.92$; $SD=1.08$) (Barcons et al., 2012). The results showed that the

distribution of attachment patterns in this sample were a little different to the general population. The percentages were 60.3% of secure attachment compared to 62% in the general population, and 12% ambivalent compared to 9% in the general population. But they showed higher insecure-avoidant attachment, 25% compared to 15% in the general population. With regard to disorganized attachment, they only showed 1.7% compared to 15% found in the general population. The main result was that adopted children were capable of developing a pattern of organized attachment as there were 2 cases with disorganized attachment (Barcons, et al., 2012). However, the authors of this study did not find that the age of adoption had an impact on the attachment style. These data suggest that the impact of the early experience continues in adolescence. Also, studies showed that an adoption background is a risk factor with regard to difficulties in relationships, even as an adult (Feeney, et al., 2007; Howe, 2001).

To summarize, there is agreement that the experience of early deprivation makes the development of a secure attachment difficult. Even though the attachment has particular characteristics during adolescence, studies with adopted adolescents (Barcons, et al., 2012; Habersaat, Tessier & Pierrehumbert, 2011; Hodges & Tizard, 1989b), and adults (Feeney, et al., 2007; Howe, 2001) suggest that this impact on attachment would remain. Nevertheless, some studies suggest that adopted children, over time, could develop a secure relationship with their adoptive families (Cohen & Farnia, 2011; Pace & Zavattini, 2011; Pugliese, Cohen, Farnia, & Lojkasek, 2010; Román, Palacios, Moreno, & López, 2012; Román Rodríguez, 2010).

1.3. Adoption, behavior problems and attachment

In recent times there have been a lot of studies on adoption and behavioral problems. This is because behavioral problems give us clues about the adaptation of children and the easy use of assessment instruments (Román Rodríguez & Palacios, 2010). Typically assessed through questionnaires, one of the most used is the Child Behavior checklist (CBCL), and the terms "internalizing behaviors" and "externalizing behavior" are increasingly used as indicators of behavioral problems. Internalizing behaviors are those that relate to anxious and depressive behaviors while externalizing behaviors are those

that are easier to observe and which are often more disruptive, generating a negative impact on social relationships and adaptation in general (Loizaga Latorre & Louzao Rojas, 2010). These include defiant behaviors and aggression, among others.

With regard to adoption, there are controversial positions regarding the presence of more behavioral problems in adopted adolescents with a history of early deprivation, compared to those who grew up with their biological parents. A number of studies conducted with adolescents with a history of early deprivation reported that they scored higher on the scales of behavioral problems than children who grew up in their biological families (Sharma, McGue, & Benson, 1998; Van IJzendoorn & Juffer, 2006; Wierzbicki, 1993). Adopted children and adolescents have a higher risk of developing antisocial behaviors than those children and adolescents with no history of adoption (Peters, Atkins, & McKernan McKay, 1999; Wierzbicki, 1993).

However, some authors reported no significant differences (Cederblad, Höök, Irhammar, & Mercke, 1999; Goldney, Donald, Sawyer, Kosky, & Priest, 1996). One study showed significant differences between adopted and non-adopted children, but these differences disappeared between the ages of 10-11, which suggested to the authors that the differences between adopted and non-adopted would diminish with age (Brodzinsky, Radice, Huffman, & Merkler, 1987). The latter is very interesting because it is contrary to the position that has been held that the adolescent is especially more conflictive than other age groups with a history of adoption.

Wierzbicki (1993) conducted a meta-analysis that reviewed 66 publications on adoption and social adjustment. The main results showed that the adopted subjects had higher scores in behavioral problems than those who were not adopted, both externalizing behaviors, such as academic problems. Finally, this meta-analysis found larger effects on adolescents in contrast to adults and children. And there was no difference regarding the "adjustment" between adopted and non-adopted, in relation to the age of adoption (Wierzbicki, 1993).

There have been two meta-analyses about behavioral problems and international adoption. The first aimed to see the prevalence of behavioral problems in adopted adolescents (Bimmel, et al., 2003). It reviewed 10 studies with a total of 2,317 adoptions and compared those with a control group of 14,345 non-adopted adolescents. The studies showed that adopted adolescents showed appropriate adjustment and generally showed no significant differences with non-adopted peers. However, adopted teens showed more behavioral problems than non-adopted adolescents. These differences were seen in externalizing behavioral problems and not internalizing (Bimmel, et al., 2003). The second meta-analysis studied behavioral problems and mental health in international adoptions and compared those with control groups of non-adopted and national adoptions (Juffer & van IJzendoorn, 2005). The authors reviewed articles that compared adopted and non-adopted controls, 34 articles on "mental health referral" and 64 on "behavioral problems", 25,281 cases of adoption (international-national) and 80,260 non-adopted. Their analysis showed that the group of international adoptions scored more behavioral problems with both externalized and internalized symptoms and found no statistical differences by gender. Although there were more behavioral problems, the scores were moderate, indicating that most subjects from the international adoptions are well adjusted but are more often referred to mental health services than the non-adopted controls. Likewise, international adoptions have fewer behavioral problems, both internalizing and externalizing symptoms, than domestic adoptions. And international adoptions also showed that, contrary to what the authors had expected, adolescents had fewer adolescent behavioral problems compared to early and middle childhood (Juffer & van IJzendoorn, 2005).

A more recent study on international adoption with 1,948 children, range age was 4-18 year-old, reported that children who had been institutionalized for at least two years, had significantly higher scores than the control group on both the internalizing and externalizing scales (Gunnar, et al., 2007). The authors concluded that adopted children have a higher risk of developing behavioral disorders.

A study of 342 adopted children and adolescents (international adoption) at the ages of 6-18, post-institutionalized, found that a history of growing up in institutions was

associated with an increased risk of attention problems and externalizing symptoms (Hawk & McCall, 2011). Furthermore, they found that scores on behavioral problems increased significantly if the child was adopted after 18 months of age. Moreover, this relationship between age of adoption and behavioral problems (social problems and externalizing problems) was more significant when assessed during adolescence, between 12 and 18 years, than in childhood, between 6 and 11 years (Hawk & McCall, 2011; Merz & McCall, 2010). Regarding the age of adoption, a study with a sample of 169 Israeli adolescents, adopted between birth and 9 years, found no relationship between age of adoption and adaptation (Gleitman & Savaya, 2011). The same study also showed low levels of behavioral problems, in both externalizing and internalizing symptoms.

Although there are no studies linking adoption, attachment style and behavioral problems, other studies have shown that children who grow up in their biological families, develop an attachment style with their parents that is considered a protective factor for behavioral problems in cases of "secure attachment" and a risk factor for some behavioral problems which leads to "insecure attachment". One study associated avoidant insecure attachment in children (4-5 years) with high scores on externalizing behaviors (Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000). Insecure attachment was also associated with internalizing behavioral problems, including anxiety and somatic difficulties (Manassis, Bradley, Goldberg, & Hood, 1995), and depressive symptoms (Kobak, Sudler, & Gamble, 1991). And one study on adolescents showed that there was a reciprocal negative effect between quality of attachment and behavioral problems, both externalizing and internalizing symptoms (Buist, Deković, Meeus, & van Aken, 2004). These results were supported by the findings of a sample of 535 adolescents that found that insecure attachment, both avoidant and anxious, predicted internalizing and externalizing problems (Pace & Zappulla, 2011).

In summary, it is clear that there are different positions regarding the association between "behavioral problems" and adoption. There are controversies which can be summarized in 4 points. First, in relation to whether adoptees have more behavioral

problems that people who grew up in their biological families; second, if the age of adoption is a risk variable for "behavioral problems"; third, whether during adolescence the adopted have more behavioral problems than the non-adopted or on the contrary these differences diminish; and finally, whether international adoptions score higher on "behavioral problems" than domestic adoptions. In the present study, we seek to explore the first two controversies and the third and fourth only partially because the sample taken includes only teenagers and national adoptions. And finally, to our knowledge, no study has explored the relationship between the adopted adolescent, behavioral problems and attachment, but the studies mentioned above suggests that the attachment style would act as a protective or risk factor in the development of behavioral problems.

1.4. A neuroscience approach to early deprivation and the social brain

Social neuroscience research of the last decade has provided great support for the theoretical and empirical understanding of psychological and social phenomena. It is relevant to study the impact at the social brain level because the first years of life are a critical period in neurodevelopment. The early deprivation experience is usually associated with a lack in stimulation. On the other hand, social cognition develops over time. Adolescence is a period of a lot of changes that include brain changes. It is therefore relevant to know the results from social neuroscience studies with regard to brain development during adolescence, and the neurodevelopment effects of early deprivation in children and adolescents.

1.4.1. The development of a social brain during adolescence

As explained before, adolescence is a period of physical, psychological and social transition between childhood and adulthood. This is also a critical stage when there are substantial changes in the social brain (Blakemore, 2008a). The "social brain" refers to the brain regions involved in social cognition. These regions include: the medial prefrontal cortex (mPFC), the anterior cingulate cortex (ACC), the inferior frontal gyrus, the superior temporal sulcus (STS), the amygdala and the anterior insula (Frith & Frith, 2007).

Studies have focused on social processes during adolescence such as emotional recognition and understanding of the other's emotions, intentions and beliefs (Blakemore, 2008a, 2008b). Some studies on emotion recognition found that the activity in parts of the frontal cortex increased between childhood and adolescence and then decreased between adolescence and adulthood (Blakemore, 2008b; McGivern, Andersen, Byrd, Mutter, & Reilly, 2002; Yurgelun-Todd & Killgore, 2006). The decrease in prefrontal activity in adolescents could be related to the pruning of synapses (Blakemore, 2008b). After that, it is possible that fewer synapses are needed to do the same work, because the synapses are more efficient (Blakemore, 2008b).

Another relevant topic linked to these stages of life is the capacity of moral reasoning (Carlo, Fabes, Laible, & Kupanoff, 1999; Carlo, Koller, & Eisenberg, 1998; Decety & Cacioppo, 2012; Decety, Michalska, & Kinzler, 2012). This ability has been closely connected to both emotional and cognitive processes, necessary to represent and integrate information about intentions, beliefs, attributions, and to anticipate and understand the actions from others (Decety & Howard, 2013; Decety, et al., 2012). Moral decision making is an important aspect of social cognition and it is considered an outcome of a large process of our biological evolutionary and cultural history (Decety & Cacioppo, 2012). This means that mature moral abilities are a fundamental capacity of adaptation in social life because they are critical to decode social cues that in turn are related to inferences on agency and intentionality, and also as part of a circuitry involved in "theory of mind" (ToM) and social perception (Allison, Puce, & McCarthy, 2000; J. Decety & Jackson, 2004; Moll, De Oliveira-Souza, & Zahn, 2008).

Adolescence is a period of a lot of changes in social behaviors and significant neuroanatomical changes in parts of the social brain (Blakemore, 2008b). Studies on neurodevelopment during adolescence are relevant for the implications of early intervention and to promote good social adjustment.

1.4.2. Early deprivation and deficit in social cognition

Postnatal brain development requires an interaction between genes and experience, early deprivation experience during critical periods of brain development, does not allow the child to have the optimal experience for a good development (Nelson, 2007; Sheridan, Drury, McLaughlin, & Almas, 2010). Many adopted adolescents suffered early deprivation before adoption. The evidence showed that this deprivation is associated with socio-emotional deficits (Tarullo & Gunnar, 2005).

Institutionalized infants and early social deprivation studies have shown important effects on social cognition on at least two levels: a) behavioral, and b) brain correlates. The first level has focused on emotion and situation recognition tasks and false belief understanding, and not really on moral reasoning. Several researchers have found the performance poor when identifying emotions in adopted children compared to children who grew up in their biological families (Barone & Lionetti, 2012; Camras, Perlman, Fries, & Pollak, 2006; Fries & Pollak, 2004; Vorria, et al., 2006). However, there has also been controversial evidence that indicated no differences between both groups in the emotion recognition task (Jeon, Moulson, Fox, Zeanah, & Nelson, 2010; Nelson, Parker, & Guthrie, 2006; Tarullo, et al., 2007). Tarullo, et al., 2007 referred to their results and suggested that they didn't find differences in the emotion processing task because there may be a delay in acquiring this ability but not a deficit; or the task might have been designed for preschoolers and was too simple for 6 - 7 year-old children. At this level, work on the false belief understanding –associated with the ability to attribute to others a belief which one knows to be false, with 4 - 5 year-old children and which is considered one of the components of ToM- has been conducted post-institutionally (Tarullo, et al., 2007). The main outcomes reveal that the post-institutionalized children (age range: 6-7 years) scored lower than the birth children group (even after checking verbal and cognitive ability). Moreover, nearly half the adopted children failed in the trials of the false belief task (Tarullo, et al., 2007). Other studies also provide similar findings (Colvert, Rutter, Beckett, et al., 2008; Colvert, Rutter, Kreppner, et al., 2008; Yagmurlu, Berument, & Celimli, 2005). With regard to moral reasoning, there are no specific or direct studies reported in the literature linked to

adopted or institutionalized children. For instance, the closest is a work about pro-social moral reasoning that made comparisons between institutionalized delinquent, orphaned and non-institutionalized adolescents (Carlo, et al., 1998). The first two groups exhibited lower moral reasoning assessments than the last group (Carlo, et al., 1998). On the other hand, within a context of maltreated toddlers, findings suggest that both physically abused and neglected children present deficits in their moral development (Koenig, Cicchetti, & Rogosch, 2004). This type of situations can tentatively be linked to early deprivation (Maughan & McCarthy, 1997). This issue could therefore also be connected to adopted children with an institutionalization record.

On the second level, regarding early deprivation and brain development, there is ample literature concerning cognitive and socio-emotional delay. A study using Positron Emission Tomography (PET) in orphaned children of Romania ($M=8.8$ years old) observed dysfunctions in different brain areas in contrast with healthy adults and children with refractory epilepsy. The orphaned child showed less activity in orbitofrontal gyrus, infralimbic prefrontal cortex, temporal medial area and lateral temporal cortex and brainstem (Chugani et al., 2001). Brain connectivity studies have made comparisons between institutionalized or early social deprivation children and non-institutionalized children and the results showed that post-institutionalized children had an significant decrease of connectivity of white matter in the left uncinate fasciculus (temporal lobule), explaining some neurocognitive deficits (Eluvathingal et al., 2006). Other similarly conducted studies also assessed cerebral volumetry –specifically white matter, corpus callosum, hippocampus and amygdala- and found important size differences in the non-institutionalized group (Sheridan et al 2012; Tottenham et al 2010; Tottenham et al 2011). In agreement with these results were the results of another study with adopted adolescents with early deprivation experiences who were compared with non-adopted adolescents. A structural magnetic resonance imaging (MRI) showed that adopted children had a significantly smaller brain volume compared with the control group (Mehta, et al., 2009). The total volume of gray and white matter was significantly lower than that of the control group. Once the differences in brain volume were corrected, the most important findings were that the group of adolescents with a history of deprivation showed a larger volume of amygdala, mainly in the right

amygdala. The period of institutionalization correlates with the amygdala volume. When the adolescent had a longer time of early deprivation, the left amygdala volume was smaller (Mehta, et al., 2009).

Electroencephalogram (EEG) studies showed a delayed maturation in electrical brain activity in post-institutionalized children – a pattern of increased low frequency (*theta*) power in posterior scalp regions and decreased high-frequency (*alpha* and *beta*) power, particularly at frontal and temporal electrodes sites – compared to children who had never been institutionalized (Marshall, Fox, & Group, 2004). On the other hand, the ERPs research found early modulations in the face and emotions recognition, highlighting larger amplitude N170 component to fear expression and less amplitude to happy and sadness in adopted children (Moulson, Fox, Zeanah, & Nelson, 2009; Parker & Nelson, 2005).

Parker & Nelson (2005) conducted a study using ERPs to see the impact of institutionalization on the neural correlates involved in emotion recognition, 72 post-institutionalized children (7 to 32 months old) and 33 children who grew up in their biological families (8 to 33 months old). The aim was to see their response to four facial expressions (fear, anger, joy and sadness). The results showed no significant differences in the recognition of emotions with regard to component Nc and PSW, whereas the N170 and P250 are modulated differently against emotions. Institutionalized children showed greater N170 amplitude in response to fear and lower amplitude in response to sadness and joy, the control group presented a reverse response. The pattern presenting the P250 component was the reverse in both groups. Another finding was that institutionalized children showed smaller amplitude N170 components, Nc and PSW, and higher P250 amplitudes compared with non-institutionalized children (Parker & Nelson, 2005). This last data item supports the results presented above on cortical hypo-activation due to a maturational delay in brain development.

Another study that evaluated 208 children 5-31 months old, recruited in a Romania BEIP study partly supports the mentioned findings (Moulson, et al., 2009). The sample consisted of a group of institutionalized children, a second group of children who had

been institutionalized but subsequently put in foster care and a control group of children who grew up in their family of origin. The experiment consisted of recording the children while stimuli were presented with pictures of faces expressing different emotions (anger, happiness, fear and sadness); assessments were conducted at three time points (baseline, 30 months and 42 months). The results showed that institutionalized children had dramatically smaller amplitude and longer latencies in the occipital components P1, N170 and P400 compared to children who grew up in their families. At 42 months, the amplitudes and latencies of the ERPs of children in foster care were modulated to intermediate between the other two groups, allowing for the assumption that the foster care intervention has an impact at the neuronal level in emotion recognition skills. In these cases it was observed that the age of entry into foster care had no impact on the results of the measurement of the 42 months old. Another finding was that emotional processing was similar in the three groups. Specifically the P250 and Nc components on the faces of fear had a higher amplitude and longer latency compared to faces of happiness (Moulson, et al., 2009).

To summarize, the studies on early deprivation impact showed that it is possible to observe both a structural alteration of the brain, an overall delay of the brain maturation level and potential amplitude and latency associated with emotion recognition. These results were correlated with behavioral responses, mainly emotional tasks.

On the other hand, a study of adopted children found that a mediating variable of emotion recognition ability was the attachment style, attachment security being one mediator between the adoption status and the performance of recognition tasks regarding emotions (Barone & Lionetti, 2012). With regard to emotion understanding, recent indications show that people with different attachment patterns (without the adoption condition) process facial emotional information differently (Donges et al., 2012; Fraley, Niedenthal, Marks, Brumbaugh, & Vicary, 2006; Niedenthal, Brauer, Robin, & Innes-Ker, 2002; Steele, Steele, & Croft, 2008; Suslow, Dannlowski, Arolt, & Ohrmann, 2010; Suslow et al., 2009). Neuroimaging studies showed differential modulation of the neural response in individuals with an insecure attachment compared

to secure adults when presented with different facial expressions (Donges, et al., 2012; Suslow, et al., 2009; Vrtička, Andersson, Grandjean, Sander, & Vuilleumier, 2008).

The processing of emotional information in faces has also been extensively studied using ERPs with people (without adoption condition). For instance, a study reported that avoidant attachment individuals showed significant differences in the P1 component in response to angry faces compared to neutral faces (Dan & Raz, 2012). This difference was not present in secure individuals or anxious individuals. Another study was conducted using women with secure or insecure-avoidant attachment (Fraedrich, Lakatos, & Spangler, 2010). Insecure women showed a more pronounced negativity in the face-sensitive N170 component. The authors concluded that encoding faces was more challenging for insecure-avoidant women than for secure-attachment women because they were shown to have more cortical activation and processing resources. In general, these studies suggest that differences in attachment patterns are related to differences in the process of perceiving facial emotions as reflected by amplitude modulation of known ERP components (Dan & Raz, 2012; Fraedrich, et al., 2010; Zhang, Li, & Zhou, 2008).

In sum, the evidence showed that early deprivation affects some regions of the “social brain” and this has an impact on social tasks, such as emotional recognition in children. Studies have examined brain areas involved in the perception of facial emotions in individuals with different attachment styles and suggest that the neural network involved in processing facial emotion information is sensitive to attachment patterns. But nothing was researched in processing facial information tasks with the ERPs technique in either adolescents or adopted adolescents. Also, electrophysiology studies with adopted adolescents on emotional processing and the moral process have not been reported nor the relationship to attachment styles in adolescents which is an important area of research. As adolescence is an important stage in the development of the social brain (Blakemore, 2008a) and evidence showed some deficits, it is relevant to study these abilities in adopted adolescents.

From what has been described, it was deemed relevant to evaluate adopted adolescents with an early deprivation experience at different levels of analysis. Due to the importance of attachment in the adoption situation, it was considered relevant to evaluate the attachment patterns of the adopted adolescents and compare them with non-adopted adolescents. The age of adoption was also taken into consideration. The first results are reported in the article: *“Attachment in adopted adolescents. National adoption in Chile”*. Taking into consideration the controversies about behavioral problems and adopted adolescents, a group of adopted adolescents was compared with a non-adopted group. Apart from considering the age of adoption, different informants – parents report and a self-report - finally considered the possible interaction between attachment and behavioral problems. The results of this research are reported in the second article: *“Behavioral Problems and attachment in adopted and non-adopted adolescents”*. Like a transcultural study it evaluated the influence of attachment deprivation on ADHD symptoms. The results of this study are presented in the third article: *“Another way of thinking about ADHD: The predictive role of early attachment deprivation in adolescents’ level of symptoms”*. At the second level, a theoretical review is carried out of the main research related to the impact of early deprivation experiences in the neurodevelopment. The results of this review are reported in the fourth article: *“The impact of early social deprivation on Neurodevelopment”*. Considering the relevance of the capacity of moral reasoning in adolescence, the brain correlates moral sensitivity in adopted adolescents with antecedents of early social deprivation and compared it with non-adopted adolescents. The results are reported in the fifth article: *“Brain signatures of moral sensitivity in adolescents with early social deprivation”*. Finally, the behavioral and ERP correlates of emotional processing in adolescents with different attachments patterns (secure-insecure) were examined and the association of these correlates to individual neuropsychological profiles was explored. The results are reported in the sixth article: *“Attachment patterns trigger differential neural signature of emotional processing in adolescents”*.

2. PUBLISHED, SUBMITTED AND IN PROGRESS ARTICLES BY THE AUTHOR

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Attachment in adopted adolescents. National adoption in Chile

María Josefina Escobar, María Pía Santelices

Abstract

The focus of this study is on the description of attachment patterns in adopted adolescents, taking into consideration the age when they were adopted and a comparison with the control group of non-adopted adolescents paired by age, gender, educational level and socio-economic level. Participants: 25 adolescents adopted at the age of 6 months or older through national adoption agencies and 25 non-adopted adolescents. To evaluate the patterns of attachment, a semi-structured interview was used: *Friends and Family Interview* (Steele & Steele, 2005). Results: Statistically significant differences were found in the attachment patterns of adopted and non-adopted adolescents. Adopted adolescents showed a more insecure attachment, a predominantly insecure-avoidant attachment. In conclusion, late adoptions are a risk factor for the development of secure attachment in adopted adolescents.

Keywords: *attachment, adoption, adolescence, Friends and Family Interview.*

1. Introduction

Experiences of abandonment and separation that adopted children suffer have a negative impact on their attachment patterns. Some studies show a predominance of insecure and disorganized attachment patterns mainly in children who were adopted after the age of 6 months (Chisholm, 1998; Rutter et al., 2001; Van IJzendoorn and Juffer, 2006; Vorria et al., 2006). This trend continues during adolescence, showing that adopted adolescents

have more difficulties in their relationships with peers and that they have less close relationships compared to adolescents who grow up with their biological family (Hodges & Tizard, 1989). Studies about international adoption are increasing, but in Latin-America national adoption is the most common way to adopt. There are few studies that evaluate the attachment styles in adolescence. To date, there are no studies in Chile about adolescents adopted after the age of 6 months and there are no standardized monitoring programs for the adoptive family, so programs tend to be very short or even absent. Over 81% of adoption cases in Chile correspond to applicants living in Chile (Servicio Nacional de Menores, 2011). In most international adoptions, Chilean children have left the country to be placed for adoption in, mainly, Italy followed by Norway as countries of destination. According to the National Youth Service of the Government of Chile, in 2011, there were 538 national adoptions and 122 international adoptions. The annual report, published in 2011 by SENAME, also highlighted that many adoptions were carried out after the children were one year old, staying in institutions or foster care. Regarding the quality of institutions in Chile, SENAME stipulates by decree that institutions during the day should have one educator to care directly for 7 children and by night there may be fewer caregivers and there are no rules regarding the number of shifts. In 2011, there were 218 adoptions of 1 year-olds and 439 adoptions of children older than 1 (Servicio Nacional de Menores, 2011). This is why it is important to find out what happens to these children who are now adolescents, because adolescence in itself is considered a stage of greater risk in the life cycle.

1.1 Attachment during adolescence.

Adolescence is a transitional stage when people seek greater independence from their primary caregivers, greater autonomy and differentiation. In this search significant and romantic relationships are built up with peers (Allen, 2008; Casulla & Fernández, 2005). The adolescent undergoes important changes at the emotional, cognitive and behavioral level, systems that are related with attachment relationships and that allow a person to progress from one that gets care to a self-sufficient human being, someone who can take care of another person (Allen, 2008). Due to these changes, adolescence is

considered a period of important transformations and that is why it is relevant to study what happens with attachments patterns. During this stage the adolescent has the meta-cognitive skill to check his or her mental state, as well as the chance to recognize positive or negative aspects in his or her relationship with his or her parents (Allen, 2008). That is why the evaluation of attachment styles during adolescence is done using instruments focused on the narrative of the adolescent. These instruments allow going more in-depth into the adolescent's narrative for a more extensive study of the richness of his or her experiences with regard to attachment relationships. This study has used the Friends and Family Interview (Steele & Steele, 2005) which allows evaluating this aspect by using the narrative of attachment.

1.2. Attachment and adoption

Studies on adopted children have reported a close relation between adoption and insecure attachment (Chisholm, 1998; Rutter et al., 2001; Van IJzendoorn and Juffer, 2006; Vorria et al., 2006). Vorria et al. (2006) in a longitudinal study compared 61 children that spent their first two years of life in institutions with another group of 39 children that grew up with their biological family. They were evaluated while they were institutionalized, and they were between the ages of 12 and 18 months, and again when they were 4 years old. The authors reported that when the children were 4 years old they showed less secure attachment than the children of the control group, concluding that the experience of early deprivation makes the development of a secure attachment difficult. Chisholm (1998) found similar results in a comparison between children who lived for at least 8 months in orphanages in Romania (OR), a second group of early adoption, before 4 months (AT), and a third group of children without a background of institutionalization (SI). The findings showed that there were no differences in attachment between the AT and SI groups. However, the OR group showed more insecure attachment patterns and more indiscriminately friendly behavior than the other two groups. In the OR group, tested twice – after 11 months of adoption and later at 26 months-, they found a higher score of secure attachment in the second test. This data suggests that despite deprivation experiences children are capable of generating relationships of attachment and that time is needed to develop these. Researchers seem

to agree that the experience of institutionalization of adopted children is associated with a more insecure attachment. Finally, it reaffirms that the impact on attachment is related to the age of adoption (Chisholm, 1998), and that the group of early adopted children are less vulnerable (O'Connor & Zeanah, 2003; Rutter, et al. 2007).

There are few studies about attachment patterns in adopted adolescents. Recently, Barcons, et al. (2012) published a study on international adoption. They studied a sample of 116 adopted children, aged between 8 and 11 years ($M=8.92$; $SD=1.08$). The instrument used to measure attachment was the Friends and Family Interview (Steele and Steele, 2005). They found that the distribution of attachment patterns in this sample were slightly different to the one in the general population. 60.3% of secure attachment compared to 62% in the general population, and 12% ambivalent compared to 9% in the general population. But they showed higher insecure-avoidant attachment, 25% compared to 15% in the general population. With regard to disorganized attachment, they only showed 1.7% compared to 15% found in the general population. The study concluded that adopted children were capable of developing a pattern of organized attachment as there were 2 cases with disorganized attachment. However, the authors of this study did not find that the age of adoption had an impact on the attachment style; but this variable was related to other values that were taken in consideration, such as social stress and interpersonal relationships.

Finally, Howe (2001), using a sample of 439 adopted adults grouped in: adopted younger than 6 months, adopted between the ages of 7 and 23 months and adopted older than 24 months, found that the older they were when adopted, the more insecure attachment they had with their adoptive mothers. Feeney, Passore & Peterson (2007), in a sample of 144 adults with an infant adoption background and 131 adults who grew up with their biological parents, showed that adults with an adoption background scored higher in avoidance and anxiety than the control group and showed more insecure attachment with a predominantly fearful style. Both studies showed that an adoption background is a risk factor with regard to difficulties in relationships, even as an adult.

Based on this background, this study aims to describe the attachment styles of nationally adopted adolescents, taking into consideration the age of adoption to see if this is relevant and comparing them with a control group of non-adopted adolescents. The hypothesis is that adopted adolescents will show more insecure attachment than the group of non-adopted adolescents and significant differences will be observed depending on the age of adoption. This is relevant to explore because Chile has many late and national adoptions

2. Method

2.1 Participants

This study is part of the Attachment Adoption Adolescents Research Network (AAARN), which is an international project focusing on attachment representation in adopted adolescents and their parents.

Three groups of Chilean adolescents aged between 11 and 18 ($M=12.90$; $SD=1.74$) participated in this study. The characteristics of the adolescents can be found in Table 1.

Table 1. Descriptive analysis of the sample

Sex	Adopted from ≥ 6 to 23 months		Adopted from ≥ 24 to 72 months		Non-adopted		Total	
	No.	%	No.	%	No.	%	No.	%
Masculine	9	64.3	5	45.5	14	56	28	56
Feminine	5	35.7	6	54.5	11	44	22	44
Total	14	100	11	100	25	100	50	100
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age at assesment	13.21	1.88	12.36	1.43	12.96	1.79	12.9	1.74
Age at adoption	10.14	5.09	46.09	14.61	...	...	25.96	20.85

The 25 adopted adolescents were national and late adoptions (≥ 6 months of age) and they were divided into two groups. A cut point was made at being adopted at the age of 24 months as researches of institutionalized children indicated that the critical stage in neurodevelopment in order to intervene are the first two years of life (Vandewerth et al., 2010). The first group consisted of 14 adolescents (5 women) adopted between the ages

6 and 23 months ($M=10.14$; $SD=5.09$) and the second group of 11 adolescents (6 women) adopted between the ages of 24 and 72 months ($M=46.09$; $SD=14.61$). The adopted adolescents had only lived in institutions before being adopted, except in 4 cases. Of these latter cases, one had lived in institutions and in foster care and the other three had only lived in foster care.

Adopted adolescents that matched the inclusion criteria were found in the adoption registration and contacted through three authorized adoption agencies in Chile: *Servicio Nacional de Menores (SENAME)*, *Fundación Chilena para la Adopción* and *Fundación San José para la Adopción*.

The adoption agencies made the first contact with the families and invited them to participate in the study. Researchers only had access to the data of 37 families who had authorized being contacted for the study. Of these, eight families were excluded from the study because they finally decided not to participate. The reasons for not participating were: in three cases they felt that they did not want to stir up past issues, in three other cases the adolescent refused to participate and in one case the mother said she would only participate if the adolescent wouldn't be interviewed because he did not know yet he was adopted. And five cases were excluded because they did not meet the criteria for inclusion in the study. In one case the adolescent had a developmental disorder and in four cases the adoptions were early (before the age of 6 months). Finally, the sample consisted of 25 adoptive families.

The control group consisted of 25 non-adopted adolescents who grew up with their biological families (11 women). The adolescents of the non-adopted group were paired by gender, age, educational level and socio-economic level to members of the group of adopted adolescents.

The control group of families was specifically contacted in order to be able to pair both groups by socio-economic level, age, gender and educational level of the adolescent. Through social networks (Facebook groups, chain letters) the specific data needed to match the data with adopted adolescents (gender, age, educational level and socio-

economic level) were published. Parents were offered the neuropsychological report of their child's evaluation.

The family's socio-economic level was defined according to the parents' level of education and their occupation in the following way: high socio-economic level (38%); middle socio-economic level (58%); low socio-economic level (4%).

Exclusion criteria used in this study included adolescents with mental disabilities or a serious psychiatric illness in their medical history reported by the mother.

2.2. Instruments

2.2.1. *Family data form and adoption background*: socio-demographic data of the family: socio-economic level, parents' educational level, children's educational level, age of adoption. Medical history: history of childbirth and subsequent complications, health information prior to the adoption (in the group of adopted adolescents), information about the child's current health, history of medical or mental health relevant for the child. The information was given by the children's mother.

2.2.2. The *Friends and Family Interview* (FFI; Steele & Steele, 2005) was used to evaluate the representations of adolescent attachment, a semi-structured interview adapted from the AAI (Adult Attachment Interview, Georges, Kaplan & Main, 1996). The FFI has 8 dimensions, each with their respective dimensions, namely: *Coherence*: truth, economy, relation, manner and overall coherence; *reflective function*: developmental perspective, theory of mind (mother, father, sibling, friend and teacher) and diversity of feelings (mother, father, sibling, friend and teacher); *evidence of secure base*: father, mother, other significant figure; *evidence of self-esteem*: social and school competence; *peer relations*: frequency and quality of contact; *sibling relations*: warmth, hostility and rivalry; *anxieties and defenses*: idealization (self, mother and father), role reversal (mother and father), anger (mother and father), derogation (self, mother and father) and adaptive response; *differentiation of parental representations*. The interview also has the non-verbal code regarding fear/distress and frustration/anger and the global attachment classification. The dimensions are scored using four ratings

(1=no evidence; 2=mild evidence; 3=moderate evidence and 4=marked evidence) according to the coding guidelines from the authors (Steele, Steele, & Kriss, 2009).

For the global attachment classification of the interview both the video and the transcript were taken into consideration as a whole. In the coding guidelines (Steele, Steele, & Kriss, 2009) the authors suggest considering the styles as emotion-regulation strategies, in which the adolescents who showed a secure attachment also showed flexibility and ease in order to cope with themselves at times, while also. At other times, being able to turn to others for support as well as offering support to others in need. According the manual, people who show avoidance use derogation or idealization as a defense, and show restriction when they have to acknowledge or express distressing feelings. Ambivalent adolescents rate highly in anger or passivity. Finally, disorganized people rate highly in fearfulness and non-verbal distress.

For this study the categories of global attachment classification were used: secure attachment, insecure-avoidant attachment, insecure-ambivalent attachment or disorganized attachment. Each interview lasted on average 35 minutes (a minimum of 18 minutes and a maximum of 1 hour and 40 minutes). Every interview was taped on video and later transcribed, and using both materials (video and transcript) a coding was done. For this study, two trained evaluators coded 6 interviews and obtained a Cohen's Kappa = 0.94. The other 44 interviews were coded by one trained evaluator.

2.3. Procedure

This project was approved by the Ethics Committee of the School of Psychology of the Pontifical Catholic University of Chile. Once the family was contacted, all the participants, parents and children, signed a voluntary consent form in accordance with the Declaration of Helsinki. An interview with the adolescent's mother was conducted afterwards, followed by an interview with the adolescent. Interviews and questionnaires were carried out at the participants' homes.

2.4 Data analysis

The statistical analysis of the data was carried out with the 19.0 version of the Statistical Package for Social Science (SPSS). Contingency charts and a Chi-square test were used for the analysis of the attachment patterns depending on the group they were part of (adopted between the ages of 6 and 23 months; adopted between the ages of 24 and 72 months, and non-adopted).

3. Results

3.1 Attachment pattern

The distribution of the attachment patterns in the sample depending on their circumstance (adopted / non-adopted) can be seen in Figure 1.

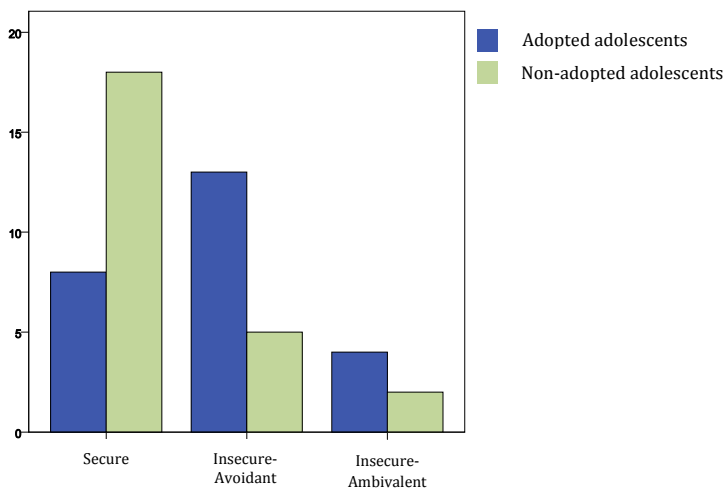


Figure 1: Distribution of the attachment patterns in the sample depending on their condition

32% of secure attachment can be seen in the group of adopted adolescents, 52% of insecure-avoidant attachment and 16% of insecure-ambivalent attachment. While the non-adopted adolescents showed 72% of secure attachment, 20% of insecure-avoidant attachment and 8% of insecure-ambivalent attachment. No disorganized pattern cases were found in this sample. There are statistically significant differences between the variable attachment patterns and group adopted / non-adopted ($\chi^2=8.068$; $p=.018$). The

group of adopted adolescents showed more insecure attachment, with a predominance of insecure-avoidant attachment.

3.2 Differences between groups

The sample was divided into three groups according to the age when they were adopted. One group of adolescents adopted between the ages of 6 and 23 months; another group of adolescents adopted between the ages of 24 and 72 months; and a control group of non-adopted adolescents. The Chi-square test was used to see the differences in the attachment patterns according to age of adoption (the three mentioned groups were taken in consideration).

Table 2 shows the differences in the attachment patterns according to the age of adoption. If the insecure-avoidant and insecure-ambivalent attachment patterns are grouped under the same category of “Insecure attachment” (see Table 3) the difference is significant ($p=.009$) in the attachment patterns depending on the age of adoption variable. These data show that there is a relation between being adopted or not, and, although there is a difference in the age of adoption and the attachment patterns in adolescents, this difference has no significant statistical power.

Table 2. Attachment pattern according FFI categories and age of adoption

Attachment pattern		Age of adoption			Total /Attachment pattern
		Adopted from ≥ 6 to 23 months	Adopted from ≥ 24 to 72 months	Non-adopted	
Secure	N	6	2	18	26 (52%)
Insecure-avoidant	N	5	8	5	18 (36%)
Insecure-ambivalent	N	3	1	2	6 (12%)
Desorganized	N	0	0	0	0 (0%)
Total /Age of adoption	n (%)	14 (28%)	11 (22%)	25 (50%)	50 (100%)

Table 3. Attachment pattern and age of adoption^a

Attachment pattern		Age of adoption			Total / Attachment pattern
		Adopted from ≥ 6 to 23 months	Adopted from ≥ 24 to 72 months	Non-adopted	
Secure	n	6	2	18	26 (52%)
Insecure	n %	8	9	7	24 (48%)
Total /Age of adoption	n (%)	14 (28%)	11 (22%)	25 (50%)	50 (100%)

^a Chi-square test (χ^2) 9.515 (p=.009)

4. Discussion

The attachment patterns in adolescents were evaluated and the results show a very significant predominance of insecure attachment patterns in adopted adolescents compared to non-adopted adolescents. What stands out is that 52% of adopted adolescents show an insecure-avoidant attachment. With regard to the age of adoption, one can see a significant difference between the two adoption groups, namely that adoptions after the age of 2 have a negative impact on attachment security.

With regard to previous studies on adolescents, the results of this research confirm the results of Hodges & Tizard (1989), who showed that adolescents who had suffered early deprivation during their first years of life had more difficulties in close relationships. This data is corroborated in this sample that shows a higher percentage of insecure attachment in the group of adopted adolescents. The results confirm that children adopted after the age of 6 months have a higher level of insecure attachment than children who grew up with their biological families (Chisholm, 1998; Rutter et al., 2001; Van IJzendoorn and Juffer, 2006; Vorria et al., 2006). Consistent with Howe's (2001) results, more insecure attachment patterns were found in children adopted later in life. Barcons et al. (2012) showed that the age of adoption would not have an impact on the attachment patterns. In contrast to this latter finding, the present study found no differences between adopted groups related to age, but due to the size of the groups, these differences have no statistical power. This should be further explored in future research. These preliminary data allow us to take the age of adoption into consideration

as a reason for a higher level of vulnerability in the development of insecure attachment patterns.

The predominance of insecure-avoidant attachment in the sample is consistent with the data shown by Barcons, et al. (2012) who found a high percentage in comparison with the normative percentage of 15% (Van IJzendoorn et al., 1999). However, this predominance is more marked in the present research (52% in the adopted adolescents). The relevance of avoidant dominance seems to be supported by the neglect they experienced and because of this neglect the children develop internal operating models in agreement with not having been in contact with any available attachments to answer their needs for affection. They had to learn to be emotionally independent and autonomous. With regard to the dimensions that are explored in the FFI adopted adolescents, they seem to have greater difficulties in counting on their mother as a "secure base" to lean on and trust compared to adolescents who grew up in their biological families. Also, with regard to the "quality of relationships with peers", which has to do with the level of intimacy and commitment to a friend, adopted adolescents score much lower than non-adopted adolescents. The hypothesis is that adopted adolescents show a pattern of avoidant attachment mainly due to not having a stable figure that responds to their demands in the earliest periods of development. So they had to learn to be independent and fend for themselves. One danger of this is that if they have no people who they can trust in their social development, this may put the adolescent in a situation of greater vulnerability with regard to crises.

Like the data found by Barcons, et al. (2012), the results show that adopted adolescents were able to develop a pattern of adaptive attachment, whether secure or insecure, as disorganized attachments were not found in the results. This is also consistent with the data from Feeney, et al. (2007) whose study shows that this impact on children persists over time, and it ranks higher in avoidance and anxiety in the group of adopted adolescents than in the control group. Feeney, et al., (2007) found that a predominance of fearful patterns is characterized by a combination of two dimensions, namely avoidant and anxious attachment (Ravitz, et al. 2010). These represent the most problematic patterns as they show a negative self-image and their image of others is that

they will offer little help or cannot be counted on (Bartholomew & Horvitz, 1991). This is considered a risk when trying to establish close and intimate relationships. In the case of this study most of the adolescents presented an avoidant attachment style, which is close to what is described as fearful in adults. This can be seen in the answers the adolescents have to the question "What do you do when you feel sad or worried" that assesses the adaptive response rate typically between 1 or 2 and this shows that they have few resources to deal with stressful situations. They also have low scores when the presence of a secure base is explored. This information is very important because they show similar relational risks as the fearful pattern in adults.

One of the limitations of this study is the relatively small sample. This is due to the difficulty in accessing the sample, the confidentiality of the adoption records, the fact that the families prefer not to talk about adoption with their children and the lack of follow-up of the families, and added to this the demographic changes due to time. Nevertheless, this is a first step in the study of attachments patterns in adopted adolescents.

With these results, one could maintain that the older the child is at the moment of adoption, the riskier it is to build a secure attachment. Although it would be ideal in these cases to promote early adoptions, mainly in Latin America the adoption of older children still exists. That is why the best way to facilitate the building up of a secure attachment with adoptive families must be discussed, as this will be reflected during their lifecycle, especially during adolescence when there are new crises and challenges. This point allows discussing the relevance of the post-adoption process as a public policy. Monitoring and supporting adoptive parents for longer periods than what is done today is considered essential. There is proof that shows an increase in security of secure attachment in adopted children at different post-adoption moments (Chisholm, 1998) that indicate a need for time in the process of a good relationship with the adoptive parents. This would support the position of the authors who consider adoption as a possibility to repair the effects of an early lack of affection (Van IJzendoorn and Juffer, 2006).

The conclusion is that adoptions after the age of 6 months carry with them a risk factor with regard to insecure attachment and this is maintained during adolescence. This also raises the need to come up with intervention strategies to promote secure attachment in post-adoption processes with adoptive families.

5. Conclusion

This research shows that adopted adolescents rank higher in insecure attachment than non-adopted adolescents, especially with regard to insecure-avoidant attachment. Also, the age of adoption is significantly related with the construction of insecure attachment. Late adoptions would be a risk factor, so public policies that allow the accompaniment and follow-up of adoptive parents for longer periods of time to promote the development of secure attachments must be taken into consideration.

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Behavior Problems and attachment in adopted and non-adopted adolescents.

María Josefina Escobar, Ximena Pereira & María Pía Santelices

Abstract

The goal of this study was to examine the differences in behavior problems between nationally adopted and non-adopted adolescents using Achenbach's Child Behavior Check-list (CBCL) and the Youth Self Report (YSR) as well as to examine the relationship between the behavior problems and the way of attachment of the adolescents. Participants: 25 adolescents adopted at the age of 6 months and older and 25 non-adopted adolescents. Results: No significant differences were found in the behavior problems of the adopted and non-adopted. The adolescents who were adopted at a later age would present more "social problems" than those who were adopted earlier on. Even though the adopted adolescents presented more insecure attachment, no significant differences were found between behavior problems and attachment style. Significant effects could be seen in the adoption factor and in the effect of interaction between adoption and attachment on the Self Report Thought Problems scale. The non-adopted/insecure adolescents scored higher. The possible interpretations of the results of this last find will be discussed further on. In conclusion, in general the adopted adolescents did not present significant differences compared to the adolescents who grew up in their birth families. This find allows de-stigmatizing adopted adolescents being "difficult adolescents". From the perception of adopted adolescents, adoptions within the first two years of life would be a protective factor for "social problems" during adolescence.

Keywords: *attachment style, adopted adolescence, behavior problems; informant discrepancies*

1. Introduction

Adolescence is a particularly critical stage for adolescents who were adopted during infancy. Great physical and psychological changes take place and questions regarding their identity and origin come up (Bimmel, et al., 2003). Studies support the idea that adopted adolescents present more behavior problems than their peers who grew up in their biological families (Hawk & McCall, 2011; Merz & McCall, 2010). Nevertheless, studies have found that said differences would not be significant (Brodzinsky, et al., 1987). It has also been reported that adopted adolescents show more insecure attachment than non-adopted adolescents (Barcons, et al., 2012; Escobar & Santelices, 2013). Finally, studies have shown that the insecure attachment style acts as a risk factor with regard to behavior problems (Buist, et al., 2004; Pace & Zappulla, 2011; Pierrehumbert, et al., 2000). To our knowledge there are no studies that have explored this possible interaction in adopted adolescents.

1.1. Adoption and behavioral problems

As mentioned before, there seems to be controversy whether adopted adolescents present more behavior problems than their peers who grew up in their biological families. Various studies have shown statistically significant differences between the adopted and non-adopted adolescents (Sharma, et al., 1998; Wierzbicki, 1993), affirming that adopted children/adolescents would be more at risk of developing behavior problems than those who have no adoption background (Peters, et al., 1999; Wierzbicki, 1993).

Nevertheless, studies have not found significant differences between the groups (Cederblad, et al., 1999; Goldney, et al., 1996). One of the studies found significant differences between adopted and non-adopted infants, but said differences disappeared at the age of 10-11 (Brodzinsky, et al., 1987). The results suggest that the differences between the adopted and non-adopted diminish with age. This goes against the position that has maintained that adolescence would be more problematic than other stages of development for the adopted subjects.

A meta-analysis which reviewed 66 publications regarding adoption and social attachment showed that those subjects with an adoption background had more externalizing and academic problems than adolescents who grew up with their biological families (Wierzbicki, 1993). Also, a bigger effect in the differences among adolescents than in children and adults was found. Finally, no significant differences were found related to the age of adoption (Wierzbicki, 1993).

With regard to international adoptions, there are two meta-analyses that were carried out between 2003 and 2005. The first, which had as objective to see the prevalence of behavior problems in adopted adolescents (Bimmel, et al., 2003), reviewed 10 studies. It was found that the adopted adolescents had more behavior problems than the non-adopted adolescents. These differences could be seen in externalizing problems but were not found in the internalizing problems (Bimmel, et al., 2003). The meta-analysis of 2005 was the first regarding behavior problems and mental health with international adoptions comparing them with control groups of nationally non-adopted and adopted adolescents (Juffer & van IJzendoorn, 2005). The authors reviewed 34 articles about “mental health referral” and 64 about “behavior problems”. The main results were that the group of international adoptions showed more behavior problems, both externalizing and internalizing. However, the authors warned that they had small effect sizes: the higher scores for behavioral problems were moderate, indicating that although relatively more international adoption individuals resorted to mental health services, most of them were in fact well-adjusted, even though they are more derived to mental health services than the non-adopted control group. They also refer to the fact that international adoptions show less behavior problems, both externalizing and internalizing, than national adoptions. And, finally, in support of the aforementioned results (Wierzbicki, 1993) in the international adoptions, it was found that the adolescents presented less behavior problems compared to middle and early infancy (Juffer & van IJzendoorn, 2005).

A more recent study about international adoption with children aged 4 to 18, reported that those who had been institutionalized for at least two years had significantly higher scores than the control group, both on the internalizing and externalizing scales

(Gunnar, et al., 2007). They suggest that the age of adoption with early privation is a risk factor and increases the, mostly externalizing, behavior problems (Gunnar, et al., 2007). Supporting this result is another study with internationally adopted children aged 6 to 18 with an institutionalization background which found that the institutionalization background was linked to a higher risk of attention problems and externalizing symptomatology (Hawk & McCall, 2011; Merz & McCall, 2010). They also found that the scores for behavior problems increased significantly when the child was adopted after the age of 18 months. On the other hand, this relationship between age of adoption and social problems and externalizing problems was more significant when evaluated during adolescence (12-18 years), more than during infancy (6-11 years) (Hawk & McCall, 2011; Merz & McCall, 2010). And this is contrary to the mentioned studies (Juffer & van IJzendoorn, 2005; Wierzbicki, 1993).

Finally, regarding the age of adoption, Gleitman & Savaya (2011) reported in a sample of adolescents adopted between birth and 9 years old, that they had not found a relationship between age of adoption and adaptation. They also reported the low levels of behavior problems, both with regard to externalizing and internalizing symptoms. Contrary to this last data, we have recently reported in a transcultural study in which a sample of 5 countries participated, that the symptoms related to ADHD (Scale for attention deficit/hyperactivity problems) were predicted according to the age of adoption of the adolescents (Roskam et al., 2013). In the study of Hawk & McCall (2011) attention problems also scored high both during infancy (6-11 years) and during adolescence (12-18 years) in late adoptions (after 18 months of age).

According to what has been shown, there would be controversial positions whether adopted adolescents present more behavior disorders than those who have no adoption background, and whether these differences are more pronounced in adolescence or, contrary, increase during adolescence. Finally, there is also no consensus if the age of adoption is a variable that is linked more closely to behavior problems.

1.2. Informant discrepancies in the assessment of behavior problems

The discrepancies between informants have been studied in the behavior problems evaluations (De Los Reyes & Kazdin, 2005). Studies have shown that there would be discrepancies between reports handed in by parents about their children and the self reports of the children (Achenbach, McConaughy, & Howell, 1987; Grigorenko, Geiser, Slobodskaya, & Francis, 2010). These discrepancies are explained by different variables. One of these is the age of the evaluated subjects. It seems that there would be more discrepancies in the reports of the adolescents' parents than in those of the children (Achenbach, et al., 1987). Another variable that might have an influence is the type of problem, as there is a higher level of agreement between the different informants when it regards externalizing problems (Achenbach, et al., 1987; Duhig, Renk, Epstein, & Phares, 2000; Langberg et al., 2010) and more parents-children discrepancies when it regards internalizing problems. In this last case the young people give these problems higher scores than their parents (Achenbach, et al., 1987; Hughes & Gullone, 2010; Youngstrom, Loeber, & Stouthamer-Loeber, 2000). Finally, it has also been found that certain psychological conditions of the parents can increase the level of discrepancy between informants and among these conditions are depressed mothers (Chi & Hinshaw, 2002), and anxious mothers (Najman et al., 2000). In short, there is a certain level of agreement that it is necessary to include multiple informants in the evaluations of behavior problems (De Los Reyes & Kazdin, 2005; Epstein, Renk, Duhig, Bosco, & Phares, 2004).

1.3. Attachment and the adopted adolescent

There are many antecedents that link adoption with an institutionalization background with insecure or disorganized attachment (Chisholm, 1998; Chisholm, et al., 1995; M. L. Rutter, et al., 2001; M.H. Van IJzendoorn & Juffer, 2006; Vorria, et al., 2006). Studies about attachment styles in adopted adolescents are scarce. A recent study with 116 adopted children aged between 8 and 11 years old ($M=8.92$; $SD=1.08$) found that

the distribution of attachment patterns in this sample were very similar to that of the general population (Barcons, et al., 2012). 60.3% of safe attachment was similar to 62% of the general population, but the adopted children showed more insecure-avoidant attachment, 25%, compared to 15% of the general population and 12% ambivalent attachment compared to 9% of the general population. With regard to disorganized attachment, the adopted children only got 1.7% compared to 15% found in the general population. This leads to the conclusion that adopted children were able to develop an organized attachment pattern as only two cases presented disorganized attachment (Barcons, et al., 2012). Based on what the literature shows, in a recently reported study with the sample of this study, we found a significant predominance of insecure attachment patterns in adopted adolescents with regard to their non-adopted peers (Escobar & Santelices, 2013) and the insecure-avoidant attachment in adopted adolescents stands out.

1.4. Attachment and behavior problems

There are studies though which have shown a relationship between attachment style and behavior problems in infancy and adolescence. One study associated insecure-avoidant attachment in children with externalizing problems (Pierrehumbert, et al., 2000). Insecure attachment has also been associated with internalizing behavior problems, among these anxiety and somatic difficulties (Manassis, et al., 1995), as well as symptoms of depression (Kobak, et al., 1991). On the other hand, a reciprocal negative effect was reported in adolescents between the quality of attachment of the internalizing and externalizing behavior problems (Buist, et al., 2004). These results were supported by the results found with a sample of 535 adolescents where insecure attachment, both avoidant and anxious, predicted both internalizing and externalizing problems (Pace & Zappulla, 2011).

Studies with adopted children showed these relations. A study with 56 adopted children found that the children who were institutionalized for a longer time showed more insecure attachment and more behavior problems (Marcovitch et al., 1997). Supporting these results is a study with 124 adopted children which found that the children, who

scored lower in secure attachment, presented more atypical behavior problems (Judge, 2004). In short, there seem to be antecedents that suggest that the insecure attachment style could act as a risk factor in the development of behavior problems.

Taking into consideration all the mentioned antecedents, the objective of this current study is to compare the behavior problems between adopted and non-adopted adolescents, considering both their age at adoption and the different reports (report of the parents /self report). Finally, considering the distribution of attachment in adopted adolescents, we want to explore the effect of interaction between the adopted and non-adopted adolescent and the attachment style, secure-insecure, of adolescents with behavior problems.

2. Method

2.1. Participants

This study is part of the Attachment Adoption Adolescents Research Network (AAARN), which is an international project focusing on attachment representation in adopted adolescents and their parents.

Three groups of Chilean adolescents aged between 11 and 18 ($M=12.90$; $SD=1.74$) participated in this study. The characteristics of the adolescents can be found in Table 1. The 25 adopted adolescents were national and late adoptions (≥ 6 months of age) and they were divided into two groups. A cut point was made at being adopted at the age of 24 months as researches of institutionalized children indicated that the critical stage in neurodevelopment in order to intervene are the first two years of life (Vanderwert, Marshall, Nelson, Zeanah, & Fox, 2010). The first group consisted of 14 adolescents (5 women) adopted between the ages 6 and 23 months ($M=10.14$; $SD=5.09$) and the second group of 11 adolescents (6 women) adopted between the ages of 24 and 72 months ($M=46.09$; $SD=14.61$). The adopted adolescents had only lived in institutions before being adopted, except in 4 cases. Of these latter cases, one had lived in institutions and in foster care and the other three had only lived in foster care.

Table 1: Descriptive analysis of the sample

Sex	Adopted from ≥ 6 to 23 months		Adopted from ≥ 24 to 72 months		Non-adopted		Total	
	No.	%	No.	%	No.	%	No.	%
Masculine	9	64.3	5	45.5	14	56	28	56
Feminine	5	35.7	6	54.5	11	44	22	44
Total	14	100	11	100	25	100	50	100
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age at assesment	13.21	1.88	12.36	1.43	12.96	1.79	12.9	1.74
Age at adoption	10.14	5.09	46.09	14.61	...	...	25.96	20.85

Adopted adolescents that matched the inclusion criteria were found in the adoption registration and contacted through three authorized adoption agencies in Chile: *Servicio Nacional de Menores (SENAME)*, *Fundación Chilena para la Adopción* and *Fundación San José para la Adopción*. The adoption agencies made the first contact with the families and invited them to participate in the study. Researchers only had access to the data of 37 families who had authorized being contacted for the study. Of these, eight families were excluded from the study because they finally decided not to participate. The reasons for not participating were: in three cases they felt that they did not want to stir up past issues, in three other cases the adolescent refused to participate and in one case the mother said she would only participate if the adolescent wouldn't be interviewed because he did not know yet he was adopted. And five cases were excluded because they did not meet the criteria for inclusion in the study. In one case the adolescent had a developmental disorder and in four cases the adoptions were early (before the age of 6 months). Finally, the sample consisted of 25 adoptive families.

The control group consisted of 25 non-adopted adolescents who grew up with their biological families (11 women). The adolescents of the non-adopted group were paired by gender, age, educational level and socio-economic level to members of the group of adopted adolescents. The control group of families was specifically contacted in order to be able to pair both groups by socio-economic level, age, gender and educational level of the adolescent. Through social networks (Facebook groups, chain letters) the specific data needed to match the data with adopted adolescents (gender, age,

educational level and socio-economic level) were published. Parents were offered the neuropsychological report of their child's evaluation.

The family's socio-economic level was defined according to the parents' level of education and their occupation in the following way: high socio-economic level (38%); middle socio-economic level (58%); low socio-economic level (4%).

Exclusion criteria used in this study included adolescents with mental disabilities or a serious psychiatric illness in their medical history reported by the mother.

2.2. Instruments

2.2.1. Family data form and adoption background

Socio-demographic data of the family: socio-economic level, parents' educational level, children's educational level, age of adoption.

Medical history: history of childbirth and subsequent complications, health information prior to the adoption (in the group of adopted adolescents), information about the child's current health, history of medical or mental health relevant for the child. The information was given by the children's mother.

2.2.2. Child Behavior Check-list, CBCL (Achenbach, 1991), which is a widespread 120 item questionnaire rating the child's behavior or emotional problems and symptoms. This instrument will be filled in by parents (Parent Report Form, for mother or mother and father) and self-administered (Youth Self-Report). The CBCL produces a total score, which gives an overall estimation of the amount of symptomatic problems expressed by the adolescent, two sub-scores (internalizing and externalizing problems), plus several scales.

Youth Self-Report, YSR (Achenbach, 1991) consists of 116 items, in nine subscales, describing a range of behaviors, feelings, and thoughts. For each, respondents are asked to indicate whether it is not true (0), somewhat true (1) or often true (2) of themselves.

The subscales cover internalizing behaviors (withdrawn, somatic complaints, and anxious-depressed) and externalizing behaviors (delinquent behavior, and aggressive behavior).

2.2.3. *The Friends and Family Interview, FFI* (Steele, Steele, Kerns, & Richardson, 2005) was used to evaluate the representations of adolescent attachment, a semi-structured interview adapted from the Adult Attachment Interview, *AAI* (Kaplan, & Main, 1985). The FFI has 8 dimensions, each with their respective dimensions, namely: Coherence: truth, economy, relation, manner and overall coherence; reflective function: developmental perspective, theory of mind (mother, father, sibling, friend and teacher) and diversity of feelings (mother, father, sibling, friend and teacher); evidence of secure base: father, mother, other significant figure; evidence of self-esteem: social and school competence; peer relations: frequency and quality of contact; sibling relations: warmth, hostility and rivalry; anxieties and defenses: idealization (self, mother and father), role reversal (mother and father), anger (mother and father), derogation (self, mother and father) and adaptive response; differentiation of parental representations. The interview also has the non-verbal code regarding fear/distress and frustration/anger and the global attachment classification. The dimensions are scored using four ratings (1 = no evidence; 2 = mild evidence; 3 = moderate evidence and 4 = marked evidence) according to the coding guidelines from the authors (Steele, Steele, & Kriss, 2009).

For the global attachment classification of the interview both the video and the transcript were taken into consideration as a whole. In the coding guidelines (Steele et al., 2009) the authors suggest considering the styles as emotion-regulation strategies, in which the adolescents who showed a secure attachment also showed flexibility and ease in order to cope with themselves at times, while also at other times, being able to turn to others for support as well as offering support to others in need. According the manual, people who show avoidance use derogation or idealization as a defense, and show restriction when they have to acknowledge or express distressing feelings. Ambivalent adolescents rate highly in anger or passivity. Finally, disorganized people rate highly in fearfulness and non-verbal distress.

For this study the categories of global attachment classification were used: secure attachment, insecure-avoidant attachment, insecure ambivalent attachment or disorganized attachment. Each interview lasted on average 35 min (a minimum of 18 min and a maximum of 1 h and 40 min). Every interview was taped on video and later transcribed, and using both materials (video and transcript) a coding was done. For this study, two trained evaluators coded 6 interviews and obtained a Cohen's Kappa=0.94. The other 44 interviews were coded by one trained evaluator.

2.3. Procedure

This project was approved by the Ethics Committee of the School of Psychology of the Pontifical Catholic University of Chile. Once the family was contacted, all the participants, parents and adolescents, signed a voluntary consent form in accordance with the Declaration of Helsinki. An interview with the adolescent's mother was conducted afterwards, followed by an interview with the adolescent. Interviews and questionnaires were carried out at the participants' homes.

2.4. Data analysis

The statistical analysis of the data was carried out with the 20.0 version of the Statistical Package for Social Science (SPSS). For the analysis of the differences between adopted and non-adopted adolescents with regard to their behavior problems Student's t-test were used and for the analysis between groups with different institutionalization times the Mann Whitney *U* test. To analyze the relationship of behavior problems with regard to the perception of the parents and that of the adolescents the Pearson's correlations were used. Next, in order to analyze the differences between these correlations in adopted and non-adopted adolescents Student's t-test was used. Finally, to analyze the impact of the factors of adoption and attachment on the behavior problems of adolescents using both their perception and that of their parents the factorial Anova was used. For the analyses of CBCL and YSR, we used raw scores (not *T* scores).

3. Results

With regard to the main objective of the study, the differences between adopted and non-adopted adolescents were analyzed with regard to behavior problems, both those reported by the parents (CBCL) and those perceived by the adolescents themselves (YSR). The results can be seen in table 2. There are no significant differences between the adopted and the non-adopted with regard to behavior problems both in the parents' reports (CBCL) and in their own reports (YSR).

Table 2. Differences in behaviors problems between adopted (n=25) and non-adopted adolescents (n=25) based in parent information (CBCL) and self-report (YSR).

	Adopted	Non-adopted		
	<i>M(SD)</i>	<i>M(SD)</i>	<i>t</i>	<i>p</i>
CBCL				
Total Withdrawn	3.32 (3.23)	2.08 (1.82)	1.669	0.102
Total Somatic Complaints	1.28 (2.03)	1.76 (2.146)	-0.812	0.421
Total Anxious/Depressed	5.88 (5.86)	4.8 (5.18)	0.689	0.494
Total Social Problems	2.84 (2.26)	1.84 (2.07)	1.627	0.11
Total Thought Problems	1.2 (1.22)	0.76 (1.16)	1.302	0.199
Total Attention Problems	5.56 (3.83)	4.2 (3.91)	1.241	0.221
Total Delinquent Behavior	2.76 (2.72)	2.04 (2.40)	0.99	0.327
Total Aggressive Behavior	7.48 (5.70)	7.08 (6.88)	0.224	0.824
Total Others Problems	5.96 (5.40)	5.04 (6.87)	0.526	0.601
Total Sex Problems Syndrome	0.36 (0.86)	0.52 (1.44)	-0.475	0.637
Internalizing	9.08 (9.09)	7.88 (7.47)	0.51	0.613
Externalizing	10.24 (8.08)	9.12 (8.98)	0.463	0.645
YSR				
Total Withdrawn	2.64 (1.99)	2.24 (1.71)	0.76	0.451
Total Somatic Complaints	2.52 (2.50)	2.48 (2.25)	0.059	0.953
Total Anxious/Depressed	5.72 (3.82)	5.4 (4.42)	0.274	0.786
Total Social Problems	2.6 (1.60)	2.68 (2.11)	-0.151	0.881
Total Thought Problems	1.08 (1.07)	2.04 (2.33)	-1.866	0.071
Total Attention Problems	4.88 (2.69)	5.08 (3.04)	-0.246	0.807
Total Delinquent Behavior	3.28 (2.17)	3.52 (2.55)	-0.358	0.722
Total Aggressive Behavior	6.84 (4.87)	7.56 (4.45)	-0.545	0.588
Total Others Problems	8.04 (3.10)	7.16 (4.38)	0.819	0.417
Total Self Destructive/Identity Problems	1.92 (2.15)	1.96 (1.17)	-0.081	0.936
Internalizing Problems	10.88 (6.96)	10.12 (7.16)	0.38	0.705
Externalizing Problems	10.12 (6.47)	11.08 (6.44)	-0.525	0.602

Within the group of adopted adolescents are two sub-groups, divided into the age at which they were adopted. 56% (14) were adopted between the ages of 6 and 24 months and 44% (11) of the adolescents were adopted between the ages of 2 and 6 years. Analyzing these two groups regarding the behavior problems, using both the reports from the adolescents themselves and that of their parents, only significant differences were found in the self report of social problems ($U=36.500$, $Z=-2.256$, $p=0.025$), where those adolescents who were adopted at a later age obtained a higher score (see table 3).

Table 3. Differences in behaviors problems between adopted from ≥ 6 to 23 months ($n=14$) and adopted from ≥ 24 to 72 months ($n=11$) based in parent information (CBCL) and self-report (YSR).

	Adopted from ≥ 6 to 23 months	Adopted from ≥ 24 to 72 months			
	<i>M</i>	<i>M</i>	<i>U</i>	<i>Z</i>	<i>P</i>
CBCL					
Total Withdrawn	12.11	14.14	64.500	-0.694	0.501
Total Somatic Complaints	14.36	11.27	58.000	-1.128	0.317
Total Anxious/Depressed	13.21	12.73	74.000	-0.165	0.893
Total Social Problems	12.46	13.68	69.500	-0.415	0.687
Total Thought Problems	12.04	14.23	63.500	-0.771	0.467
Total Attention Problems	11.82	14.5	60.500	-0.906	0.373
Total Delinquent Behavior	11.39	15.05	54.500	-1.251	0.222
Total Aggressive Behavior	11.25	15.23	52.500	-1.347	0.183
Total Others Problems	13.14	12.82	75.000	-0.110	0.936
Total Sex Problems Syndrome	14.5	11.09	56.000	-1.545	0.267
Internalizing	12.32	13.86	67.500	-0.522	0.609
Externalizing	11.25	15.23	52.500	-1,344	0.183
YSR					
Total Withdrawn	11.75	14.59	59.500	-0.979	0.344
Total Somatic Complaints	12.96	13.05	76.500	-0.028	0.979
Total Anxious/Depressed	13.61	12.23	68.500	-0.470	0.647
Total Social Problems	10.11	16.68	36.500	-2.256	0.025*
Total Thought Problems	14.04	11.68	62.500	-0.833	0.434
Total Attention Problems	12.68	13.41	72.500	-0.249	0.809
Total Delinquent Behavior	11.64	14.73	58.000	-1.061	0.317
Total Aggressive Behavior	12.18	14.05	65.500	-0.632	0.536
Total Others Problems	14.14	11.55	61.000	-0.881	0.403
Self Destructive/Identity Problems	14.25	11.41	59.500	-0.987	0.344
Total Socially desirable Items	13.79	12	66.000	-0.607	0.572
Internalizing Problems	12.86	13.18	75.000	-0.110	0.936
Externalizing Problems	12.11	14.14	64.500	-0.688	0.501

* Significant differences at the 0.05 level (2-tailed).

With regard to the correlation between the perception of behavior problems of the adolescents from the parents' perspective and their own perspective, the results are shown in table 4. One can see that from the 11 common scales between the test of the parents and children, in the group of adopted children there is a significant correlation in two of them, while in the group of non-adopted children there is a significant correlation of 7 scales between parents and children. We can also say that this difference between the groups of adopted and non-adopted adolescents is significant ($t=-2.947, p=0.008$).

Table 4. Correlations between parent-adolescents behavior problem assess (CBCL-YSR)

	Correlation Adopted	Correlation Non-adopted
Withdrawn	,637**	0,3
Somatic Complaints	0,306	0,386
Anxious/Depressed	0,282	,416*
Social Problems	0,13	0,225
Thought Problems	0,082	0,341
Attention Problems	0,301	,489*
Delinquent Behavior	0,202	,634**
Aggressive Behavior	0,24	,671**
Others Problems	,428*	,514**
Internalizing Problems	0,292	,558**
Externalizing Problems	0,217	,702**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

As reported before, there are statistical differences in the attachment styles (Escobar & Santelices, 2013), and the adopted adolescents presented more insecure attachment, which can be seen in table 5.

Table 5. Attachment pattern depending on their condition

	Adopted n (%)	Non adopted n (%)	$\chi^2(1)$	<i>p</i>
Secure attachment	8 (32%)	18 (72%)	8.013	0.005
Insecure attachment	17 (68%)	7 (28%)		

When analyzing the impact of adoption and the attachment factors on the behavior problems of the adolescents, according to both their own perception and the perception of their parents (Table 6) a main significant effect of the adoption factor was found and an interaction effect between adoption and attachment in the variable Self Report Thought Problems. Even though a significant interaction effect was found between the factors of the variable Self Report Anxious/Depressed, the estimation of the interval of trust for the size of the effect doesn't allow maintaining the statistical strength of said difference.

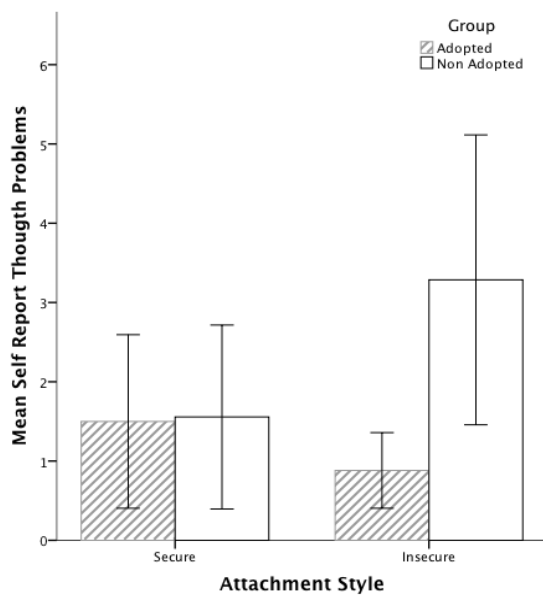
Tabla 6. Impacto de los factores de adopción y apego sobre los problemas conductuales de los adolescentes tanto en su percepción como la de sus padres

Dependent Variable	Main Effects		Interaction Effects
	Adoption	Attachment Style	Adoption*Attachment Style
CBCL			
Withdrawn	$F_{(1,46)}=2.14, p=0.150$	$F_{(1,46)}=0.01, p=0.916$	$F_{(1,46)}=0.06, p=0.811$
Somatic Complaints	$F_{(1,46)}=0.06, p=0.807$	$F_{(1,46)}=2.17, p=0.147$	$F_{(1,46)}=2.85, p=0.98$
Anxious/Depressed	$F_{(1,46)}=0.75, p=0.391$	$F_{(1,46)}=0.45, p=0.507$	$F_{(1,46)}=0.36, p=0.552$
Social Problems	$F_{(1,46)}=1.89, p=0.175$	$F_{(1,46)}=0.02, p=0.884$	$F_{(1,46)}=0.58, p=0.450$
Thought Problems	$F_{(1,46)}=0.70, p=0.407$	$F_{(1,46)}=0.70, p=0.407$	$F_{(1,46)}=0.00, p=0.958$
Attention Problems	$F_{(1,46)}=1.32, p=0.256$	$F_{(1,46)}=0.00, p=0.939$	$F_{(1,46)}=0.02, p=0.882$
Delinquent Behavior	$F_{(1,46)}=0.66, p=0.422$	$F_{(1,46)}=0.09, p=0.766$	$F_{(1,46)}=0.742, p=0.394$
Aggressive Behavior	$F_{(1,46)}=0.06, p=0.808$	$F_{(1,46)}=1.27, p=0.267$	$F_{(1,46)}=0.01, p=0.942$
Others Problems	$F_{(1,46)}=0.23, p=0.631$	$F_{(1,46)}=0.00, p=0.948$	$F_{(1,46)}=0.12, p=0.734$
Sex Problems Syndrome	$F_{(1,46)}=0.21, p=0.650$	$F_{(1,46)}=0.00, p=0.948$	$F_{(1,46)}=0.02, p=0.902$
Internalizing Problems	$F_{(1,46)}=0.32, p=0.577$	$F_{(1,46)}=0.09, p=0.768$	$F_{(1,46)}=0.13, p=0.721$
Externalizing Problems	$F_{(1,46)}=0.00, p=0.949$	$F_{(1,46)}=0.85, p=0.363$	$F_{(1,46)}=0.10, p=0.755$
YSR			
Self Report Withdrawn	$F_{(1,46)}=0.19, p=0.669$	$F_{(1,46)}=0.34, p=0.563$	$F_{(1,46)}=0.30, p=0.588$
Self Report Somatic Complaints	$F_{(1,46)}=0.28, p=0.603$	$F_{(1,46)}=1.67, p=0.203$	$F_{(1,46)}=1.43, p=0.238$
Self Report Anxious/Depressed	$F_{(1,46)}=0.09, p=0.769$	$F_{(1,46)}=0.09, p=0.761$	$F_{(1,46)}=4.365, p=0.042$ partial $\eta^2=0.087$, CI95%[0.00,0.26]
Self Report Social Problems	$F_{(1,46)}=0.40, p=0.530$	$F_{(1,46)}=1.38, p=0.246$	$F_{(1,46)}=0.37, p=0.546$
Self Report Thought Problems	$F_{(1,46)}=5.14, p=0.028$ partial $\eta^2=0.100$, CI95%[0.05,0.18]	$F_{(1,46)}=1.05, p=0.310$	$F_{(1,46)}=4.68, p=0.036$ partial $\eta^2=0.092$, CI95%[0.05,0.16]
Self Report Attention Problems	$F_{(1,46)}=0.04, p=0.835$	$F_{(1,46)}=0.04, p=0.835$	$F_{(1,46)}=2.76, p=0.104$
Self Report Delinquent Behavior	$F_{(1,46)}=0.37, p=0.547$	$F_{(1,46)}=0.39, p=0.535$	$F_{(1,46)}=0.66, p=0.420$
Self Report Aggressive Behavior	$F_{(1,46)}=0.84, p=0.365$	$F_{(1,46)}=0.73, p=0.397$	$F_{(1,46)}=2.78, p=0.102$
Self Report Others Problems	$F_{(1,46)}=0.20, p=0.656$	$F_{(1,46)}=0.40, p=0.532$	$F_{(1,46)}=1.45, p=0.234$
Self Report Destructive/Identity Problems	$F_{(1,46)}=0.10, p=0.755$	$F_{(1,46)}=1.20, p=0.280$	$F_{(1,46)}=1.34, p=0.237$
Self Report Internalizing	$F_{(1,46)}=0.22, p=0.644$	$F_{(1,46)}=0.21, p=0.651$	$F_{(1,46)}=3.10, p=0.085$
Self Report Externalizing	$F_{(1,46)}=0.78, p=0.381$	$F_{(1,46)}=0.72, p=0.401$	$F_{(1,46)}=2.26, p=0.140$

Therefore, analyzing these significant effects we can see that non-adopted adolescents obtain higher scores than the adopted adolescents in the Self Report Thought Problems.

With regard to the interaction effect, we can see that when insecure attachment is presented the non-adopted adolescents have higher scores ($M=3.29$, $SD=1.98$) than the adopted adolescents ($M=0.88$, $SD=0.93$) in Self Report Thought Problems. These differences are smaller when presenting secure attachment (adopted: $M=1.5$, $SD=1.31$; non-adopted: $M=1.56$, $SD=2.33$) than when presenting insecure attachment (fig.1).

Fig.1. Interaction effect attachment pattern and condition in Self Report Thought Problems



The assumed homogeneity of the variances is fulfilled for most of the sub-scales. In the cases where it was not fulfilled and statistically significant differences were detected, as a way of control of the possible errors due to this, the variables were re-grouped in four groups respecting the interaction and using the Welch correction.

4. Discussion

The main objective of this study was to evaluate the differences in behavior problems between adopted adolescents and adolescents who grew up in their biological families. The results didn't show significant differences between the groups of adopted and non-adopted adolescents, either in the reports of the parents or their own reports, even though the adoptive mothers scored higher on both internalizing and externalizing

problems than the biological mothers, in agreement with previous studies (Brodzinsky, et al., 1987; Cederblad, et al., 1999; Goldney, et al., 1996). These differences though were not significant.

Unlike the reviewed meta-analyses (Bimmel, et al., 2003; Wierzbicki, 1993), no significant differences were found on any of the scales of behavior problems between adopted and non-adopted adolescents. This is a very relevant result as there were no significant differences between the adopted and the non-adopted groups either in the reports of the parents or in the reports of the adolescents. This suggests that both from the perception of the parents and that of the adolescents there are no differences in the behavior problems during adolescence of an adopted child and an adolescent who grew up with his/her biological family. This will help de-stigmatize adolescence in adopted children, as their behavior, according to the results of this study, are no different from that of children growing up in their biological families.

A second important finding is that, based on the reviewed literature, discrepancies were found between the reports from the different informants (mothers – adolescents). Taking into consideration the 11 common scales between parents and children to evaluate behavior problems, the group of adopted adolescents showed a significant correlation in only two of them, while in the group of non-adopted adolescents there was a correlation of 7 scales between parents and children. These differences could suggest, although in the reports from the parents and those from the children there were no differences between the groups, that the correlations between the perception of the parents and the children with regard to behavior problems in adolescents would show a greater distance between the perceptions of mothers-adopted children.

The data show that adoptive mothers score higher than their children on almost all the scales. This opens the possibility of interpreting the data from two points of view. The first has to do with adoptive mothers and the second with adoptive children. With regard to the first hypothesis, the studies indicate that the condition of adoptive parents places them in a more alert state with regard to the behavior of their children. This is understandable because most of them had to go through psychological suitability

evaluations. Also, they are very motivated to bring up their children and maybe because of this they can perceive any kind of symptom sooner (Bimmel, et al., 2003; Juffer & van IJzendoorn, 2005). Other differences that have been noticed in the aforementioned studies are the socio-economic level and the educational level which are higher in the adoptive families. Nevertheless, these characteristics have been overcome in this study as the studied group and the control group was paired up in both variables. The second hypothesis might be because the adolescents scored lower when evaluated, trying to show themselves to be over-adapted in the face of their experiences and relating this behavior to a false self.

In both cases it is worthwhile to ask about the post-adoption processes. In these cases it will be good to accompany the parent so that they can live with less anxiety through the development processes of the children and/or work with the children on the possibility of acting like themselves without the insistence or need to please the rest.

A third finding of the study is that among the adopted adolescents differences were found according to age of adoptions on the social problems scale. From the perception of the adolescents, the adolescents who were adopted at a later age, after the age of 2, scored significantly higher on this scale. This data only partly supports the study of Sharma et al. (1998) who reported, also using the YSR, having found differences on the scale of “social problems”, but they also reported differences on the scales of “self-destruct” and “withdrawn” which was not found in this analysis. The same happened with the data reported by Merz y McCall (2010) who also found that the age of adoption would have an influence, and this would be mainly associated to “social problems” of the adolescents as well as to “externalizing problems”. The data of this study support the antecedents that refer to the age of adoption as possibly being a risk factor only for “social problems”, accentuating the importance of early adoptions.

Finally, as we reported in a previous study, adopted adolescents presented more insecure attachment than the adolescents who grew up in their biological families (Escobar & Santelices, 2013). Although no effect was found when only attachment in behavior disorders was considered, significant effects of the adoption factor were seen

and the interaction effect between adoption and attachment on the scale of Self Report Thought Problems. This makes it possible to interpret that insecure attachment leads to a higher risk of presenting Thought Problems in non-adopted adolescents. The interpretation of this result presents certain difficulties. Nevertheless, this probably suggests that this kind of symptomatology is more evident in adolescents with insecure attachment who grew up in their biological families because in adopted adolescents there could be other variables that were not taken into consideration in this study, which leads to the question which other variables should we take into consideration with adopted adolescents, apart from attachment.

This study has certain limitations that must be taken into consideration. One of its limitations is that the sample is very small. This is due to the difficulty in accessing the sample, the confidentiality of the adoption records, the fact that the families prefer not to talk about adoption with their children and the lack of follow-up of the families, and added to this the demographic changes due to time. Added to this is a limitation that studies with an adoption population present. These studies are voluntary and first of all need the authorization of the parents and later the motivation of the child to participate, which does not rule out the possibility that the adolescents who agree to participate are those that have managed to adapt better and have a better relationship with their parents (Gleitman & Savaya, 2011). Nevertheless, this is the first study of behavior problems with a population of adopted adolescents in Chile. Thus, new questions have come up as well as new information which is very relevant for clinical young- infant psychologists. It allows accentuating which aspects should be considered when facing an adopted adolescent. Likewise, it makes us aware of the importance to consider the possibility of finding discrepancies among informants. And that is why the information of multiple informants is relevant in the evaluations of the adolescents, and a more external observer could be included, such as a teacher.

5. Conclusion

The results of this study allow de-stigmatizing adopted adolescents as “problematic adolescents” as they show that in general there are no significant differences with adolescents who grew up in their biological families. The importance of early adoptions is again emphasized, seeing that from the perception of the adopted adolescents, adoptions after the age of 2 would be a risk factor for social problems. Even though adopted adolescents present more insecure attachment than their non-adopted peers there is no interaction effect with behavior problems.

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Another way of thinking about ADHD: the predictive role of early attachment deprivation in adolescents' level of symptoms

Roskam, I., Stievenart, M., Tessier, R., Muntean, A., Escobar, M.J., Santelices, M. P., Juffer, F., Van Ijzendoorn, M.H. & Pierrehumbert, B.

Abstract

Purpose: Attention deficit and hyperactivity disorder (ADHD) is one of the most frequent disorders in childhood and adolescence. Both neurocognitive and environmental factors have been related to ADHD. The current study contributes to the documentation of the predictive relation between early attachment deprivation and ADHD.

Method: Data were collected from 641 adopted adolescents (53.2 % girls) aged 11–16 years in five countries, using the DSM oriented scale for ADHD of the Child Behavior Checklist (CBCL) (Achenbach and Rescorla, Manual for the ASEBA school-age forms and profiles. University of Vermont, Research Center for Children, Youth and Families, Burlington, 2001). The influence of attachment deprivation on ADHD symptoms was initially tested taking into consideration several key variables that have been reported as influencing ADHD at the adoptee level (age, gender, length of time in the adoptive family, parents' educational level and marital status), and at the level of the country of origin and country of adoption (poverty, quality of health services and values). The analyses were computed using the multilevel modeling technique.

Results: The results showed that an increase in the level of ADHD symptoms was predicted by the duration of exposure to early attachment deprivation, estimated from the age of adoption, after controlling for the influence of adoptee and country variables. The effect of the age of adoption was also demonstrated to be specific to the level of

ADHD symptoms in comparison to both the externalizing and internalizing behavior scales of the CBCL.

Conclusion: Deprivation of stable and sensitive care in infancy may have long-lasting consequences for children's development.

Keywords: ADHD, Regulation, CBCL, Deprivation, Adoption, Adolescence, Culture

Introduction

Attention deficit and hyperactivity disorder (ADHD) is characterized by inattention, hyperactivity and impulsivity. It is one of the most frequent disorders in childhood and adolescence. The worldwide pooled prevalence of ADHD is 5.29 %, with gender-related differences, i.e. a higher prevalence in boys than in girls (Polanczyk et al., 2007; Ullebø et al., 2012). Age-related differences have also been reported in developmental studies that have found a change in trajectories, with for example a clear reduction in ADHD symptomatology for inattention, hyperactivity and impulsivity at the moment of the transition to middle school for young adolescents (Langberg et al., 2008). In several studies, ADHD has been found to interfere with adolescents' personal, social and academic development (Galéra et al., 2009; Mikami et al., 2006).

The aim of the current research is to examine the predictive role of early experience of attachment deprivation for ADHD symptoms in adolescence. Two bodies of research have been dedicated to this topic. First, there have been studies in which participants' attachment and ADHD have been assessed and related to each other. Second, there have been studies of subjects, who have reported deprivation in attachment, in particular adoptees. In this second set of studies, no assessment of the children's attachment pattern has been completed prior to their adoption for practical reasons. It is assumed that adoptees are at risk of insecure attachment relationships because of their background of institutional, unresponsive caregiving and neglect (Rutter et al., 2007; Tieman et al., 2006; van den Dries et al., 2009).

The etiology of ADHD

Both neurocognitive and environmental factors have been related to ADHD.

According to the cognitive theories, ADHD could be explained by a low level of executive functioning characteristics, such as inhibiting prepotent responses, interference control and cognitive flexibility (Barkley, 1997). It could also be due to a motivation deficit (Sonuga-Barke, 2003; Sonuga-Barke, 2005) or to a deficit in temporal processing (Sonuga-Barke, Bitsakou & Thompson, 2010). Neurobiological explanations, such as the crucial role of the dopamine transporter gene have also been proposed (Bellgrove et al., 2008). It has nevertheless been recognized that neurocognitive factors cannot explain the whole variance in ADHD symptoms (Pinto et al., 2006).

Environmental factors have been reported as implicated in the etiology of ADHD (Hechtman, 1996). Researchers have examined whether and to what extent ADHD symptoms are related to the characteristics of the cultural and the family environments. With regard to the characteristics of the cultural environment, ADHD has been considered as a relevant construct across cultures (Bauermeister et al., 2010; Brewis et al., 2000). However, cross-cultural variations have been found in the assessment of ADHD symptoms in children and adolescents as well as in parental explanatory models of ADHD (Bussing et al., 2003; Lee & Neuharth-Pritchett, 2008; Roessner et al., 2007). In addition, findings among adoptees have recently been published showing the importance of the country of origin, in particular in Eastern Europe, for attention problems later on (Barcons-Castel, Fornieles-Deu & Costas-Moragas, 2011).

With regard to the characteristics of the family environment, ADHD has been found to be more common among children reared in families experiencing adversity such as marital discord, low socio-economic status, large family size, paternal criminality, and maternal mental disorder (Pheula, Rohde & Schmitz, 2011; Rydell, 2010; Wadsworth & Achenbach, 2005). ADHD has also been found to be related to negative parent-child relationships. Numerous studies have reported that coercive parenting styles are

predictive of ADHD symptoms (Finzi-Dottan, Manor & Tyano, 2006; Keown, 2012). However, much less attention has been paid to the attachment framework in order to document the importance of the quality of parent–child relationship in ADHD. The attachment framework provides an interesting new way of thinking about ADHD. In particular, the recent developments in attachment theory have shown the role played by attachment security in the child’s emotional and behavioral self-regulation (Vondra et al., 2001; Waters et al., 2010), and this important role has also been stressed in connection with ADHD (Barkley, 2010; Cardona et al., 2012; Walcott & Landau, 2004). The attachment framework is actually a theory about how a child learns to regulate his/her own affect as a result of how sensitively caregivers respond to the child’s needs and help him/her to learn to self-regulate (Mikulincer, Shaver & Pereg, 2003). Attachment theory is a model of the development of self-regulation, and where self-regulation is disturbed, as is the case in ADHD, this suggests that attachment theory will be relevant to consideration of the etiology of the syndrome.

Attachment and ADHD

Attachment theory assumes that the early caregiver-child relation is crucial for the emergence of the self-regulatory skills (Mikulincer, Shaver & Pereg, 2003) the lack of which is implicated in ADHD symptoms (Barkley, 2010; Walcott & Landau, 2004). The predictive link between attachment and ADHD has been empirically observed. It has been illustrated in several clinical reports and case studies reporting insecure attachment among ADHD children and adolescents (Crittenden & Kulbotten, 2007; Dallos & Smart, 2011; Niederhofer, 2009; Stiefel, 1997). The link between attachment and ADHD has also been cross-sectionally examined. These studies documented the co-occurrence of ADHD symptoms and insecure attachment. For example, insecure attachment score has been related to hyperactivity and inattention symptoms among 384 11–16 year-old adolescents (Keskin & Cam, 2010). Control–case studies have also provided support for the relation between attachment insecurity and ADHD. For example, 19 boys aged 5–10 years with a diagnosis of ADHD were compared with 19 control children with respect to attachment. Consistent support was found for the association between attachment insecurity and ADHD (Clarke et al., 2002). Finally, the

predictive relation between attachment and ADHD has been supported by only a few longitudinal studies. For example, ADHD has been assessed among 53 6–8 year-old children identified as having significant levels of disorganized attachment at 1 year of age. The results showed that attachment disorganization was correlated to ADHD scores for both inattention and hyperactivity symptoms 6 years later (Pinto et al., 2006).

ADHD in adoptees

Adoptees have experienced parental separation and early attachment deprivation, i.e. lack of assistance with affect regulation in early childhood, lack of reciprocity, or lack of empathetic emotional mirroring by the caregiver and associated emotional containment, which potentially harm infant functioning and later development. Neglect in 1 month of life, i.e. the lack of caregiver's care and nurturance, has been found to have deleterious effects on children's cognitive, socio-emotional, and behavioral development (Hildyard & Wolfe, 2002; Muris & Maas, 2004; Smith, Howard & Monroe, 2000; van der Vegt et al., 2009). A meta-analysis of 98 adoptee-control studies concluded that despite low to moderate effect sizes, adoptees displayed on average higher levels of both externalizing and internalizing problems than controls (Juffer & van IJzendoorn, 2005). In addition, when compared with their non-adopted siblings, adoptees' adjustment was worse in late adolescence (Weinberg et al., 2004).

More specifically, ADHD has been considered as a characteristic outcome of early deprivation. Indeed, inattention and overactivity symptoms have even been thought to form an institutional deprivation syndrome (Kreppner et al., 2001; Rutter et al., 2007; Sonuga-Barke & Rubia, 2008). Both control–case and follow-up studies from the adoption literature provide interesting information about the influence of early attachment deprivation on ADHD.

Recent case–control studies have consistently reported group differences, with more pronounced ADHD symptoms in adoptees than in controls. These group differences were seen to be moderated by the age of adoption, which can be regarded as an indicator of the duration of exposure to early attachment deprivation (Kreppner et al.,

2001; Merz & McCall, 2010). For example, group differences have been found between adopted children aged 8–11 years and controls with respect to ADHD symptoms (Wiik et al., 2011). A nuanced picture emerged from this study, which compared children with pronounced early deprivation and neglect, i.e. those adopted after 12 months of age and having previously been mostly in institutional care, with children with moderate early deprivation, i.e. those adopted before 8 months of age and having previously been mostly in foster care. These results suggest that the duration of exposure to early deprivation moderated the differences between the groups. Group differences were also reported in another recent study, in which the rates of ADHD medication were found to be higher among 10–15 year-old adoptees than among controls. It was also reported that the rate of such medication was likely to increase with higher age at adoption (Lindblad, Weitoft & Hjern, 2010).

Follow-up studies have delivered results consistent with those of control-case studies. They also help document the role of individual, family and cultural risk factors in adoptees' behavioral adaptation. Lower levels of behavioral adjustment have been found to be predicted by age of adoption (Sharma, McGue & Benson, 1996) and other risk factors, such as current age, single parenthood and culture of origin (Abrines et al., 2012; Elmund et al., 2007; Xing Tan & Marfo, 2006). More specifically, ADHD seems to increase with the age of adoption, suggesting that exposure to early attachment deprivation provokes self-regulatory deficits, thus increasing children's vulnerability to ADHD symptoms (Gunnar & van Dulmen, 2007; Merz & McCall, 2010; Simmel et al., 2001).

The current study

The current study contributes to the documentation of the predictive relation between early attachment deprivation and ADHD. Data have been collected in five countries among 641 adolescents aged 11–16 who were adopted before the age of 7 years. The influence of attachment deprivation on ADHD symptoms was initially tested by taking into consideration several key variables at the adoptee and country levels that have been reported as influencing behavioral issues, in particular ADHD. It will be recalled that

age- and gender-related differences in ADHD have been found (Langberg et al., 2008; Polanczyk et al., 2007) and the risk for ADHD has turned out to be higher in families experiencing adversity such as low socio-economical status or marital discord (Pheula, Rohde & Schmitz, 2011; Rydell, 2010; Wadsworth & Achenbach, 2005). Cross-cultural variations in the assessment of ADHD symptoms as well as in the explanatory models of the syndrome have been reported (Bussing et al, 2003; Lee & Neuharth-Pritchett, 2008; Roessner et al., 2007), and variations in the level of attention problems have been displayed among adoptees according to their country of origin (Barcons-Castel, Fornieles-Deu & Costas-Moragas, 2011). It was hypothesized that an increased level of ADHD symptoms was predicted by the duration of exposure to early attachment deprivation, estimated from the age of adoption, over and above the influence of adoptee variables, i.e. age, gender, length of time in adopting family, parents' educational level as a proxy of SES and marital status, and country variables, i.e. social and economic development, quality of health services and values. It was also hypothesized that ADHD symptoms are a characteristic outcome of early deprivation (Kreppner et al., 2001; Sonuga-Barke & Rubia, 2008). A non-significant main relation was therefore expected between the duration of exposure to early deprivation, estimated from the age of adoption, and other outcomes, in particular externalizing and internalizing behavior.

Method

Sample

This study is part of the Attachment in Adopted Adolescents Research Network (AAARN). For the current research, the inclusion criteria were that the child had been adopted before the age of 7 years, i.e. a maximum of 84 months of early attachment deprivation, that they were aged 11–16 years, and that they knew they had been adopted.

Adoptee variables

Data were collected from 641, 11–16 year-old ($M = 13.45$, $SD = 1.64$) adolescents (53.2 % girls). The majority had been adopted from another country (93 %). Prior to their adoption, most children had lived in institutions that provided them with adequate physical resources but not consistent, responsive caregiving. Therefore, the age of adoption, i.e. the number of months spent in the country of origin, ranging from 0 to 82 months ($M = 16.50$, $SD = 20.08$), was considered as a measure of the duration of exposure to early attachment deprivation. On the other hand, the length of time in the adoptive family was also considered to avoid confusing causal effects, as the symptoms may have been aggravated by the behavior of the adoptive parents. The length of time in the adoptive family ranged from 4 to 17 years ($M = 11.89$, $SD = 2.27$).

The educational level of the adoptive parents was taken as a proxy for socio-economic status (SES). Educational level is highly correlated to SES in most developed countries (Peterson, 2000). Moreover, owing to the current worldwide economic context, educational level is preferred as a stable indicator, rather than for example, family income, which may fluctuate. The adoptive parents' educational level was classified into five groups: elementary school ($N = 46$ (7.2 %) mothers and $N = 48$ (7.5 %) fathers), secondary school ($N = 159$ (24 %) mothers and $N = 130$ (20.3 %) fathers), undergraduate studies ($N = 199$ (31 %) mothers and $N = 163$ (25.4 %) fathers), graduate studies ($N = 173$ (27 %) mothers and $N = 181$ (28.2 %) fathers) and postgraduate studies ($N = 62$ (9.7 %) mothers and $N = 93$ (14.5 %) fathers). Note that this information was missing for 2 mothers and 26 fathers, mostly in the case of single parent families. The data for the single mother or single father were considered for these families. To reduce the number of constructs in the analyses, the parents' educational level was averaged from the mother's and the father's levels ($r = 0.56$, $p < 0.001$).

Marital status was considered in a dichotomous manner to contrast two-parent families with adoptive parents living together ($N = 533$, 83.1 %) and alternative situations of single parenthood with the parent living alone (single parent, divorced or widowed) or

living with a partner other than the other adoptive parent (N = 96, 15 %). Note that this information was missing for 12 (1.9 %) families.

Country variables

The adolescents had been adopted in Canada (N = 367, 57.3 %), The Netherlands (N = 174, 27.1 %), Romania (N = 43, 6.7 %), Belgium (N = 33, 5.1 %) and Chile (N = 24, 3.7 %). Several characteristics of both the adoptive country and the country of origin were considered in the current study.

The adopted adolescents came from 30 different countries: 108 from Sri Lanka (16.8 %), 83 from Romania (12.9 %), 70 from China (10.9 %), 59 from South Korea (9.2 %), 58 from Colombia (9 %), 48 from Mexico (7.5 %), 47 from Haiti (7.3 %), 37 from Russia (5.8 %), 25 from Taiwan (3.9 %), 25 from Chile (3.9 %), 12 from Guatemala (1.9 %), 11 from Bolivia (1.7 %), 11 from Vietnam (1.7 %), 9 from Brazil (1.4 %), 6 from El Salvador (0.9 %), 5 from Peru (0.8 %), 4 from Ethiopia (0.6 %), 3 from Costa Rica (0.5 %), 3 from the Philippines (0.5 %), 3 from Poland (0.5 %), 3 from Honduras (0.5 %), 2 from Thailand (0.3 %), 2 from Belgium (0.3 %), 1 from Ukraine (0.2 %), 1 from Cape Verde (0.2 %), 1 from Bulgaria (0.2 %), 1 from Cambodia (0.2 %), 1 from India (0.2 %), 1 from Lithuania (0.2 %), and 1 from Venezuela (0.2 %).

Because it was not possible to record data at an individual level concerning the characteristics of children's caregiving settings in their country of origin, we chose to extrapolate from the global characteristics of childcare and health conditions in the countries of origin. It was considered that the level of social and economic development

as well as the quality of the health system in the country of origin may have influenced the quality of the caregiving environment in an institution prior to adoption. These cultural characteristics could therefore impact the adolescents' level of ADHD symptoms. They are shared by all participants coming from the same cultural background. In taking them into consideration in the current study, we sought to disentangle the effect of duration of exposure to early attachment deprivation at the individual level from the effect of shared cultural experience of health system and care

services. First, the social and economic development in the country of origin was assessed using the Human Development Index (HuDI), which was developed by the United Nations Development Programme and published in 2008. It is provided by the CIA World Factbook (CIA, 2009) with the collaboration of the Organization for Economic Co-operation and Development (OECD) and the World Health Organization (WHO). In the HuDI, the higher the score, the higher the social and economic development in the country. Indicators are used to measure the critical indicators of life expectancy, educational attainment and income. In our sample, the HuDI scores in the countries of origin ranged from 0.35 (the lowest score, for Ethiopia) to 0.90 (the highest score, for Belgium) ($M = 0.75$, $SD = 0.08$). Second, the quality of the health system was assessed by means of the ranking given by the World Health Organization. Five performance indicators were used to measure health systems in 191 WHO member states: overall level of population health; health inequalities (or disparities) within the population; overall level of health system responsiveness (a combination of patient satisfaction and how well the system acts); distribution of responsiveness within the population (how well people of varying economic status find that they are served by the health system); and the distribution of the health system's financial burden within the population (who pays the costs). The WHO ranking provides relative scores, i.e. societies are compared with other societies. The higher the rank, the better the health system in the country. In our sample, the WHO ranking in the countries of origin ranged from 21 (the highest rank, for Belgium) to 180 (the lowest rank, for Ethiopia) ($M = 92.38$, $SD = 46.18$). The correlation between the HuDI score and the WHO ranking was -0.61 , $p < 0.001$.

With regard to the countries of adoption, it was considered that both cultural values and the quality of the health system could influence the adolescents' level of ADHD symptoms. These cultural characteristics could hence impact expectations about the behavioral adjustment of adolescents according to cultural standards of normality (Dmitrieva et al., 2004; Super et al., 2008), as well as the quality of care and mental health services in the country of adoption, and the support and help given to the adoptive family where necessary. First, the quality of health system in the country of adoption was assessed using the WHO ranking as described above. In our sample, the

WHO ranking in the countries of adoption ranged from 17 (the highest rank, for the Netherlands) to 99 (the lowest rank, for Romania) ($M = 28.21$, $SD = 12.21$). Second, the cultural values in the countries of adoption were considered on the basis of the work of Hofstede (Hofstede, Hofstede & Minkov, 2010), in particular the individualism–collectivism dimension for each of the five countries under consideration. The high end of the collectivism–individualism dimension can be defined as “a preference for a loosely knit social framework in which individuals are expected to take care of themselves and their immediate families only”. Its opposite, collectivism, represents “a preference for a tightly knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society’s position on this dimension is reflected in whether people’s self-image is defined in terms of ‘I’ or ‘we’ (Hofstede, 2012). The collectivism–individualism dimension provides relative scores, i.e. countries are compared with other countries. The higher the score, the higher the level of individualism in the country. In our sample, the individualism scores in the countries of adoption ranged from 23 (the lowest score, for Chile) to 80 (the highest score, for both Canada and the Netherlands) ($M = 76.02$, $SD = 11.46$). The correlation between the WHO ranking and the individualistic score was -0.59 , $p < 0.001$.

Data collection procedure

All of the adolescents came from a community sample. Canadian data were extracted from a large dataset from the Quebec study on international adoption (Habersaat, Tessier & Pierrehumbert, 2011; Tessier et al, 2005). The Canadian original dataset was obtained following authorization from the Cour de la Jeunesse of Quebec giving the authors access to the adoption files. For the current study, a selection of subjects corresponding to the three criteria of inclusion (see above) was made. The selected families received questionnaires by mail. A letter signed by the Secretary for the International Adoption was enclosed with the questionnaire, inviting the parents to participate. A letter of consent was also included, with a brief description of the study. The response rate was 36.8 %. In The Netherlands, the questionnaires on behavior problems were completed within a longitudinal adoption study in which internationally

adopted children were followed from infancy to adolescence (Beijersbergen et al., 2012; Jaffari-Bimmel et al., 2006). At the start of the study, adoptive families were randomly recruited through Dutch adoption organizations. In adolescence, the adoptive families were visited at home to conduct assessments and interviews, and to administer questionnaires. Ethical guidelines were followed throughout the study and all participants gave informed consent before their inclusion in the study. At the time of the current study, adolescents from 190 families corresponded to the three criteria of inclusion. Only 15 of them (7.9 %) were not willing to participate. The Romanian data were collected with the collaboration of the governmental adoption service.

Cooperation agreements were established with 9 of the 47 Romanian counties. In each of the nine counties, the child protection system established prior contact with the families that had been selected on the basis of the three selection criteria as described above. All of the families contacted within the 2-years period set for the current research project agreed and were then contacted by the research team for a meeting that took place at home or at the child protection service. Belgian questionnaires were completed by adoptive families from the French-speaking part of the country, who were willing to participate. These families were informed about the research project by social networks or by word of mouth. All the families that voluntarily contacted the research team with a view to participating within the 6 months period set for this project and that satisfied the inclusion criteria were included. Eight trained master's students visited the parents and adolescents at home in order to describe the study and give instructions on completing the questionnaires. Chilean families that met the three criteria for inclusion were recruited from the registry of adoptions at the three state agencies authorized to conduct adoptions in Chile: "*SENAME*" (National Youth Service), "*Fundación Chilena para la Adopción*" and "*Fundación San José para la Adopción*". Adoption agencies initially contacted 71 families to invite them to participate in the study. Thirty-seven families (52.1 %) agreed to being contacted by the research team. Of these, seven families finally decided to withdraw: three families did not want to stir up past issues, three adolescents refused to participate and one adolescent did not yet know he had been adopted. Six additional cases were excluded because they did not meet the inclusion criteria: one adolescent had incurred a developmental disorder, in four cases, the

adoption was late (after 84 months of age), and one adolescent was more than 16 years old. Finally, the Chilean sample consisted of 24 adoptive families (33.8 %). The completion of the questionnaires was organized at home. The Ethics Committee of the School of Psychology of the *Pontificia Universidad Católica de Chile* approved the study. All participants gave signed informed consent.

Outcome measure

The outcome variable was the current level of ADHD symptoms in adoptees assessed with the DSM-oriented scale for attention deficit/hyperactivity problems of the Child Behavior Checklist (CBCL) covering ages 6–18 years (Achenbach & Rescorla, 2001). The DSM-oriented scale for attention deficit/ hyperactivity problems is composed of seven items focusing on inattention, e.g. cannot concentrate, hyperactivity, e.g. cannot sit still, and impulsivity, e.g. impulsive. Strong evidence for the reliability and convergent and discriminative validity of the scale has been provided (Kreppner et al., 2001; Nakamura et al., 2009). The DSM-oriented scale for ADHD was completed by the adoptive mothers. The internal consistency was good, with $\alpha = 0.82$ in the whole sample and α ranging from 0.72 to 0.88 according to the five subsamples (Canada, The Netherlands, Romania, Belgium, Chile). Data were checked for normality. The test for normality was significant (Kolmogorov–Smirnov(KS) (641) = 0.17, $p < 0.001$).

Two other subscales of the CBCL, i.e. the externalizing and internalizing behavior scales, were used to test the specificity of the relation between the age of adoption and the level of ADHD symptoms. The externalizing behavior scale encompasses the rule-breaking and aggressive behavior syndrome scales. The internalizing behavior scale encompasses the anxious/depressed, somatic complaints and withdrawn syndrome scales. Since the externalizing and internalizing behavior scales were closely correlated to the DSM-oriented scale for ADHD with $r = 0.75$, $p < 0.001$ and $r = 0.55$, $p < 0.001$, respectively, the residuals of externalizing and internalizing scores have been considered as outcomes in the analyses. Data were checked for normality. The test for normality was significant both for the externalizing behavior subscale (KS (641) = 0.13, $p < 0.001$) and the internalizing behavior subscale (KS (641) = 0.13, $p < 0.001$).

Statistical analysis

A preliminary set of analyses was computed to test the main relation between the age of adoption and the level of ADHD symptoms irrespective of the adolescents' country of origin and adopting country, in a classical hierarchical regression analysis taking account of the adoptee control variables (age, gender, length of time in the adoptive family, parents' educational level and marital status). Moreover, the specificity of this relation was tested by considering the externalizing and internalizing behavior scales of the CBCL in two similar hierarchical regression analyses. Note that because of close correlations between the length of time in the adoptive family and both age and age of adoption, with $r = 0.68$, $p < 0.001$ and $r = -0.71$, $p < 0.001$, respectively, the residuals of the length of time in the adoptive family were entered as a predictor.

Second, the data were considered using the multilevel modeling technique (Raudenbush et al., 2001). The Hierarchical Linear Model (HLM) is a statistical (maximum likelihood) procedure designed to address the unit of analysis problem in multilevel analyses. HLM accounts for the interdependence of adolescents from the same country of origin and adopted in the same country. A two-level HLM was computed in the current study (Maas & How, 2005; Snijders, 2005). It models both country-level and adoptee-level variance on the outcome, i.e. the level of ADHD symptoms. Each adoptee was therefore nested in a level 2 group according to both countries of origin and country of adoption. Adoptee variables, i.e. those having a different value for each adolescent, were considered as predictors at level 1, while country variables, i.e. those having a common value for all the adolescents sharing the same country of origin and country of adoption, were entered as predictors at level 2. All available groups were considered at level 2 since "In most research, the group sizes n_j are variable between groups. [...] This does not constitute a problem for the application of the hierarchical linear model in any way. The hierarchical linear model can even be applied if some groups have size $n_j = 1$, as long as some other groups have greater sizes" (Snijders & Bosker, 1999). The total number of groups was 42 with their size varying from 1 to 108. The conditions were met for computing an HLM equation (Maas & How, 2005; Snijders, 2005; Snijders & Bosker, 1999).

Results

Preliminary analyses

The results of the classical hierarchical regression analysis are displayed in Table 1.

Table 1. Regression analysis predicting the level of ADHD symptoms, externalizing and internalizing behavior

	Level of ADHD symptoms	Externalizing behavior	Internalizing behavior
<i>Step 1</i>			
Age	-0.105**	0.120**	0.053
Gender	0.217***	-0.013	-0.168***
Length of time in adoptive family	-0.164***	-0.038	-0.097*
Educational level	0.032	0.013	-0.025
Marital status	-0.049	-0.111**	-0.060
R^2	7.5 %	2.2 %	4.6 %
<i>Step 2</i>			
Age of adoption	0.208***	0.028	-0.021
DR^2	5 %	0 %	0 %
Total R^2	12.5 %	2.2%	4.6%

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results show that considering age, gender, length of time in adoptive family, parents' educational level and marital status in a first step, the level of ADHD symptoms was predicted by age, gender and length of time in adoptive family. As expected, the level of ADHD symptoms was seen to decrease with age. In addition, boys displayed a higher level of symptoms than girls. Finally, the longer the time spent in the adoptive family, the lower the level of ADHD symptoms. The variance components indicated that 7.5 % of the total variance was explained in this first model by the five adoptee control variables. The inclusion of the age of adoption in the second step showed that this variable significantly predicted the level of ADHD symptoms over and above the adoptee control variables. The variance components indicated that 12.5 % of the total variance was explained in this second model (5 % more than in the first model).

The specificity of the relation between the age of adoption and the level of ADHD symptoms was tested in two similar hierarchical regression analyses with the residuals

of both externalizing and internalizing behavior as outcomes. In the first step, externalizing behavior was predicted by age and marital status. The level of externalization was seen to increase with the age and adolescents in alternative marital situations displayed higher levels of externalizing behavior than those living with the adoptive parents together. The variance components indicated that 2.2 % of the total variance was explained in this first model by the adoptee control variables. In the second step, the age of adoption was not significantly related to externalizing behavior and no significant additional variance was added to the first model.

In the first step, internalizing behavior was predicted by gender and by length of time in adoptive family. The longer the time spent in the adoptive family, the lower the level of internalization. In addition, girls displayed higher levels of internalizing behavior than boys. The variance components indicated that 4.6 % of the total variance was explained in this first model by the adoptee control variables. In the second step, the age of adoption was not significantly related to internalizing behavior and no significant additional variance was added to the first model.

Multilevel analysis

Before modeling our main research question for the level of ADHD among adolescents, we ran an unconditional model (with no predictors) to see which part of the total variation was attributable to the adoptee and the country levels. The results from the random section indicated both individual and cultural significant variability and showed that it was appropriate to examine the influence of several predictors of the level of ADHD symptoms in conditional models.

A first conditional model with adoptee control variables was analyzed to see which part of the total variation was due to the adoptee control variables, i.e. age, gender, length of time in adoptive family, parents' educational level and marital status. Significant effects of the length of time in adoptive family and gender were found. The longer the time spent in the adoptive family, the lower the level of ADHD symptoms. In addition, boys

displayed higher levels of ADHD symptoms than girls. The variance components indicated that 5.31 % of the total variance was explained by the model.

A second conditional model was analyzed to test our main hypothesis, i.e. the specific effect of the age of adoption on the level of ADHD symptoms, controlling for the adoptee variables (age, gender, length of time in adoptive family, parents' educational level and marital status), and taking into consideration the variance at the adoptee and country levels.

Does the age of adoption predict the level of ADHD symptoms in adolescence across different groups of adoptees? The data presented in Table 2 suggest that the answer is yes: a higher age of adoption was significantly related to a higher level of ADHD symptoms. The significant coefficient meant that each additional month in the age of adoption resulted in an increase of 0.020 in the level of ADHD symptoms. The variance components indicated that 8.82 % (3.51 % more than in the first conditional model) of the total variance was explained by the model.

The third conditional model was analyzed as a full model with adoptee variables at level 1 and country variables at level 2. It investigated the extent to which the age of adoption influenced the adoptees' level of ADHD symptoms, controlling simultaneously for adoptee and country characteristics and taking into account the variance at the adoptee and country levels. The analysis of the third conditional model revealed that, when other adoptee and country characteristics were controlled for, the age of adoption remained significantly related to the level of ADHD symptoms. Moreover, the WHO rankings of both the country of origin and the country of adoption were significantly related to the level of ADHD symptoms. The results suggest that, when adoptee and other country characteristics were controlled for, adolescents from the groups at level 2 with a higher ranking in both their country of origin and their country of adoption displayed lower levels of ADHD symptoms. In other words, adolescents displayed lower levels of ADHD symptoms if they came from a country with a better health system and if they had been adopted in a country with a better health system. The significant coefficient meant that an improvement of one position in the WHO ranking resulted in a decrease

in the level of ADHD symptoms of 0.013 for the country of origin and 0.027 for the country of adoption. The introduction of the country variables accounted for about 1.11 % of additional explained variance.

The results are displayed in Table 2 for the models.

Table 2. Multilevel unconditional model, conditional models with adoptee-level variables and with adoptee-level and culture-level variables

<i>Parameter</i>	<i>Unconditional model</i>		<i>Conditional model with adoptee-level variables</i>		<i>Conditional model with adoptee-level and culture-level variables</i>	
	Estimate	SE	Estimate	SE	Estimate	SE
FIXED						
Intercept	2.003***	(.17)	1.725**	(.46)	1.650†	(.84)
Adoptee variables						
Age			.013	(.03)	.019	(.03)
Gender			.186***	(.05)	.184***	(.05)
Educational level			.029	(.05)	.034	(.05)
Marital status			-.080	(.06)	-.080	(.06)
Age of adoption			.006**	(.00)	.006*	(.00)
Culture variables						
MPI in culture of origin					1.254	(1.29)
WHO ranking in culture of origin					-.006†	(.00)
Individualistic value in adopting culture					.001	(.00)
WHO ranking in adopting culture					.008	(.00)
RANDOM						
Variance components						
Adoptee-level	83.85%		80.33%		80.71%	
Culture-level	16.15%		9.66%		7.92%	
Explained			10.01%		11.36%	
DEVIANCE						
	1325.50		1365.30		1384.67	

†*p*<.10

**p*<.05

p*<.01 *p*<.001

Discussion

The main purpose of the current research was to study the predictive role of early attachment deprivation on the level of ADHD symptoms among adopted adolescents. The impact of the age of adoption was treated as a measure of the duration of exposure to deprivation. It was tested after controlling for the influence of adoptee (age, gender, length of time in adoptive family, parents' educational level as a proxy of SES, and marital status) and country factors (social and economic development and health

services in the country of origin, and individualistic values and health services in the country of adoption).

Our results support the main hypothesis that attachment deprivation predicts the level of ADHD symptoms, taking into consideration several adoptee and country variables, as well as the interdependence between adolescents according to both their country of origin and their country of adoption. We found that higher ages of adoption predicted higher levels of ADHD symptoms in adolescents. This suggests that neglect in 1 month of life, i.e. the lack of stable care and nurturance which has an impact on the development of attachment relationships, contributes to an increase in the level of ADHD symptoms several years later. As suggested in earlier studies, attachment processes apparently contribute to the development of attention skills and of emotional and behavioral self-control. Children with early attachment deprivation are therefore at risk of exhibiting behavioral problems later on, in particular ADHD symptoms (Barkley, 2010; Cardona et al., 2012; Walcott & Landau, 2004). It should be noted that the adoptees in the current study may have experienced deprivation in a broader sense, not only having missed out on stable attachment relationships but also having lacked essential ingredients needed for healthy physical, emotional and cognitive development (e.g. lack of stimulation, toys, and learning materials).

Furthermore, our results support the hypothesis that ADHD symptoms are a characteristic outcome of early deprivation (Kreppner et al., 2001; Sonuga-Barke & Rubia, 2008), whereas the duration of exposure to deprivation was not significantly related to either externalizing or internalizing behavior. Our results corroborate the assumption that early deprivation as experienced by adoptees in their 1 month of life, i.e. lack of assistance with affect regulation in early childhood, lack of reciprocity, lack of empathetic emotional mirroring by the caregiver and associated emotional containment, is associated with poor self-regulation and attention problems, and that this association is more robust than the findings for other behavioral or emotional outcomes. This relation may be explained by the importance of sensitive and responsive interactions in the caregiver–child dyad for the development of a secure relationship in

which the child learns to regulate his/her own affect and behavior (Haddad & Garralda, 1992; Mikulincer, Shaver & Pereg, 2003).

Beside these hypotheses, other significant effects of control variables have been found. For individual factors, as expected, ADHD symptoms were at a higher level in boys than in girls. This main effect confirms the results from worldwide prevalence studies (Polanczyk et al., 2007). In addition, a lower level of ADHD symptoms was predicted by the length of time in the adoptive family. In other words, additional years spent in their adoptive family setting can be regarded as helping adoptees to recover. Finally, as suggested in the previous developmental studies (Langberg et al., 2008), a reduction in ADHD symptomatology with age was found in our sample, but only in the classical hierarchical regression analysis and not when the variance at the adoptee and country levels was taken into account.

The absence of any effect of marital status or socioeconomic status contradicts previous findings (Elmund et al., 2007; Pheula, Rohde & Schmitz, 2011; Rydell, 2010; Wadsworth & Achenbach, 2005). However, it could be that a measure of the level of marital conflict would be more predictive of the level of ADHD symptoms in adolescents than a dichotomous classification of adoptive parents as either living together (first group) or living separately or a single adoptive mother (second group). Also, it could be that the range in educational level of the adoptive parents was not large enough to display significant relations with the level of ADHD symptoms. This range is somewhat limited because of the policy of selection of the adoptive families according to their socio-demographic characteristics.

The results displayed for the cultural factors were in line with those from previous research (Barcons-Castel, Fornieles-Deu & Costas-Moragas, 2011; Bussing et al., 2003; Lee & Neuharth-Pritchett, 2008). A significant effect was shown for the WHO ranking of both the country of origin and the country of adoption. This stresses the importance of the quality of the health services for children institutionalized prior to their adoption in their country of origin but also for these children after their adoption. This point relates in particular to the system's responsiveness, which is the main factor that

determines the country ranking; this makes sense in light of the theoretical background to attachment deprivation.

Although important from both clinical and research perspectives, this study is by no means definitive. A first important limitation in studies relying on adoption is the bias in the association between the origin of the children and the country of adoption. This is because individual countries have agreements on the adoption of children with certain countries rather than others. For example, all of the 37 Russian children had been adopted in Canada. Such a bias has implications with regard to both the number and the size of the level-2 cells in the analyses. A second limitation in studies on adoption in general as well as in the current study is the lack of qualitative information about the individual care and nurturance that children have actually received before adoption. The age of adoption is in most cases the only variable that can be used as a measure of the duration of exposure to early deprivation in care and nurturance. Although the age of adoption may serve as a rough, but effective proxy for considering effects of deprivation (see also van den Dries et al., 2009), the study may also reveal a whole range of health and other forms of deprivation as causal, and these may be part of the early lives of children before their adoption. Another alternative hypothesis adjusting to a different culture and family becomes more and more difficult as children grow older. A third limitation is that the current findings were based on parent information only and did not include teacher- or self-reports.

It should be noted that meta-analytical evidence has convincingly shown that adoption is a positive and effective intervention in adopted children's lives. Despite the experiences of deprivation, adoptees show catch-up growth in the domains of physical, social-emotional, and cognitive development, outperforming those children unfortunately left behind in institutional care (Jaffari-Bimmel et al., 2006). Adoptees also display more behavior problems (including ADHD) than their nonadopted counterparts, but this concerns a minority of adoptees. The large majority function well and much better than might be expected based on their background of deprivation (Juffer & van IJzendoorn, 2005).

In conclusion, in a large cross-national study including 641 adopted adolescents in five countries we tested the contribution of early deprivation to later ADHD symptoms and found that the age of adoption significantly predicted the level of ADHD symptoms, with increasing ages of adoption predicting higher levels of ADHD. This outcome suggests that deprivation of stable and sensitive care in infancy may have long-lasting consequences for children's development. Implications for policy and practice are that adoptive parents should be supported to help their children recover from experiences of deprivation and that children without parental care should be placed in foster or adoptive families as early as possible to avoid or prevent experiences of institutional deprivation.

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Author Contributions. Analyzed the data: IR RT. Contributed database/materials: MJE MP FJ MVI BP. Wrote the paper: IR RT. Revising of the manuscript and contributed on writing manuscript: MJE MP FJ MVI BP

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The impact of early social deprivation on Neurodevelopment

María Josefina Escobar, Agustín Ibáñez & Vladimir López

Abstract

Institutionalization of children, who because of adverse circumstances do not have a family to take care of them, is often an unavoidable alternative. There is evidence that the experience of early social deprivation has an impact at different levels of the cognitive, behavioral and physical development. In the last decades, the development of neuroscience techniques have allowed exploring the impact these experiences have on neurodevelopment and how this is reflected in a deficit in cognitive and social skills. The objective of this article is to carry out a review of the studies that employ neuroimaging techniques and electroencephalography on children with an institutionalization background. The results can be grouped in data that propound structural damages due to early deprivation and another group of studies that propound a delay in the cerebral maturing. The implications of the impact of early deprivation on the cerebral development of the child are discussed as well as what this implies with regard to social cognition, cognitive skills and psychopathology. These findings show the relevance of early and timely interventions, taking into consideration the developmental critical periods. Especial emphasis is placed in the need of a follow-up program for children with background of adverse environmental experiences in early childhood.

Keywords: *Institutionalization, Neurodevelopment, , Early social deprivation, Brain, MRI, EEG, ERP.*

Introduction

In the last two decades we have witnessed a growing interest in the study of the potential consequences for children exposed to primary adverse experiences early in life (Rutter et al., 2007; Vorria et al., 2006; Zeanah et al., 2003). Some situations like earthquakes, wars and poverty may cause a large number of children not being able to grow up with their biological families. These situations, where institutionalization is frequently seen as the least of all possible evils, have received a great deal of attention. A wide range of factors, from large-scale human conflicts or natural disasters to failed parenthood and complicated adoption programs, make it far from clear that institutionalized care could be substituted in any foreseeable future. Yet, several common practices in institutions worldwide might represent potential risks for healthy child development (MacLean, 2003). Some of these common characteristics of institutionalized care are: a large number of children to one caregiver (15 to 1), a high turn-over of caregivers, low level of training of caregivers and a lack of appropriate stimulation according to age to enable child development (Nelson, 2007).

These early deprivations might have a negative impact on the emotional, cognitive and neurophysiologic development of the children (Cardona, Manes, Escobar, López, & Ibáñez, 2012; Kertes, Gunnar, Madsen, & Long, 2008; Kreppner, O'Connor, & Rutter, 2001; O'Connor & Rutter, 2000; Parker & Nelson, 2005; Zeanah et al., 2009). Some of the negative consequences described include physical and medical deficiencies due to malnutrition, cognitive, affective and behavioral problems and insecure or disorganized attachment patterns (MacLean, 2003). Children with an institutionalization background also have poorer performances in recognizing emotions compared to those raised by their biological families (Vorria, et al., 2006). Regarding the latter, it has been suggested that experiences of family interactions facilitate the development of emotion recognition processes; thus, institutionalized children might need more time to compensate this deficit. Nevertheless, this evidence is challenged by other studies using behavioral measures that found no differences in the ability to discriminate emotions associated with institutionalization (Jeon, Moulson, Fox, Zeanah, & Nelson, 2010; Nelson, Parker,

& Guthrie, 2006). These studies are interpreted as evidence of the adequacy of institutional experiences to stimulate the development of such skills.

At the neurophysiological level it has been widely accepted that postnatal brain development needs a proper interaction between genetic and environmental factors. In this context, institutionalization is often seen as implying a lack of experiences needed for optimal child neurodevelopment (Nelson, 2007). In other words, deprivation in the early stages of human development could compromise critical periods of brain development (Sheridan, Drury, McLaughlin, & Almas, 2010). In the last few years, several studies have focused on the potential imprints that these early experiences could have on brain development and their behavioral consequences (Chugani et al., 2001; Eluvathingal et al., 2006; Marshall, Fox, & Group, 2004; Mehta et al., 2009; Moulson, Fox, Zeanah, & Nelson, 2009; Sheridan, et al., 2010; Tarullo, Garvin, & Gunnar, 2011; Telzer et al., 2013; Tottenham et al., 2010; Tottenham et al., 2009).

This article has reviewed the accrued electrophysiological and neuroimaging evidence from the neurodevelopmental studies in children with an institutionalization background. The main findings and consistent correlations with some characteristics of social behavior are presented. Special emphasis has been placed on the evidence related with emotions and social information recognition. Finally, a comprehensive discussion is presented of the impact of early deprivation on brain development and on social behavior and how increasing knowledge in this area could potentially help design early and efficient interventions.

Methods

An electronic database search of Web of Science, EBSCO and Google Scholar was conducted to retrieve relevant articles for the literature review. Key terms used for the advanced search included: “*institutionalized*”; “*early deprivation*”; “*adopted children*”; “*adopted adolescent*” and “*brain*”; “*electroencephalography*”; “*MRI*”; “*event related potentials*”. The main inclusion criterion for the present review was the utilization of electrophysiological and neuroimaging techniques in children/adolescents with an

institutionalization background compared with a control group. The search was limited to articles written in English and published in peer-reviewed scientific journals. Reference lists of screened studies were also reviewed for relevant articles, especially the references cited in the review from Sheridan et al., 2010.

Results

In this review we searched for studies on children or adolescents with an institutionalization background showing electrophysiological and neuroimaging evidence of their neurodevelopment and with consistent correlations with their social behavior development. We found 25 articles that met the search criteria. Table 1 shows the details and characteristics of the included studies. 12 articles used neuroimaging techniques; among them positron emission tomography (PET), magnetic resonance imaging (MRI), functional MRI (fMRI) and diffusion tensor imaging (DTI). 14 articles used electroencephalograph (EEG), both in resting state and during tasks performing that later resulted in an event related potentials (ERP) analysis.

Table 1. Characteristics of included studies

Author (Year)	Country (Project)	Sample	Technique	Others Instruments	Key findings
Chugani and colleagues (2001)	USA	Total sample: 34 subjects. PI: 10 (Romanian orphanages). Mean age was 8.8 years old. Control group was: 17 healthy adults, mean age 27.6 years old, and 7 children with refractory focal epilepsy, mean age 10.7 years old.	PET	Neuropsychological evaluation, CBCL	- PI showed decreased metabolism bilaterally in the orbital frontal gyrus, the infralimbic prefrontal cortex, the medial temporal structures (amygdala and head of hippocampus), the lateral cortex and the brain stem. - PI presented mild neurocognitive deficit in language processing, memory and executive functions. - PI showed clinically significant behavioral problems in attention, thought and social scales
Marshall and colleagues (2004)	USA (BEIP)	Total sample: 150 children IG: 104 children (Romanian orphanage). The average age was 22.4 months. NI: 46 children the Bucharest community, the average age was 21 months.	EEG		- IG had patterns of brain activity that showed a maturational lag in nervous system development. - IG showed a pattern of increased low-frequency (<i>theta</i>) power and decreased high-frequency (<i>alpha</i> and <i>beta</i>) power. - IG showed less marked hemispheric EEG asymmetries than NI, particularly in the temporal region.
Parker & Nelson (2005)	USA (BEIP)	Total sample: 105 children. IG: 72 children (Romanian orphanage), mean age 22.4 months.	EEG, ERPs (<i>recorded while viewing</i>)		- IG and NI: no differences were evident in patterns of precognitive responses to images of facial expression in Nc y PSW component.

		NI: 33 children, mean age was 20.9 months.	<i>photographs of facial expressions happy, sad, angry and fear)</i>		<ul style="list-style-type: none"> - IG showed different modulation of N170 and P250 component. - IG showed larger amplitude of the N170 component to fear expressions than to sad and happy ones. And P250 showed inversed pattern. For all of these components NI showed inversed pattern.
Parker & Nelson (2005; 2007)	USA (BEIP)	Total sample: 105 children. IG: 72 children (Romanian orphanage), mean age 22.4 months. NI: 33 children, mean age 20.9 months.	EEG, ERPs <i>(recorded while view two color photographs mother or caregiver face and stranger face)</i>		<ul style="list-style-type: none"> - IG and NI evidenced discrimination between caregiver and stranger. - IG and NI presented the typical effects of the Nc, larger amplitude for stranger versus caregiver. - IG showed larger amplitude of the component N170, PSW and Nc than the NI. The component P250 has a reverse pattern.
Eluvathingal and colleagues (2006)	USA	Total sample: 14 children. PI: 7 children (Romanian orphanages). Mean age 9.7 years; and the mean time in orphanage care was 39 months. NI: 7 children. Mean age was 10.7 years.	MRI; DTI	Neuropsychological evaluation, BASC	<ul style="list-style-type: none"> - PI showed decreased of connectivity in the left uncinate fasciculus compared to NI. - PI had lower head circumference, lower total brain volume, gray matter and white matter than NI. - PI presented mild specific cognitive deficit and impulsivity

Marshall and colleagues (2008)	USA (BEIP)	Total sample: 136 children. The assessments were in 3 moments: 18 months ($n=136$ IG, Romanian orphanages); 30 months ($n=49$ IG and $n=56$ FC); and 42 months of age ($n=41$ IG and $n=49$ FC).	EEG		<ul style="list-style-type: none"> - In the 42 months assessment the FC and IG showed minimal differences in EEG power and coherence. - The children who were placed in foster care earlier exhibited increased <i>alpha</i> power and reduced short- distance EEG coherence. - The results suggested that intervention of foster care had impact in <i>alpha</i> power, but no in <i>theta</i> power.
Bauer and colleagues (2009)	USA	Total sample: 61 children. PI: 31 children, mean age 10.9 years; mean time spent in institution 10 months (orphanage to $n=12$ Romanian; $n=12$ Russia; $n=5$ China; $n=2$ other eastern countries). NI: 30 children, mean age 11.3 years.	Structural MRI	CANTAB	<ul style="list-style-type: none"> - PI had smaller left and right superior –posterior cerebellar lobes volume than NI. - The left superior – posterior lobe mediated a planning component of executive functions.
Mehta and colleagues (2009)	UK (ERA)	Total sample: 25 adolescents. PI: 14 adolescents, mean age was 16.2 years and mean of time spent in institution was 24.7 months (Romanian orphanages). NI: 11 adolescents, mean age 16.0 years.	MRI	WISC-R	<ul style="list-style-type: none"> - PI showed grey and white matter volumes were significantly reduced compared to NI. - PI showed larger amygdala volume than NI, especially in right hemisphere. - The volume of left amygdala was related to the time of deprivation, longer stays in institutions was related to smaller left amygdala volume.

Mehta and colleagues (2009)	UK (ERA)	Total sample: 23 adolescents. PI: 12 adolescents, mean age 16.1 years and mean of time spent in institution was 23.1 months (Romanian orphanages). NI: 11 adolescents, mean age 16.0 years.	MRI. Monetary incentive delay Task	- PI showed absence of ventral striatal activity across all reward levels.
Moluson and colleagues (2009)	USA (BEIP)	Total sample: 121 children. Assess in 3 time points: pre-intervention; 30 months of age and 42 months of age. 81 IG, at base line mean age was 23.5 months ($n = 37$ IG at 30 months; and $n = 23$ at 42 months). FC: 42 children at 23 months and 33 at 40 months. NI: 40 children at baseline, mean age 21.2 months; 20 children at 30 months and 21 children at 42 months.	EEG, ERPs (<i>recorded while view two color photographs mother or caregiver face and stranger face</i>)	- IG showed smaller amplitude for the P1 than NI. FC the amplitude P1 was between IG and NI. - The three groups showed no differences in the amplitude or latency of the Nc o P250. - The IG showed pervasive cortical hypoarousal in response to faces and in FC. But this deficit gets better in FC at 42 months. - The three groups distinguished familiar faces to stranger faces.
Moluson and colleagues (2009)	USA (BEIP)	Total sample: 85 children. Assess in 3 time points: baseline; 30 months of age and 42 months of age. IG: 62 children, at base line mean age was 23.6 months ($n = 26$ IG at 30 months; and $n = 29$ at 42 months). FC: 33 children at 23 months and 33 at 40 months.	EEG, ERPs (<i>recorded while view color pictures of faces expressing the emotions anger, happiness, fear, and sadness</i>)	- IG showed smaller amplitudes and longer latencies for the occipital components: P1, N170 and P400 compared with NI. - FC at 42 months has intermediate ERPs amplitude and latencies between IG and NI. Suggesting that the environmental change impacts the neuronal level and emotion recognition processes.

		NI: 23 children at baseline, mean age 21.1 months; 20 at 30 months and 21 at 42 months.			- The three groups showed similar pattern of face processing, fearful faces elicited larger amplitude P250 y Nc components than happy faces.
Behen and colleagues (2009)	USA	Total sample: 27 children. 15 post-institutionalized mean age was 126.3 months and mean of time spent in institution was 35.5 months (orphanage of Eastern Europe, Northern Asia or South Asia). Control group: 12 children never institutionalized. Mean age was 145.5 months.	MRI, DTI	WISC IV; GDS; Behavioral Assessment System for Children	- PI diffuse connectivity pattern, especially in right hemisphere, potentially related to incomplete neuronal pruning during development. Aberrant connectivity in fronto-strial projections in PI. - The structural abnormalities found in PI was associated with inattention and over-activity
Govidan and colleagues (2009)	USA	Total sample: 32 children. PI: 17 adopted children in USA, mean age 10.9 years. Mean duration spent in orphanage 32.2 months (Orphanage of Eastern Europe <i>n</i> :10, Central Asian/Rusian <i>n</i> :17). NI: 15 children, mean age 11.7 years.	MRI, DTI	WISC-III; CELF-3; WRAML; GDS; BASC	- PI showed multiple structural abnormalities in white matter (frontal, temporal and parietal cortices) - DTI metrics were associated with duration of time spent in institutions and inattention and hyperactivity
McLaughlin and colleagues (2010)	USA (BEIP)	Total Sample: 166 children. IG: 117 children (Romanian orphanage). NI: 49 children. EEG was acquired following entry into the	EEG	PAPA	- IG showed a significant reduction in <i>alpha</i> power and increases in <i>theta</i> relative power in frontal, temporal, and occipital regions, suggesting a delay in cortical maturation.

		study at age 6 to 30 months, and a structured diagnostic interview of psychiatric disorders was completed at age 54 months.			- The pattern of brain activity in IG predicted symptoms of hyperactivity and impulsivity.
Vanderwert and colleagues (2010)	USA (BEIP)	Total sample: 143 children were 8 years old. IG: 48 children FC: 53 children NI: 42 children.	EEG		- The intervention of institutionalized children placed to foster care before 24 months had effects in brain electrical activity. - FC (before 24 months old) did not have differences in <i>alpha</i> power with NI. - The results suggested 2 years old was a sensitive period to recover the impact of early deprivation in brain activity.
Tottenham and colleagues (2010)	USA	Total sample: 62 children. PI: 34 children, mean age was 9.3 years; and mean time in orphanage institution was 15 months (orphanages to East Asia <i>n</i> =11 and Eastern Europe <i>n</i> =1). NI: 28 children, mean age 10.8 years.	MRI	Emotional Face Go/Nogo task, Screen for Child Anxiety Related Emotional Disorders, CBCL	- PI showed larger volumes of the amygdala than NI. - The time spent in orphanage was related with amygdala volume (more time spent in orphanage larger volume). - Larger volume of amygdala predicted more rating in: anxiety score and internalizing score.
Tottenham and colleagues (2011)	USA	Total sample: 44 children. PI: 22 children; mean age was 9.3 years old, and the mean time in orphanage care was 15	fMRI (scanner while completed the	Eye-tracking, SCARED; Conners and	- PI showed more intense amygdala activity compared to NI. - PI presented larger activation of amygdala for

		months (orphanages to East Asia $n=18$ and Eastern Europe $n=4$); mean age in orphanage was 2.8 months (SD=6.8). NI: 22 children, mean age 10.8 years	<i>emotional face Go / Nogo task</i>	CBCL	fearful faces compared to neutral ones. The NI did no showed these differences. - PI showed that amygdala activity was associated with less eye-contact.
Tarullo and colleagues (2011)	USA	Total sample: 143 children. EEG at 18 months and assess at 36 months of age. PI: 37 children; mean in institutional care was 11.5 months (orphanage $n=26$ China; $n=7$ Russia; $n=2$ Ukraine; $n=1$ Guatemala; $n=1$ unknown). FC: 39 adopted children, mean age of adoption 7.6 months. NI: 47 children.	EEG		- PI and FC showed lower <i>alpha</i> power than NI. - PI presented an atypical distribution: higher <i>theta</i> power and lower <i>alpha</i> power than NI. - The patter at 18 months of higher relative <i>theta</i> power and lower <i>alpha</i> was associated with indiscriminative friendly behavior at 36 moths. - PI and FC more likely to show indiscriminative friendly behavior.
Sheridan and colleagues (2012)	USA (BEIP)	Total sample: 74 children. PI: 29 children, mean age 9.68 years. FC: 25 children, mean age 9.92 years. NI: 20 children, mean age 9.63 years.	MRI, resting EEG		- PI showed smaller total white volume and smaller posterior corpus callosum volume than NI. This difference was not seen between FC and NI. Suggesting that white matter recovery and neurodevelopment plasticity could play an important role in the changes seen when the environment improves. - EEG <i>alpha</i> power pattern seen in PI was partially mediated by cortical white matter. - PI and FC showed significantly smaller total

					cortical gray matter compared with NI. - Didn't find effect on institutionalization on relative amygdala volume
Almas and colleague (2012)	USA	Total sample: 193 children. Mean age 8.58 years. IG: 44 children (Romanian orphanage). FC: 52 children. NI: 97 children	EEG	Stranger Situation Procedure	- EEG <i>alpha</i> power at 8 years of age significantly moderate the relation between attachment security and social skills. - FC (when children was placed into foster care before 20 months) and NI had better social skills than NI and FC (when children was placed into foster care after 20 months)
Slopen and colleagues (2012)	USA (BEIP)	Measurements were performed in two moments. First moment (EEG) children were mean age 22 months. Recognition task: IG 78 children and NI 36 children. Emotion task: IG 54 children and NI 20. Second moment, at 54 months psychopathology was assess (25 children lost del IG).	EEG, ERPs <i>(recorded during two tasks: familiar and unfamiliar task and facial displays of emotions task)</i>	PAPA	- Lower peak amplitude of P700 component, was associated with (and partially explained) symptoms of ADHD at 54 months. - Suggest the presence of specific neurodevelopment pathways that explain the heightened risk for psychopathology in IG
Nelson and colleagues (2013)	USA (BEIP)	Total sample: 97 children 8 years old. IG: 26 children (Romanian orphanage) FC: 38 children. NI: 33 children.	EEG, ERPs <i>(recorded while view color pictures of faces)</i>		- IG had less accurate to recognizing fear and neutral faces and had more difficulty to inhibiting a response in generally, than FC and NI

expressing the emotions anger, happiness, fear, and sadness)

McDermott and colleagues (2013)	USA (BEIP)	Total sample: 150 children 8 years old. IG: 49 children (Romanian orphanage). FC: 54 children. NI: 47 children.	EEG, ERPs	Flanker task; WISC-IV; HBQ; SSRS;	- Early deprivation was associated with impaired inhibitory control on flankers task. - FC had better response monitoring compared to IG on the error related positivity. - In FC who exhibited larger error related negativity responses had lower levels of socio-emotional behaviors problems.
Gee and colleagues (2013)	USA	Total sample: 89 children/adolescents. PI: 41 children/adolescent NI: 48 children/adolescent	fMRI <i>(during the scan participant completed Emotional face task)</i>		- PI showed aberrant frontoamygdaline hyperreactivity and altered trajectories for amygdala-prefrontal connectivity. - PI presented a mature pattern of connectivity (negatively coupled amygdala-mPFC activity), they resembled the typical adolescent phenotype.
Telzer and colleagues (2013)	USA	Total Sample: 49 children/adolescents PI: 17 (Asian orphanage), mean age 11.2 years; and the mean time in orphanage care was 25.8 months; 19 (European orphanage), mean age 9.9 years; and the mean time in	fMRI <i>(during the scan participant completed Emotional</i>		- Deprivation to other race faces in childhood disrupts recognition of emotion and showed enhanced amygdaline activation in response to out-group faces. -Later age of adoption is associated with greater

orphanage care was 36.45 months.

matching task)

bias to race.

NI: 13 children/adolescents. Mean age 10.8

Abbreviations: *Project:* BEIP=Bucharest Early Intervention Project; ERA=The English and Romanian Adoptees study. *Sample:* PI=Post-institutionalized group; NI=Never institutionalized group; IG=Institutionalized group; FC=Foster care group; *Technique:* PET= Positron emission tomography; DTI= diffusion tensor imaging; MRI= Magnetic resonance imaging; fMRI= functional MRI; EEG= electroencephalogram; ERP= Event related potentials; *Other Instruments:* CBCL=Child Behavior Checklist; BASC= Behavioral assessment scales for children; CANTAB= Cambridge Neuropsychological Test Automated Battery; WISC=The Wechsler Intelligence Scale for Children; GDS=Gordon Diagnostic System; CELF=Comprehensive Evaluation of language Function; WRAML= Wide range assessment of learning and memory; PAPA= Preschool Age Psychiatric Assessment; SCARED = Self-Report for Childhood Anxiety and Related Disorders; Conners= Conners Parent Rating Scale–Revised: Short Form; HBQ= Health and behavior questionnaire; SSR= Social skills ratings system.

Among the main findings regarding structural changes in the studies with neuroimaging of children with an institutionalization background compared to children who do not have this background, differences can be seen regarding the volume of the different brain structures. For example, a reduced volume of the superior-posterior right and left lobes of the cerebellum was found, (Bauer, Hanson, Pierson, Davidson, & Pollak, 2009) less volume of the white matter, grey matter and a smaller sized corpus callosum (Sheridan, Fox, Zeanah, McLaughlin, & Nelson, 2012). These differences, which were found by Sheridan et al. (2012), were not seen in children who were in foster care and those who were never in institutions, which suggests that the neuroplasticity of the white matter recuperates when the environmental conditions are better. Other relevant structural findings include a higher volume of the amygdala, mainly the right amygdala (Mehta et al., 2009). The biggest volume of the amygdala of these post-institutionalized children might be related to the length of institutionalization (Mehta, et al., 2009) and resulted in lesser emotional regulation and higher level of anxiety (Tottenham, et al., 2010). Contrary to what is described, Sheridan et al. (2012) did not report effects of institutionalization on the amygdaline volume.

Structural changes in cerebral pathways in children with early deprivation have also been reported. Children with an institutionalization background show a diminished connectivity of the white matter in the left uncinate fasciculus (Elovathingal, et al., 2006). The uncinate fasciculus originates in the temporal lobe (Brodmann areas 20 and 38) and the cortical nucleus of the Amygdala (Brodmann areas 28, 34 and 36) and project on the frontal lobe, especially on the medial orbitofrontal cortex (Brodmann area 11) and the sub-callosum (Brodmann area 25). This finding could explain, in part, certain neurocognitive difficulties these children have. The alterations in this fasciculus and the areas it connects have been associated with the verbal and visual episodic-declarative memory, executive functions (EF) and general intelligence (Elovathingal, et al., 2006). Diffuse connectivity patterns have also been reported in the right hemisphere associated to lack of attention and hyperactivity (Behen et al., 2009). Govidan et al., 2009 reported abnormalities in brain connectivity in children with an institutionalization background. They found reduced white matter fractional anisotropy in frontal, temporal and parietal lobe including the uncinate and superior longitudinal fasciculi in children

with early deprivation. These findings are considered evidence of limbic and paralimbic abnormalities related with childhood institutionalization as they were correlated with the time spent at the institution.

Evidence was also found of a deficit at the functional level in children with an institutionalization background. Among the findings are: less cerebral activation in the prefrontal cortex, the amygdala (right), hippocampus and the brain stem (Chugani, et al., 2001) areas of the brain which are involved in superior cognition, emotion and emotional regulation. Likewise, it was found that the amygdala presented, in children with an institutionalization background, higher activity in the face of negative emotions, mainly fear (Tottenham et al., 2011). Also, a hyper-reactivity has been described of the amygdala and an accelerated development of the pre-frontal amygdala connectivity which is reminiscent of the maturing processes observed during adolescence of children with no institutionalization background (Gee et al., 2013). In a recent study Telzer et al., (2013) studied the impact that the lack of exposure to other races in early childhood could have later in life when trying to recognize emotions in faces from that particular race. This study provides evidence of how early experiences could shape neural responses (amygdala activity) later in life. They found that youths adopted in US from Eastern Europe and East Asia, exposed during early life to only one race in their institutions, had problems recognizing emotions from other races' facial expressions and enhanced amygdaline activation in this condition. The greater the early deprivation the larger was the race bias in amygdala activity in these youths. Finally, it has also been reported that adolescents with an institutionalization background could exhibit an absence of activity in the striatal ventral and the caudate nucleus during a monetary incentive task, when facing rewards (Mehta et al., 2010).

Studies with EEG show a global retardation in the maturing of the cortical electrogenesis and cortical hypo-activation in children with an institutionalization background (Marshall, et al., 2004; McLaughlin et al., 2010). The EEG patterns (more *theta* power and less *alpha* and *beta* power), as well as a smaller hemispheric asymmetry, mainly in the temporal region, suggest a delay in the maturing of the central

nervous system (Marshall, et al., 2004). These patterns seem to improve when children are placed in foster care before the age of 2 years. This might suggest that the first two years of life would be a critical period to carry out interventions to improve the care conditions (Marshall, et al., 2004; Vanderwert, Marshall, Nelson, Zeanah, & Fox, 2010). The modifications that have been seen are an increase in alpha power but there were no changes in theta power (Marshall, et al., 2004; Vanderwert, et al., 2010). Sheridan et al., (2012) also reported reduced alpha power in children with an institutionalization background. They found that the reduction in cortical white matter, as measured in MRI, was significantly related with this alpha power reduction and that the white matter increases across development also resulted in the recovery of the EEG abnormalities (Sheridan, et al., 2012). Finally, but not less relevant, is that the abnormal distribution that can be seen in the EEG of children adopted at the age of 18 months foretells problems at the behavioral level such as indiscriminate friendliness (Tarullo, et al., 2011). Also, the delay in maturing in the electric activity of the brain (lower *alpha*) has been associated with higher attention deficit hyperactivity disorder (ADHD) symptomatology (McLaughlin, et al., 2010; Slopen, McLaughlin, Fox, Zeanah, & Nelson, 2012), less secure attachment and less social skills (Almas et al., 2012).

The ERP elicited by faces has also been an important tool to study brain activity related to emotion and social cues processing (Escobar et al., 2013). Different ERP components exhibit particular modulations in amplitude or latency following maturational or environmental influences (de Haan, Johnson, & Halit, 2003; Grossmann, Striano, & Friederici, 2007). ERP studies show that children with an institutionalization background show a different amplitude modulation in several of the ERP components elicited by faces. For instance, when exposed to familiar and novel faces, as done in the studies of Parker et al., (2005; 2007) children without an institutionalization background normally have larger early negative component (N170), negative central component (Nc) and positive slow-wave component (PSW), but the early positive component (P250) exhibited larger amplitude in the institutionalized group. Regarding familiarity, the larger amplitude of the Nc component to novel faces was present in both groups, but the institutionalized group exhibited also significantly larger amplitude of the PSW to

familiar faces. The latter effect was not present in the group without an institutionalization background (Parker & Nelson, 2005; Parker & Nelson, 2007). With regard to emotional recognition, there also seems to have been modulation differences, and what stands out especially is higher amplitude of the N170 in response to fear and lower amplitude in response to sadness and happiness in this group (Parker & Nelson, 2005; Parker & Nelson, 2007). The control group presented an inverse response, showing an inverse P250 pattern (Parker & Nelson, 2005). Nevertheless, this last data was not confirmed in posterior reports (Moulson, et al., 2009).

The results of studies regarding face familiarity and emotion recognition suggest that the abnormal patterns could be modified through early interventions in institutionalized children, as the children who were in foster care showed amplitudes that were halfway between the institutionalized children and those who were never institutionalized (Moulson, et al., 2009). Eventually these findings could go together with possible deficits in perceptual processing, attention selection and specific processing of the emotion in a face or there could be problems in understanding the emotion itself (Tarullo & Gunnar, 2005). Other ERP studies that have addressed error monitoring and behavioral control systems found that some of the typical electrophysiological patterns exhibited a differential modulation in children with an institutionalized care background. For instance, McDermott et al., (2013) found an impaired inhibitory control in a flanker task accompanied by a smaller Error-Related Positivity and Error-Related negativity compared with a group of children in foster care.

Discussion

The results of this review can be regrouped in two types of findings. The first one has to do with the evidence that supports that children/adolescents with a background of early deprivation show less maturation or a delay in neurodevelopment (Marshall, et al., 2004; McLaughlin, et al., 2010; Moulson, et al., 2009; Slopen, et al., 2012; Tarullo, et al., 2011). This delay in maturing would explain in part the increase in alterations in EF (Cardona, et al., 2012), developmental disorders and ADHD symptoms (McLaughlin, et

al., 2010; Slopen, et al., 2012), indiscriminate friendship (Tarullo, et al., 2011), less secure attachment and less social skills (Almas, et al., 2012).

By taking this model of delayed maturing into consideration it opens up the possibilities to think of interventions that help recuperate these delays.

The second type of findings has to do with alterations at the structural level in children with early deprivation. The studies have shown: a bigger volume of the amygdala (Mehta, et al., 2009; Tottenham, et al., 2010), smaller left and right superior – posterior cerebellar lobes volume (Bauer, et al., 2009), structural abnormalities in white matters comprising portions of frontal, temporal and parietal cortices (Govindan, Behen, Helder, Makki, & Chugani, 2010), having an impact on the EF and emotional processing. They also have an abnormal pattern of amygdaline activation that could persist long after the adverse environmental influences have been modified (Gee, et al., 2013; Telzer, et al., 2013). Also, an abnormal lessening of the connectivity of the white matter in the left uncinate fasciculus has been found (Eluvathingal, et al., 2006). These studies have emphasized the severity of the alterations; the existence of critical periods for intervention and the need to develop strategies that would compensate for these deficits.

There is ample evidence that early deprivation experiences have a negative effect on neurodevelopment. And according to what has been shown, the brain structures associated to socio-affective skills are especially affected. There is an urgent need to translate this accrued knowledge into practice in the existing protection systems (Nelson, 2007). That is why precise and comprehensive descriptions of the impact of early deprivation on the brain maturation and brain functioning is essential, as it will allow thinking of the best way to modify the institutional environment, the work with the children during the institutionalization period and, even more importantly the post-adoption follow-up. This would be, we consider, the best possible approach to institutionalization and its potential consequences, preventing when possible or responding timely to the above mentioned deficits.

With regard to the social deprivation period, there are at least two approaches that could ameliorate the socio-affective impact of institutionalization. It is necessary to consider the critical periods in neurodevelopment – some authors have indicated the age of 2 years could be the limit to modify the deficit at the neurodevelopment level – and the relevance of proper stimulation (Vanderwert, et al., 2010). In the first place, public policies must be elaborated that allow decreasing the institutionalization times. Evidence has shown that there is a relation between the institutionalization time and the impact at the brain level (Almas, et al., 2012; Gee, et al., 2013; Govindan, et al., 2010; Mehta, et al., 2009; Telzer, et al., 2013; Vanderwert, et al., 2010). The adoption procedures once the child can be adopted must be speeded up, guaranteeing the child a prompt and proper welcome into a suitable family. Likewise, modalities like foster care should be given priority over the institutions. Studies have shown that foster care is more favorable for the neurodevelopment of the child, as it allows decreasing the number of children per caretaker and increasing the quality of interactions. The studies have also shown that the intervention of changing a child from an institution into foster care within the critical periods improves, in part, some of the neurodevelopmental deficits (Almas, et al., 2012; McDermott et al., 2013; Moulson, et al., 2009; Moulson, Westerlund, Fox, Zeanah, & Nelson, 2009; Nelson, Westerlund, McDermott, Zeanah, & Fox, 2013; Vanderwert, et al., 2010).

In second place, and taking into consideration that institutionalization in some situations is inevitable, thought has to be given to which improvements should be considered for the institutionalization conditions. Improvements that favor the brain development and maturing of those children who will spend some time in the institutions, but also, mainly of those children who cannot be put up for adoption. Among the conditions that should improve are the number of children per caretaker and trying to give the child a caretaker who can answer the child's individual needs, avoiding a high turnover of caretakers and giving the children stability and favoring the attachment processes (Tarullo & Gunnar, 2005). A study that has recently been published by our team shows that the attachment variable in adolescents seems to have an impact on emotional processing as well as on EF (Escobar, et al., 2013). The promotion of secure attachment

could be considered a protecting factor for some deficits that are related to institutionalization. Likewise, the children should be properly stimulated so that they can have experiences that favor the cognitive and social development. Based on what the evidence with regard to deficit has shown, emphasis should be placed on stimulating: face recognition (familiar versus strange), emotion recognition, social keys, error monitoring, emotion control and EF.

Currently, it is somewhat unchallenged, in terms of public policies, that the adoption processes imply a period in which the adopters are evaluated. Nevertheless, the follow-up of these families is neglected once the child has been given in adoption. It is necessary to take the next step, which consists of designing policies with regard to the follow-up processes and to educate or specialize the proper professionals in this matter. Looking at all the mentioned antecedents, the importance of following up on the children post institutionalization seems natural. The follow-up must consider the necessity of neurodevelopmental evaluations of these children, without pathologizing them. On the contrary, what the follow-up must do is making sure that the potential impact of, or the deficits related with, early deprivation are detected and timely taken care of; in order to avoid the known consequences at the behavioral, relational and cognitive level (Cardona, et al., 2012; Kertes, et al., 2008; Kreppner, O'Connor, & Rutter, 2001; O'Connor & Rutter, 2000; Vorria, et al., 2006; Zeanah, Smyke, Koga, & Carlson, 2005). The follow-up policies should, early on and in a timely fashion, start looking into the presence of deficits or delays in development and suggest the proper interventions if necessary.

In the last decades, neuroscience, together with the progress in evaluation technologies, has noticeably increased the available knowledge in this area. Nevertheless, the current reality shows us that it is difficult to use this kind of technology at the support or primary care level. That is why it is worthwhile and needed, based on the knowledge that is generated with these instruments, to develop simpler detection and measuring strategies, which are less costly and more easily generalizable.

Finally, it must be taken into consideration that the results found in this review do not exclusively pertain to institutionalization. There are studies that show similar results at the structural and/or functional level of neurodevelopment which is the product of other types of early age adversity: poverty and malnutrition (Lipina & Colombo, 2009); sexual abuse (Andersen et al., 2008), physical abuse (Grant, Cannistraci, Hollon, Gore, & Shelton, 2011) abuse and neglect (Panzer, 2008). The consistent systematization of this knowledge would potentially allow in a near future elaborating good screening tools to be used by the professionals of the primary level and of child protection institutions.

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Brain signatures of moral sensitivity in adolescents with early social deprivation

María Josefina Escobar, David Huepe, Jean Decety, Lucas Sedeño, Marie Kristin Messow, Sandra Baez, Alvaro Rivera-Rei, Andrés Canales Johnson, Juan Pablo Morales, David Gómez, Johannes Schröder, Facundo Manes, Vladimir López and Agustín Ibañez

Abstract

The present study investigated the brain correlates of moral sensitivity in adolescents with antecedents of early social deprivation. Using EEG, we measured brain activity during the Intentional Inference Task (IIT) which evaluates rapid moral decisions making. The participants must to distinguish between intentional or unintentional harm on object or a person. Our hypothesis is that social deprivation group (DG) will show abnormal cerebral correlates of intentionality attribution to moral actions in comparison with the control group (CG). The ERPs results showed atypical early/late cortical markers associated with intentionality attribution during moral decision making on DG, particular when the stimuli implies intention harm to a person. Source estimation of high-density electroencephalography (hdEEG) also evidenced less activity for the DG compared to the CG in the right PFC; bilateral vmPFC and the right insula. These findings suggest the importance of social environment to early moral neurodevelopment, and can be considered like a prefrontal maturation model of social deprivation.

Introduction

Children in institutional rearing and foster care are exposed to early social deprivation which in turns triggers important delays in physical, cognitive, behavioral and socio-emotional development (Kreppner, O'Connor, & Rutter, 2001; MacLean, 2003; Pollak et al., 2010; Sigal, Perry, Rossignol, & Ouimet, 2003; Smyke et al., 2007; Vorria et al.,

2006; Windsor, Glaze, & Koga, 2007). Particularly, socio-cognitive impairments problems persist and sometimes even increase over time in adolescence (Bauer, Hanson, Pierson, Davidson, & Pollak, 2009; Bimmel, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2003; Colvert, Rutter, Kreppner, et al., 2008; Hodges & Tizard, 1989; Wierzbicki, 1993). Moral cognition is a process very sensitive to neurodevelopment (Moll, De Oliveira-Souza, & Zahn, 2008) and particularly during adolescence (Carlo, Fabes, Laible, & Kupanoff, 1999; Carlo, Koller, & Eisenberg, 1998; Decety, Michalska, & Kinzler, 2012). Moral decision making is considered as an outcome of complex processes of our biological, evolutionary and cultural history (Decety & Cacioppo, 2012). The ability to make moral decisions has been strongly connected to both emotional and cognitive processes, necessary for representing and integrating information about intentions, beliefs and attributions of others (Decety & Howard, 2013b; Decety, et al., 2012). Moral abilities are necessary to master social life situations because they allow inferences about agency and intentionality, both properties of theory of mind (ToM) and social perception (Allison, Puce, & McCarthy, 2000; Decety & Jackson, 2004; Moll, De Oliveira-Souza, & Zahn, 2008). In our study we assessed the neural correlates of an Intention Inference Task (IIT) indexing rapid moral decision making in adolescents with early social deprivation.

Studies of moral sensitivity have identified different regions engaged in IIT and other moral tasks, such as the posterior superior temporal sulcus [pSTS, also reported as the temporoparietal junction (TPJ)], amygdala, ventromedial prefrontal cortex (vmPFC), lateral prefrontal cortex (IPFC), anterior cingulate cortex (ACC) and insula (Decety, Michalska, & Kinzler, 2012; Decety & Porges, 2011; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Moll et al., 2002; Moll et al., 2007; Moll, De Oliveira-Souza, & Zahn, 2008; Moll, Zahn, de Oliveira-Souza, Krueger, & Grafman, 2005; Schaich Borg, Sinnott-Armstrong, Calhoun, & Kiehl, 2011). Source estimation of high-density electroencephalography (hdEEG) has also evidenced an early engagement of pSTS, amygdala and vmPFC (Decety & Cacioppo, 2012) in the IIT. Moreover, during the IIT, the amygdala, dorsolateral prefrontal cortex (dlPFC) and medial prefrontal cortex

(mPFC) seem to be more sensitive to neurodevelopmental changes through life span, compared with other involved brain regions.

The effects of institutionalization and early social deprivation trigger considerable behavioral and neurophysiological impairments. Behavioral deficits regarding social cognition have been reported in domains such as emotion recognition (Barone & Lionetti, 2012; Camras, Perlman, Fries, & Pollak, 2006; Fries & Pollak, 2004; Vorria et al., 2006) and ToM (Colvert, Rutter, Beckett, et al., 2008; Colvert, Rutter, Kreppner, et al., 2008; Tarullo, Bruce, & Gunnar, 2007; Tarullo & Gunnar, 2005; Yagmurlu, Berument, & Celimli, 2005). Regarding moral cognition, no specific and direct studies of adopted or institutionalized children have been performed yet. Nevertheless, prosocial moral reasoning seems to be impaired in delinquents and orphaned adolescents (Carlo, Koller, & Eisenberg, 1998). Furthermore, physically abused/neglected children present deficits in their moral development (Koenig, Cicchetti, & Rogosch, 2004). These situations can be tentatively associated with early deprivation (Maughan & McCarthy, 1997) and indirectly suggest neurodevelopmental changes in moral cognition.

The effects of institutionalization on brain development evidence an involvement of structures associated with high level and moral cognition, such as orbitofrontal gyrus, infralimbic PFC, temporal medial area, lateral temporal cortex and brainstem (Chugani et al., 2001). Brain connectivity (Eluvathingal et al., 2006), volumetric morphometry (Mehta et al., 2009; Sheridan, Fox, Zeanah, McLaughlin, & Nelson, 2012; Tottenham et al., 2010; Tottenham et al., 2009) and even cortical responses to emotional facial expressions (Moulson, Fox, Zeanah, & Nelson, 2009; Parker & Nelson, 2005) present abnormalities in children/adolescents with early deprivation. Furthermore, early deprivation experiences are associated with atypical patterns of brain activity that suggest a delay in cortical development (Marshall, Fox, & Bucharest Early Intervention Project Core, 2004) linked to hyperactivity and impulsivity symptoms (McLaughlin et al., 2010). Nevertheless, no single study has assessed brain correlates of moral decision making in participants with early social deprivation.

Through a moral judgment task, the current study aims at exploring for the first time the brain correlates of moral sensitivity in adolescents (between 11 and 15 years of age) with antecedents of early social deprivation as compared to participants that match the deprived group in age-gender, executive functions (EF) and educational level. Given that institutionalization can affect basic cognitive processes (Cardona, Manes, Escobar, López, & Ibáñez, 2012) we also controlled EF and other basic processes between the early social deprivation group (DG) and the control group (CG). Additionally, we measured behavioral disturbances among participants given their sensitivity to detect subtle effects of institutionalization (Bimmel, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2003; Hawk & McCall, 2010; Juffer & van IJzendoorn, 2005; Wierzbicki, 1993). We used a well-established moral cognition paradigm, sensitive to neurodevelopmental changes and previously validated with functional magnetic resonance imaging (fMRI) and eye-tracking measures (Decety, et al., 2012) as well as hdEEG (Decety & Cacioppo, 2012). We recorded hdEEG during an IIT which evaluates rapid moral decisions regarding actions that involve an intention to harm (intentional vs. unintentional harm) on different target types (object vs. persons). We predicted that; 1) Participants within the DG will show abnormal cerebral correlates of intentionality attribution of moral actions in comparison with the CG. 2) Between groups cortical responses in the perception of intentional harm vs. unintentional harm task will be correlated with different activations in IIT-related brain areas (mPFC, vmPFC, insula and pSTS/TPJ) as reported with source estimation. 3) These differential activations will be correlated with behavioral disturbances.

Methods

Participants. The present study is part of the Attachment Adoption Adolescents Research Network (AAARN), an international project focusing on adopted adolescents. The sample recruited included two groups: the DG who had an early social deprivation at least 6 months (18 rearing in institutional care and 2 rearing in foster care) and a CG of non-adopted adolescents growing up in their biological family (N = 20). Afterwards, 3 cases (DG = 1 and CG = 2) were excluded because of excessive artifacts in the EEG

recordings. The DG consisted of 19 adopted adolescents (10 males and 9 females) between 11 and 15 years of age. The average age was 12.58 years (SD=1.3) and the mean adoption age was 30.05 months (SD=21.68; range= 6–72 months). The adopted adolescents were recruited from Chilean adoption agencies: *Servicio Nacional de Menores (SENAME)*, *Fundación Chilena para la Adopción* and *Fundación San José para la Adopción*. DG was compared to 18 adolescents reared by their biological parents (10 males and 8 females). The average age for both groups was 12.56 years (SD=1.3). CG was recruited from social networks (Facebook groups, chain letters). We controlled for between group differences in age [$t(35) = 0.052, p = .96$], sex [$\chi^2(1) = 0.24, p = .62$] and education level [$t(35) = 0.30, p = .77$]. Participants had no history of any physical or mental disorders as assessed with a neuropsychiatric interview with the parents and the institutions records. Parents and adolescents gave informed consent in agreement with the Declaration of Helsinki. The Ethic Committee of the School of Psychology of the Pontifical Catholic University of Chile approved all experimental procedures.

Child Behavior Checklist (CBCL) (Achenbach, 1991). **In** order to evaluate the behavioral dimension, we used the CBCL to assess the child’s behavior or emotional problems and symptoms. Parents filled a questionnaire with 120 items if a behavior is (0) “not”, (1) a “little”, “sometimes”; or (2) “often”, “clearly” typical for their child. The Total Problems score consists of the sum of the scores of eight sub-scales syndromes. Some of them are combined in two total sub-scales: Internalizing (Withdrawn, Anxious/depressed Behavior, and Somatic Problems) and Externalizing (Delinquent and Aggressive Behavior). The CBCL is the most commonly assessment of general behavioral problems in studies with adopted population (Bimmel, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2003; Hawk & McCall, 2010; Juffer & van IJzendoorn, 2005; Wierzbicki, 1993).

Neuropsychological assessment. All participants completed a neuropsychological battery assessing attention, speed processing visual-spatial abilities, and EF. In the verbal fluency task, participants were given a category or a letter and asked to state all

of the words that came to mind in one minute. In the digit span subtest (Wechsler, 2003), participants were asked to repeat a given set of numbers in the same order (digit span forward) or in reverse order (digit span backward). The block design task (Wechsler, 2003) required participants to arrange cubes of red, white, or red and white sides to form a specific pattern. For the picture arrangement task (Wechsler, 2003) participants were required to piece together a misarranged story into the correct order. In the symbol search task (Wechsler, 2003), participants were asked to decide whether a given symbol was present in a line-up of other symbols. The coding subtest (Wechsler, 2003), involves a key of symbols to decipher a numerical code. To measure attention and speed processing, we incorporated the trail making test (Partington & Leiter, 1949), which entails connecting numbers (test A) or letters and numbers (test B) spread out randomly on sheet of paper in sequential order.

Intention Inference Task (IIT). EEG signals were recorded while participants completed a modified version of a standard IIT, developed by Decety et al., 2012 (Decety, Michalska, & Kinzler, 2012) in studies on empathy and morality. The IIT assesses rapid moral decisions regarding actions involving intention to harm (intentional vs. unintentional) on different target type (object vs. person). Participants were asked to judge whether the action they had seen was performed intentionally or unintentionally (Decety & Cacioppo, 2012). In our study, participants were presented with a series of three-frame video on a computer screen: The first frame (T1) was 100 ms long and displayed an establishing scene; the second frame (T2) was a 100 ms frame displaying either an intentional harm or an unintentional harm, followed by a third 100 ms frame (T3) confirming the intentional or unintentional harm. The trials began with a fixation cross that was presented for 800 ms. A 500 ms inter-trial interval was added. During the experiment, accuracy and reaction times were recorded.

Procedure. Once the family was contacted, all participants and their parents signed a consent form. Afterwards we conducted an interview with the adolescent's mother. First, we tested the participants with the neuropsychological battery in order to assess

general cognitive processes. While the participants performed the IIT, we recorded the EEG.

EEG recordings and preprocessing. EEG signals were recorded with HydroCel Sensors from a GES300 Electrical Geodesic amplifier at a rate of 500 Hz using a system of 129-channels. Data that were outside a frequency band that ranged from 0.1 Hz to 100 Hz were filtered out during the recording. Later, the data were further filtered using a band-pass digital filter with a range of 0.3 to 30 Hz to remove any unwanted frequency components. During recording, the vertex was used as the reference electrode by default, but signals were re-referenced offline to average electrodes. Two bipolar derivations were designed to monitor vertical and horizontal ocular movements (EOG). Continuous EEG data were segmented during a temporal window that began 200 ms prior to the onset of the stimulus and concluded 800 ms after the offset of the stimulus. Eye movement contamination and other artifacts were removed from further analysis using both an automatic (ICA) procedure and a visual procedure. No differences were observed between groups regarding the number of trials. All conditions yielded a percentage of artifact-free trials that was at least 80%.

ERP preprocessing and analysis.

For ERPs, a strategy for channel selection based on the observed effects (and previously reported in ERPs studies of empathy (Decety, Yang, & Cheng, 2010; Ibanez et al., 2011)) was used: The time course analysis for three representative ROIs (Fz, Cz and Pz) involving 6 adjacent electrodes was included as an additional within-subject ANOVA factor (electrode). We considered mean amplitude values: (1) An early window before the stimulus presentation endings (150-300ms) was selected in order to track the early automatic responses and a late window (600-800ms) which corresponds with the time windows effects observed in a previous report of the IIT (Decety & Cacioppo, 2012) where the T1 stimuli was presented by 500ms, and the onset was marked an the T2 stimuli onset, and the reliable effects were observed after 200 ms, (equivalent to 600-800 windows in our design).

Data analysis

ANOVAs and Tukey's HSD post-hoc comparisons (when appropriate) were used to compare the demographic, neuropsychological, and reaction time data across all of the groups. Repeated measures ANOVAs and Tukey's HSD post-hoc comparisons (when appropriate) were performed to analyze the behavioral IIT and ERP data. Pearson product-moment correlation coefficient was computed to evaluate the association of behavioral outcome (CBCL) with source space brain correlates of the relevant category (person intentional).

Source reconstruction analysis

Cortical current density mapping of ERPs for the intentionally harmed persons condition were reconstructed using the BrainStorm package (Tadel, Baillet, Mosher, Pantazis, & Leahy, 2011). The forward model was calculated using the Open MEEG Boundary Element Method (Gramfort, Papadopoulos, Olivi, & Clerc, 2010) on the cortical surface of a template MNI brain (colin27 atlas) with a 1 mm resolution. The inverse model was constrained using a weighted minimum-norm estimation (wMNE) (Baillet et al., 2001) to estimate source activation in picoampere-meters (pA.m). For each subject an absolute average over trials was computed for each condition. These activation values per subject and condition were normalized by calculating z-scores of the primarily computed average relative to the baseline activity within the -200 to 0 ms window. These z-scores were used to plot cortical maps and to extract the ROIs that were visually identified in the cortical maps.

Source reconstructions were performed on the waves obtained from the intentionally harmed person condition for the whole time window. The statistical analysis was performed using cluster-based permutation tests (Maris & Oostenveld, 2007) and was implemented in the FieldTrip toolbox for M/EEG analysis (Oostenveld, Fries, Maris, & Schoffelen, 2011). We selected this statistical analysis to handle the multiple comparisons problem of EEG data. In this analysis, the statistical metric of the original data was computed with independent samples. T-statistics and clusters were identified

based on t-values that were at the 2.5-th and the 97.5-th quartiles of the two-sided t-test. Afterwards, the selected t-values were combined into connected sets based on their temporal adjacency, and cluster-level statistics were calculated by taking the sum of the t-values within each cluster. The data were later permuted by applying 2000 permutation draws to generate a histogram called the Monte Carlo approximation of the permutation distribution. To calculate the differences between our data and this distribution, we used the Monte-Carlo estimation of the permutation p-value, which is the proportion of random partitions in which the observed test statistic is larger than the value drawn from the permutation distribution. If this p-value is smaller than the critical alpha-level of 0.05, then it is concluded that the data between the two groups are significantly different. This Monte Carlo method generated a non-parametric estimate of the p-value, representing the statistical significance of the originally identified cluster. For a similar methodology, please see (Chennu et al., 2013).

Several scouts, BrainStorm jargon for the ROIs that are defined as a subset of vertices of the surface, were selected from two different atlases (Desikan et al., 2006; Destrieux, Fischl, Dale, & Halgren, 2010). In addition, some scouts were manually constructed using the BrainStorm toolbox to improve surface segmentation. Selection of the ROIs for source analysis was based on previous fMRI (Decety, Michalska, & Kinzler, 2012; Decety, Michalska, & Kinzler, 2012) and evoked magnetic fields studies (Decety & Cacioppo, 2012) that reported the neural generators of empathy-related processes and the ERPs that were analyzed in the current study. Based on previous studies of moral evaluations and empathic responses, for the intentionally harmed people condition we expected to observe major activity in the vmPFC and dlPFC, the pSTS the amygdala and the insula (Decety & Cacioppo, 2012; Decety, et al., 2012; Decety, et al., 2012). Based on a prior study (Escobar et al., 2013) we expected higher activity in the vmPFC, dlPFC and the amygdala for the control group compared to the study group and higher activity in the right pSTS/TPJ for the study group compared to the control group. We expected these effects in two different time windows: in an early time window between 150 and 300ms after stimulus onset and in a late time window between 600 and 800ms after stimulus onset.

Results

Neuropsychological Assessment

Both groups presented a similar profile. The CG performed better than the DG on cube construction [$t(35) = 2.15, p < .05$] and Trail Making Test B [$t(35) = 2.45, p < .05$]. No significant differences between groups were observed on picture arrangement, the coding, digits and symbol search, on the verbal fluency task, task, or Trail Making Test A. See Table 1.

Behavioral problems

The Child Behavior Checklist (CBCL) showed no significant differences between groups on externalizing ($t(35) = 0.27, p = 0.79$, two-tailed) and internalizing problems ($t(35) = 0.17, p = 0.86$, two-tailed).

IIT (Behavior)

Accuracy measure. The principal outcome, replicating previous IIT reports, was a interaction between target type (object vs. person) and intention to harm (intentional vs. unintentional); $F(1,35) = 37.41, p < .001$. Post-hoc analysis (Tukey HSD, $MS = 46.16, df = 35$) evidenced that person stimuli had higher ratings in the intentional situation ($M = 70.01; SE = 4.08$) than in the accidental situation ($M = 55.02; SE = 2.63$) ($p < 0.001$), but this effect was not found for objects. No group differences were observed.

Table 1. Demographic data; Neuropsychological assessment; Behavioral problems and IIT behavioral measures

Demographic Data					
	DG		CG		DG vs. CG
	M	SD	M	SD	
Age	12.58	1.3	12.56	1.3	NS
Years of Education	7.05	1.39	6.83	1.15	NS
Gender (M:F)	10:9		10:8		NS
Neuropsychological Assessment					
Coding	48.11	9.036	51.22	9.490	NS
Picture Arrangement	21.63	7.595	25.11	6.720	NS
Cube Construction	38.63	10.616	46.00	10.186	0.038
Symbol Search	23.95	5.930	25.06	5.546	NS
Digits	10.84	3.671	11.67	2.326	NS
Verbal Fluency	71.55	64.803	97.14	77.636	NS
TMTA	45.63	12.006	45.39	11.587	NS
TMTB	129.37	53.904	94.61	27.421	0.019
Behavioral problems					
Externalizing	9,74	8,530	10,56	9,697	NS
Internalizing	8,58	6,526	9,00	8,160	NS
IIT Behavioral Measures					
	Accuracy (%)				
	DG		CG		
	M	SD	M	SD	
Object intentional	63.60	28.60	71.74	17.72	
Object unintentional	62.26	15.05	70.44	17.52	
People intentional	64.61	27.97	75.41	20.95	
People unintentional	48.93	17.22	61.11	14.51	
	RT (ms)				
	DG		CG		
	M	SD	M	SD	
Object intentional	748.90	311.88	822.29	234.80	
Object unintentional	894.13	402.67	868.39	277.48	
People intentional	721.56	321.39	748.04	236.00	
People unintentional	902.90	460.84	921.32	284.99	

IIT (ERPs)

Based on previous reports of event related potentials (ERPs) elicited by painful stimuli (Decety, Yang, & Cheng, 2010; Fan, Chen, Chen, Decety, & Cheng, 2013; Ibanez et al., 2011; Yang, Decety, Lee, Chen, & Cheng, 2009) we selected three regions of interest

(ROIs) at frontal, central and posterior sites at two (early [within stimulus presentation] and late [after stimulus presentation]) windows.

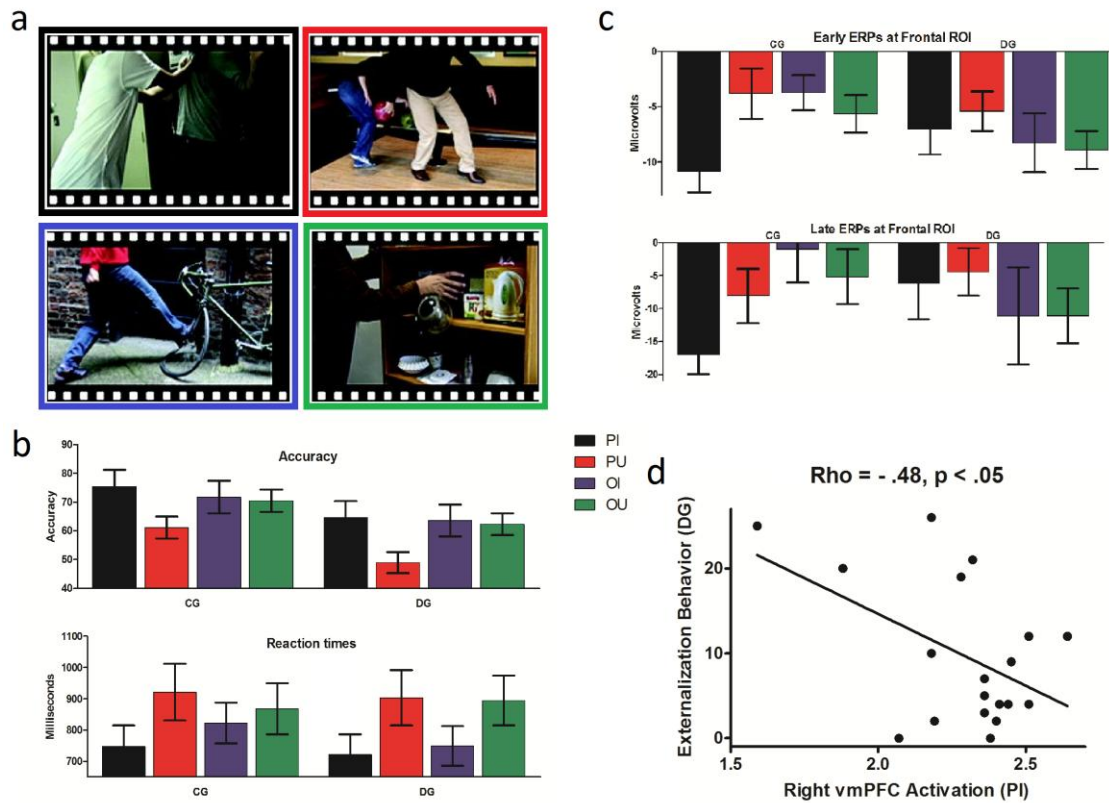


Figure 1. Stimuli examples and summary results. (a) Examples of the visual stimuli used in the study depicting people (top row) or objects (bottom row) being harmed intentionally (left) or by accident (right). The stimuli were short dynamic visual scenarios. (b) Accuracy and reactions times for both groups (CG and DG). (c) ERPs for early and late windows at frontal ROI for both groups (CG and DG). (d) A significant negative linear association of DG' externalization behavior with signal change was observed in the right ventromedial prefrontal cortex ($r = -.48, p < .05$). PI: person intentional; PU: person unintentional; OI: Object Intentional; OU: Object Unintentional.

Early window

At all ROIs. An interaction of intention x target ($F(1, 35)=6.60, p=0.01, \eta^2 =0.15$), followed by post hoc comparisons (Tukey HSD, $MSE = 60.37, df = 35$) showed that person intentional stimuli elicited enhanced activation compared to person unintentional ($p=0.025$). A interaction of ROI x intention x group ($F(2, 70)=9.81, p=0.00017; \eta^2$

=0.21) was also observed. For the CG, post hoc-analysis (Tukey HSD, MSE=52.49, df = 43.28) showed a trend towards increased activation for the intentional compared to the unintentional condition ($p=0.07$) in the frontal ROI. These effects were non-significant in DG in the frontal ROI, but significant (and opposed in direction) at CZ ROI (Intentional > Unintentional $p=0.008$).

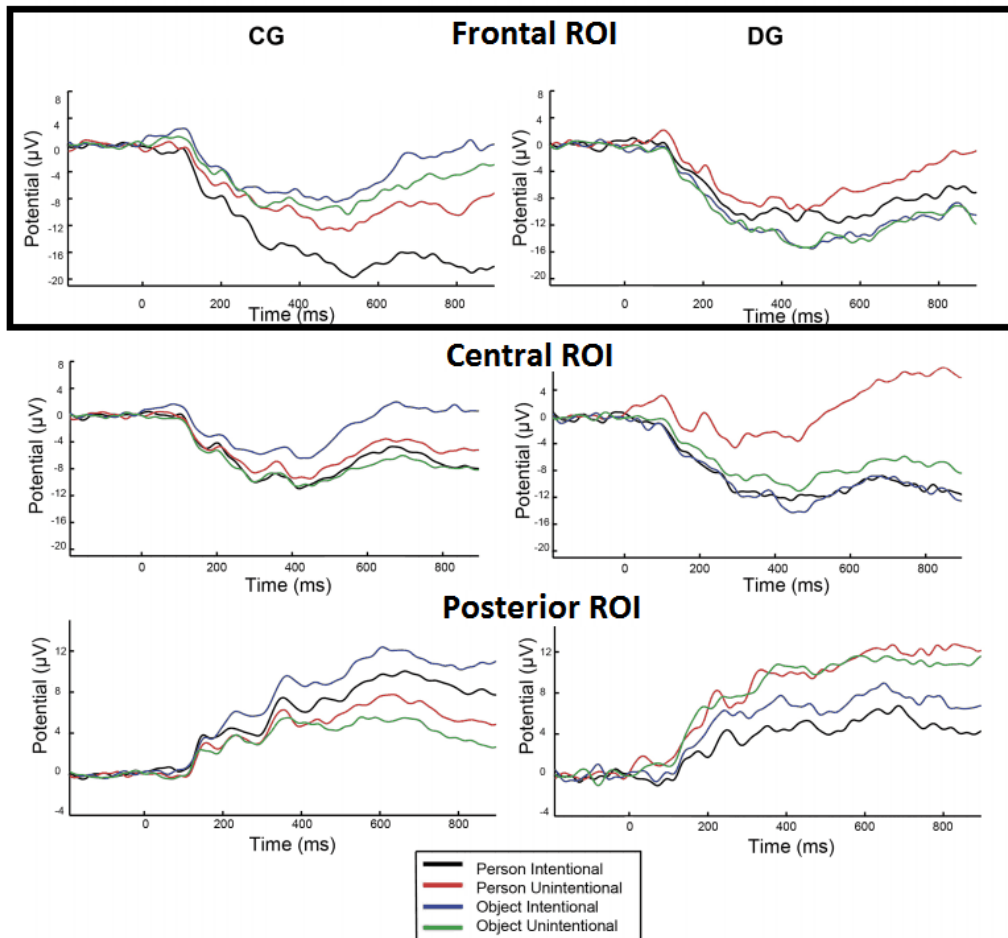


Figure 2. ERPs for all conditions and groups. At all ROIs and windows, PI stimuli elicited enhanced activation than PU, but CG presented a trend toward increased activation of Intentional compared with Unintentional stimuli. Moreover, in frontal ROIs the CG presented increased amplitudes of PI compared with PU. This effects was absent in DG.

Frontal effects. Given the general effects of ROI ($F(2, 70)=60.64, p=0.00000, \eta^2 =0.63$), and the above reported interactions, we analyzed these effects separately at the frontal ROI for each group.

In the CG, we found increased activity for persons stimuli compared to objects [target effect $F(1, 17)=5.81, p=0.02, \eta^2 =0.25$] as well as an interaction of target x intention ($F(1, 17)=2.26, p=0.15, \eta^2 =0.31$). Post hoc comparisons (Tukey HSD, $MSE = 56.93, df = 17$) showed enhanced activation of person intentional compared to person unintentional ($p=0.024$).

Unlike the CG, the DG presented no significant effects of intention or target (nor interactions) at the frontal ROI.

Late window

The effects found here were very similar at the results that are shown in the early window.

Source Space

Early window. When compared the relevant category among groups (person intentional), we observed significantly higher activity for the CG compared to the DG (figure 3a) in the right PFC ($t=309.14, p<0.01$), the left vmPFC ($t=98.38, p=0.02$) and the right vmPFC (280-300ms: $t=110.85, p=0.01$). In addition we observed tendencies towards a significantly higher activity for the CG compared to the DG in the left PFC ($t=33.16, p=0.06$) and in an earlier latency in the right vmPFC (140-200ms: $t=32.85, p=0.06$). See figure 3c

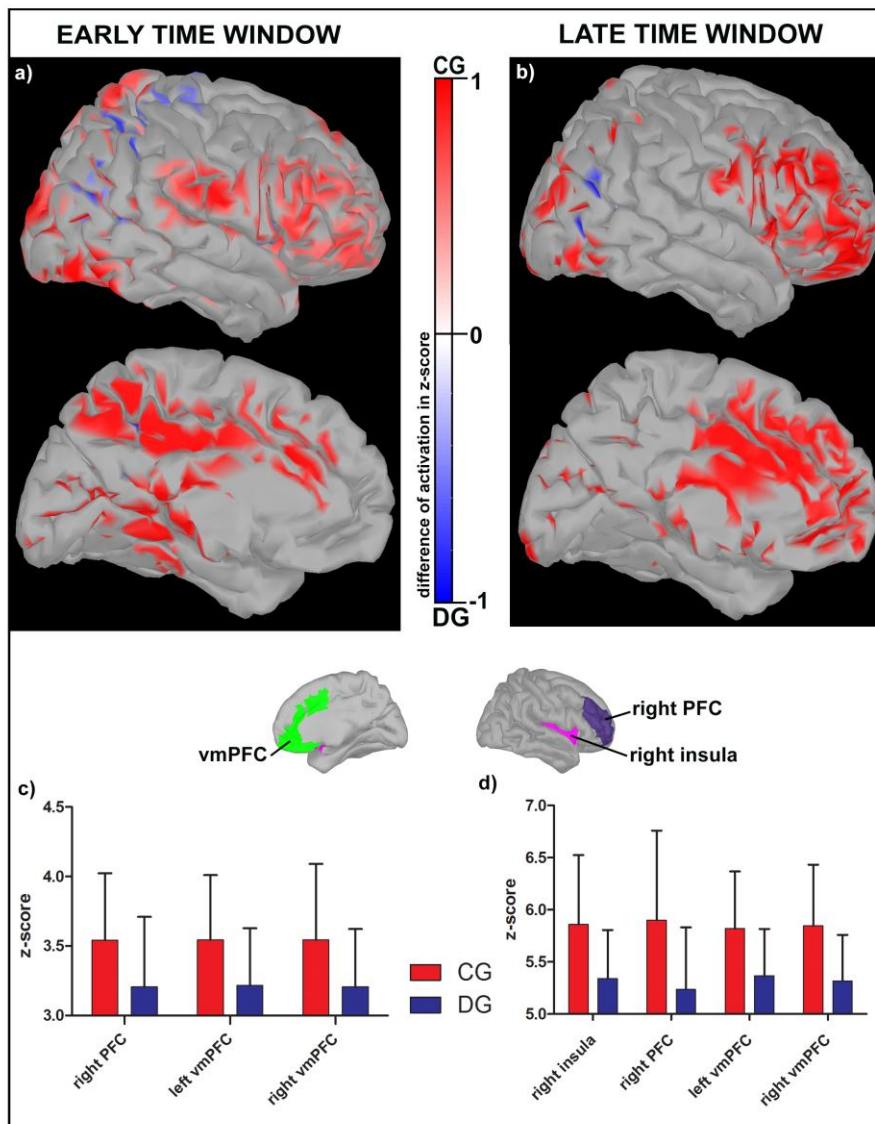


Figure 3. Source space comparison of PI in CG and DG. (a & b) Differences in cortical activation between the CG (red) and the DG (blue) in z-scores. Panel (a) shows the peak difference in the early time window (150-300ms) while panel (b) shows the peak difference in the late time window (600-800ms). Panels (c) and (d) show only significant differences of cortical activation between groups, in z-scores. The shown values are averages over subjects and time. During the early time window (c) significantly higher activity of the CG compared to the DG was observed in the right prefrontal cortex (PFC) and both the left and the right ventromedial prefrontal cortex (vmPFC). During the late time window (d) significantly higher activity for the CG compared to the DG was observed in the right PFC, the left and right vmPFC and the right insula. vmPFC: ventromedial prefrontal cortex; PFC: prefrontal cortex.

Late window. Similar enhanced activation (figure 3b) of the CG compared to the DG were observed in the right insula (cluster $t=148.09$, $p<0.01$), the right PFC (600-700ms: $t=309.14$, $p<0.01$ and 700-800ms: $t=52.99$, $p=0.03$) the left vmPFC ($t=121.54$, $p<0.01$) and the right vmPFC respectively ($t=234.17$, $p<0.01$). Additionally tendencies towards significantly higher activity for the CG compared to the DG were observed in the left PFC ($t=34.83$, $p=0.05$) and the left anterior temporal lobe (left ATL, $t=26.75$, $p=0.07$). See figure 3c

Association between source estimation and behavioral problems

No effects were observed when entering both groups regarding significant z scores (sources) and behavioral scores (CBCL). Nevertheless, in DG, an inverse significant relationship between CBCL (externalizing factor) and z scores from right vmPFC (combining both early and late windows) was found ($r = -.48$, $p < .05$). See figure 1d.

Discussion

Although the effects of early social deprivation on cognitive development have been studied in children and adolescents, no study on moral sensitivity associated to brain markers has been reported yet. Moral development involves a fundamental social adaptation and interaction factor and is crucial for successful functioning in families, peer groups, and other environments (Amy, Dante, & Fred, 2004). Early childhood deprivation has been associated with maladaptive behaviors and social problems - such as maladjustment, impulse control, rule breaking (Hawk & McCall, 2010; Wierzbicki, 1993). We assessed the neural correlates of moral sensitivity in adolescents with early social deprivation using an ecologically valid task while controlling for EF and educational level. Atypical early/late cortical markers associated with intentionality attribution during moral decision making were observed in DG, and in particular regarding intentional situations involving persons. Moreover, when compared with controls, source space for this last condition revealed reduced DG activation in the right PFC, the bilateral vmPFC and right insula. Additionally, the right vmPFC activation was inversely correlated with behavioral problems in DG. Thus, results support the

hypothesis of atypical brain activation in individuals with antecedents of early social deprivation when process moral information in comparison with CG. Thus, these findings suggest for first time the impact that the environments with social deprivation in early childhood have on the posterior neurodevelopment, specifically on moral decision making in adolescents. This study has reported important evidence on brain immaturity linked the moral development on adolescents considering this component like a high level of cognitive abilities.

Early-life stressful experiences and social deprivation have been associated to immature development of the prefrontal cortex (Marshall, Fox, & Bucharest Early Intervention Project Core, 2004; McLaughlin et al., 2010; Pollak et al., 2010; Schore, 2012), and in turn the vmPFC is linked to moral judgments (Anderson, Bechara, Damasio, Tranel, & Damasio, 1999; Eslinger, Flaherty-Craig, & Benton, 2004; Greene, Nystrom, Engell, Darley, & Cohen, 2004; Koenigs et al., 2007; Saver & Damasio, 1991) but not the capacities for general intelligence, logical reasoning and declarative knowledge (Anderson, Barrash, Bechara, & Tranel, 2006; Koenigs & Tranel, 2007; Saver & Damasio, 1991). This evidence is consistent with the atypical neural activation observed in DG together with their preserved general cognitive skills. We found a neural modulation of intentionality and target types in CG, replicating previous EEG results (Decety & Cacioppo, 2012). At both early (~200ms) and late (~600ms) windows, we found person intentional stimuli produced the strongest modulation. Previous studies showing that images of intentional harm is associated with greater activation of amygdala/temporal pole and vmPFC (Decety & Cacioppo, 2012). Conversely, in the DG, evoked neural responses (mainly at frontal ROIs) failed to discriminate rapid moral decisions regarding actions involving intention to harm (intentional vs. unintentional harm). Moreover and in contrast to CG, no neural facilitation was observed for person intentional situations at frontal regions. Neural facilitation in the vmPFC points to the processing of emotionally laden stimuli (Elliott, Agnew, & Deakin, 2010). Early social deprivation has negative consequences on emotional capacities in late development (Tarullo, Bruce, & Gunnar, 2007; Tarullo, Garvin, & Gunnar, 2011; Tarullo & Gunnar, 2005). This would explain the stronger modulation in the CG (and not in the DG) for

stimuli that showed intentional harm to persons. Thus, the fact that person intentional stimuli did not yield stronger cortical activity in DG suggests an immature mechanism of emotional moral processing. Therefore, our results parallel neurodevelopment studies of delayed frontal lobe maturation in institutionalized children (Marshall, et al., 2004; McLaughlin, et al., 2010).

Regarding source space, several fronto-insular regions (right PFC, bilateral vmPFC, right insula) previously reported as relevant for the IIT (Decety & Cacioppo, 2012; Decety, Michalska, & Kinzler, 2012) presented reduced activation in the DG. These results are consistent with neurodevelopmental effects observed in right PFC and bilateral vmPFC in institutionalized children (Chugani et al., 2001). The reduced activation in insula and bilateral vmPFC (late windows) has also been linked to immature emotional regulation and delayed frontal maturation in children in deprivation contexts (McLaughlin, et al., 2010). Given that these structures are strongly associated with moral decision making (Decety & Cacioppo, 2012; Decety, et al., 2012; Gleichgerrcht, Torralva, Roca, Pose, & Manes, 2011; M. Koenigs et al., 2007), our results point to specific effects of social deprivation on the neurodevelopment underlying moral sensitivity.

In our study, behavioral externalization problems (e.g., delinquent and aggressive behaviors) of the DG as reported by parents were negatively associated with brain activity on right vmPFC. These results add to studies that found the right vmPFC to be one of the most important regions associated with emotional regulation and social emotions (such as compassion, shame and guilt) (Koenigs, et al., 2007), decision making (Bechara et al., 2001; Bechara, Tranel, & Damasio, 2000; Clark et al., 2008; Hooper, Luciana, Conklin, & Yarger, 2004), and moral values (Thomas, Croft, & Tranel, 2011). Similarly, lesions in the vmPFC induces maladaptive social behaviors (Anderson, et al., 1999; Beer, Heerey, Keltner, Scabini, & Knight, 2003; Damasio, Tranel, & Damasio, 1990; Eslinger, Grattan, Damasio, & Damasio, 1992). Thus, once again our results point to a delayed maturation of processes in the PFC involved in both, the abnormal neural responses to moral sensitivity and their association with externalization problems.

No significant differences for behavioral measures of moral sensitivity between the groups were found. This is consistent with previous findings for IIT where it has been reported that all participants –irrespective of their age from 4 to 37 years- are able to properly distinguish between intentional actions and unintentional actions. Moral judgment involving whether the actions were intentional or unintentional not differ with age, as it is a simple paradigm (Decety & Cacioppo, 2012; Decety, et al., 2012). And previous studies in children had showed that in early age the intentionality is used for them to determinate the moral relevance in social context (Smetana & Killen, 2008). However, the IIT is sensitive to changes in neurodevelopment through moral brain differential activation across age (Decety & Cacioppo, 2012; Decety, et al., 2012). Similarly our study showed that early social deprivation does not affect the accuracy of the IIT, but impacted at the neurodevelopmental level.

We tried to control the effect of basic cognitive impairments in order to identify primary abnormalities in the neural correlates of moral decision making that are not explained by other deficits. Thus, in the DG we assessed only high functioning individuals. Neuropsychological outcome exhibited only minimal group differences in visuomotor abilities and cognitive flexibility. This finding is consistent with previous research suggesting that institutionalized children perform worse in these domains (Cardona, Manes, Escobar, López, & Ibáñez, 2012; Colvert et al., 2008; Pollak, et al., 2010). When growing up, the participants of this study were provided during development with social and affective support from their adoptive families. Foster care induces improvement of cognitive abilities in comparison with institution care (McDermott et al., 2013). This would explain why our participants have relatively intact cognitive capabilities in basic cognitive domains.

Understanding the intentions behind a harmful action of one person towards another is a complex and emotionally laden task. It does not only involve ToM (Allison, Puce, & McCarthy, 2000) towards both, the agent and the harmed person, but also the ability to empathize (Decety & Jackson, 2004). Both ToM and empathy are themselves complex mechanisms that involve several neural and psychological sub-mechanisms (Allison, et

al., 2000; Decety & Jackson, 2004). Both empathy and ToM depend on social experiences of the individual involving dialogue about emotions and intentions of others. These mechanisms that can be learned and are in fact trained in certain therapies. Children from socially deprived environments usually get less attention from their caregivers and consequently find themselves less often in situations where they are expected to understand the intentions or emotions of others or even of themselves. A very important brain region that is involved in emotion regulation is the vmPFC. It is therefore plausible that children from the deprived group exhibited a weaker maturation of the brain areas that underpin emotion regulation (vmPFC, insula) and ToM (PFC).

Our study is the first report of moral sensitivity in adolescents with antecedents of social deprivation. Several lines of research should be assessed in future studies. Our sample size is moderate, but other studies of social deprivation have recruited a similar or less number of participants (Behen et al., 2009; Eluvathingal et al., 2006; Mehta et al., 2009). Our moderate sample is partially explained by the restricted recruitment proceeds and the inclusion of only high functioning participants from the DG (regarding executive performance). Besides, previous reports of this paradigm using EEG have proven sensitive with less than 10 participants (Decety & Cacioppo, 2012). Nevertheless, future studies with a higher sample allowing the inclusion of participants with different degrees of cognitive impairment (and not only high functioning participants as reported here) would be desirable. A second limitation frequently found on adopted participants (Roskam et al., 2013; Slopen, McLaughlin, Fox, Zeanah, & Nelson, 2012; Tottenham et al., 2010) is the scarce information about care previous to the adoption, for instance, prenatal risk factors like prenatal nutrition, maternal stress during pregnancy or prenatal exposure to alcohol. The role of these pre- and postnatal antecedents in moral cognition should be assessed in future studies. Finally, not only the impairment profiles, but also the efficacy of intervention strategies in socially deprived participants should be assessed using sensitive measures of frontal maturation and moral cognition.

To conclude, our results provide an experimental approach with ecological stimuli involving a simple and efficient measurement of brain signatures that underlie moral sensitivity in adolescents with social deprivation. While different aspects of basic cognitive delay associated with early social deprivation have already been reported, the present study is the first one to show atypical brain correlates underlying moral sensitivity with spared basic cognitive domains. Our data from ERPs, source space and brain-behavior associations' together point to a prefrontal maturation model of social deprivation. To the best of our knowledge, this study is a novel contribution to the field of the neuroevolution on morality (Decety, 2011; Decety & Howard, 2013; Decety & Michalska, 2012) regarding social deprivation, opening new perspectives for future research.

Author Contributions

Conceived and designed the experiments: MJE AI. Performed the experiments: MJE JD AR DH SB FM VL AC AI. Analyzed the data: AR LS MK AC AI. Contributed reagents/materials/analysis tools: MJE AR DH VL DM AC AI JD. Wrote the paper: MJE DH VL AI MK. Contributed on writing manuscript and revising of the manuscript: JS JD FM JMP

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Attachment Patterns Trigger Differential Neural Signature of Emotional Processing in Adolescents

María Josefina Escobar, Alvaro Rivera-Rei, Jean Decety, David Huepe, Juan Felipe Cardona, Andres Canales-Johnson, Mariano Sigman, Ezequiel Mikulan, Elena Helgiu, Sandra Baez, Facundo Manes, Vladimir Lopez, Agustín Ibañez

Abstract

Background. Research suggests that individuals with different attachment patterns process social information differently, especially in terms of facial emotion recognition. However, few studies have explored social information processes in adolescents. This study examined the behavioral and ERP correlates of emotional processing in adolescents with different attachment orientations (insecure attachment group and secure attachment group; IAG and SAG, respectively). This study also explored the association of these correlates to individual neuropsychological profiles. *Methodology/Principal Findings.* We used a modified version of the dual valence task (DVT), in which participants classify stimuli (faces and words) according to emotional valence (positive or negative). Results showed that the IAG performed significantly worse than SAG on tests of executive function (EF attention, processing speed, visuospatial abilities and cognitive flexibility). In the behavioral DVT, the IAG presented lower performance and accuracy. The IAG also exhibited slower RTs for stimuli with negative valence. Compared to the SAG, the IAG showed a negative bias for faces; a larger P1 and attenuated N170 component over the right hemisphere was observed. A negative bias was also observed in the IAG for word stimuli, which was demonstrated by comparing the N170 amplitude of the IAG with the valence of the SAG. Finally, the amplitude of the N170 elicited by the facial stimuli correlated with EF in both groups (and negative valence with EF in the IAG). *Conclusions/Significance.* Our results suggest that individuals with different attachment patterns process key

emotional information and corresponding EF differently. This is evidenced by an early modulation of ERP components' amplitudes, which are correlated with behavioral and neuropsychological effects. In brief, attachments patterns appear to impact multiple domains, such as emotional processing and EFs.

Introduction

Research suggests that individuals with different attachment patterns process social information differently, especially in terms of facial emotion recognition (Donges et al., 2012; Fraedrich, et al., 2010; Fraley, et al., 2006; Niedenthal, et al., 2002; Steele, et al., 2008; Suslow, et al., 2009). Nevertheless, few studies have examined the neural systems involved in facial emotion for different attachment patterns (Vrticka, Bondolfi, Sander, & Vuilleumier, 2012). To our knowledge no study has explored the neural correlates of attachment patterns in adolescents. Adolescence is a crucial life stage in the development of the social brain (Blakemore, 2008a) where significant changes at the emotional, cognitive, and behavioral level occur. These changes have been associated attachment patterns that reflect the transition to a self-sufficient individual instead of depending on others (Allen, 2008). It is likely that attachment patterns in adolescents shape social information processing, especially facial emotion. Consequently, we posit that these processes should be reflected in neurophysiological and neuropsychological measures. The purpose of this study is to identify the cortical markers of emotion processing in adolescents with different attachment patterns and to explore their relation to individual neuropsychological profiles.

According to attachment theory, attachment orientations are represented as internal working models (IWMs) (Bowlby, 1969). The IWMs of attachment influence the way people organize their behavior, including how they perceive, attend to, and process information of emotional significance (Niedenthal, et al., 2002). Non-verbal interactions, especially facial expressions, are integral to attachment communication (Bowlby, 1969, 1973). The attachment system is based on a basic need for security and protection, and is activated in response to distress or threat. Individuals who present a secure attachment pattern have IWMs of their parents as available and responsive (Bretherton &

Munholland, 2008). In contrast, an insecure attachment pattern stems from caregivers with an unavailable or unpredictable response to a child's needs. Based on these concepts, Ainsworth (1989) proposed a classification of three attachment patterns: one secure attachment pattern (described above) and two insecure attachment patterns. The insecure-ambivalent/anxious pattern encodes IWMs of their caregivers as unpredictable individuals. Thus, the child seeks to remain near the caregiver to increase chances of contact. Individuals with an insecure-avoidant pattern have IWMs that depict the caregiver as consistently failing to provide security (Cassidy & Berlin, 1994; Dykas & Cassidy, 2011). Expanding on Ainsworth's research, Main and Solomon (1990) defined a disorganized pattern of attachment, in which individuals have IWMs that represent their caregivers as a possible threat, causing the child to adopt to fearful or disoriented behavior (Dykas & Cassidy, 2011; Hesse & Main, 2006). Thus, it is possible that the type of IWMs in attachment could explain some differences in the processing social cognitive information (Vrticka & Vuilleumier, 2012).

A secure attachment pattern has been correlated with numerous benefits to an individual's psychological well-being beyond the inter-subjective and social domain. A primary caregiver's consistency and availability enable a child to freely explore the environment and increase a child's confidence in receiving comfort. Furthermore, these early experiences influence cognitive abilities, such as attention and memory processes for attachment-relevant information (Dewitte, De Houwer, Buysse, & Koster, 2008; Kirsh & Cassidy, 1997). For example, insecure attachment is associated with reduced attention to angry faces, which can reflect a failure to notice threatening stimuli (Dewitte, et al., 2008). In terms of memory, studies have found that insecure individuals can suppress attachment-relevant information that would cause emotional pain, while secure individuals process their attachment-relevant information fully and flexibly (Dykas & Cassidy, 2011). Furthermore, a relationship between attachment and general cognitive abilities has been observed in some studies. For instance, individuals with secure attachment perform better academically (Aviezer, Sagi, Resnick, & Gini, 2002; Jacobsen & Hofmann, 1997; Teo, Carlson, Mathieu, Egeland, & Sroufe, 1996). Moreover, an association has been evidenced between performance on general attention

tasks and attachment style (Gillath, Giesbrecht, & Shaver, 2009). For example, the latter study reported that avoidant individuals regulated their attention mainly by ignoring potential distracters. Furthermore, research suggests that secure attachment is associated with high performance on executive function tasks, (EF) (Bernier, Carlson, Deschenes, & Matte-Gagne, 2012) such as increased language competence (van IJzendoorn, Dijkstra, & Bus, 1995). These findings suggest that general cognitive performance and cognitive abilities, such as attention and memory for attachment-relevant information, are correlated with different attachment patterns.

Recent empirical evidence also demonstrates that individual's process facial emotional information based on attachment style (Fraley, Niedenthal, Marks, Brumbaugh, & Vicary, 2006; Donges, et al., 2012; Niedenthal, Brauer, Robin, & Innes-Ker, 2002; Steele, et al., 2008; Suslow, et al., 2010; Suslow, et al., 2009). In neuroimaging studies, individuals with insecure (avoidant or anxious) attachment exhibited differential modulations of neural responses to facial expressions than individuals with secure attachment (Donges, et al., 2012; Suslow et al., 2009; Vrtička, et al., 2008). Moreover, individuals with avoidant attachment showed a weaker activation of the somatosensory cortex to sad, masked faces (Suslow, et al., 2009) and lower activation of the ventral striatum and ventral tegmental areas in response to smiling faces followed by positive feedback (Vrticka, Andersson, Grandjean, Sander, & Vuilleumier, 2008). These results suggest the existence of a tendency for avoiding negative emotional states that demand attachment-system activation (Suslow, et al., 2010; Suslow, et al., 2009) and positive social signals (Vrticka, et al., 2008). Anxious attachment was demonstrated to be positively related to activation of the left inferior, middle, and medial prefrontal areas, and globus pallidus, claustrum, and the right cerebellum in response to masked happy faces (Donges, et al., 2012). Moreover, anxious attachment has been associated with increased activation of the left amygdala in response to angry faces followed by negative feedback (Vrticka, et al., 2008). These studies indicate that individuals with anxious attachment are more responsive to emotional facial signals at an automatic processing level than are individuals with secure attachment (Donges, et al., 2012; Vrticka, et al., 2008).

Processing of emotional information in faces has been extensively studied using event-related potentials (ERPs) (Ibanez et al., 2012). This technique provides excellent temporal resolution for assessing cognitive brain processes. Current ERP research in social neuroscience highlights the role of early and late cortical dynamics (Ibanez, et al., 2012). Early responses (e.g., 80–200 ms after stimulus onset) usually index bottom-up sensory mechanisms sensitive to stimulus. For instance, early modulation refers to the facilitation of early automatic and pre-attentional discrimination of salient stimuli. Later stages (300–800 ms) may reflect top-down control mechanisms that influence the processing of task-relevant stimuli. The late process can be interpreted as correlates of arousal, control, and awareness. Nevertheless, early components, especially the N170, have evidenced modulation through different top down mechanisms. Examples include ingroup bias (Ibanez et al., 2010), attention (Feng, Martinez, Pitts, Luo, & Hillyard, 2012), and awareness (Rodriguez et al., 2012). Moreover, the N170 emotional modulation is a good predictor of social-cognitive profile (executive functions, processing speed, fluid intelligence and theory of mind) in normal as well as psychiatric conditions (Ibanez et al., 2013). To our knowledge, few studies have explored the relationship between attachment orientation and emotional face-processing using early ERPs. It is important to note that all of these studies have shown differences in the modulation of components among adult attachment styles. Because previous research on attachment has focused on late components, assessing the N170 modulation would expand the literature by providing a measure of early and automatic processes influenced by top-down effects. For the current study we reported the P1 and N170 components.

The P1 and N170 ERP components are especially useful for examining individual differences between attachment orientation and emotional face-processing. The P1 component can be modulated by the stimulus type (ST), which is elicited by comparing faces to words (Rossion, Joyce, Cottrell, & Tarr, 2003; Schendan, Ganis, & Kutas, 1998). For instance, significant differences in the P1 component in response to angry face stimuli compared to neutral stimuli have been observed in individuals with avoidant attachment (Dan & Raz, 2012). This difference was not present in secure

individuals or anxious individuals. Furthermore, the N170 is an early cortical response that is triggered more strongly with facial stimuli, as compared to object or word stimuli (Proverbio, Riva, Martin, & Zani, 2010; Rossion, et al., 2003). To our knowledge, only one study has assessed facial processing indexed by N170 for different attachment patterns (Fraedrich, et al., 2010). Insecure women showed a more pronounced negativity in the face-sensitive N170 component. The authors concluded that encoding faces was more challenging for insecure-avoidant women than for secure-attachment women, as insecure-avoidant women showed greater activation of cortical and processing resources. In general, the main finding in these studies, amplitude modulation of known ERP components (Dan & Raz, 2012; Fraedrich, et al., 2010; Zhang, et al., 2008), suggests that differences in attachment patterns are related to differences in facial emotion processing.

Studies that have examined the brain areas involved in the perception of facial emotion among attachment styles, have used adult populations (Dan & Raz, 2012; Fraedrich, et al., 2010; Zhang, et al., 2008). To our knowledge, no study on attachment style has focused on adolescents. Since adolescence marks a crucial stage in the social brain development, studying attachment style during this life stage is an important area of research (Blakemore, 2008a). The current study aims to explore the brain correlates of emotional information processing in adolescents with different attachment patterns. We also sought to determine the relation of attachment patterns to the neuropsychological profile of adolescents.

The primary aim of this study was to assess whether there exists an association in adolescents between attachment patterns and capability to process emotional facial expressions. To address this question we chose an ERP design based on a modified version of the dual valence task (DVT) (Ibanez, Hurtado, et al., 2011; Ibanez, Petroni, et al., 2011). Participants had to classify stimuli according to its emotional valence (positive or negative). Faces and words were presented to test the effects of ST (faces vs words) and valence (positive vs negative). Our second aim was to explore whether the attachment patterns were related to individual neuropsychological profiles.

Consequently, participants were required to undergo a comprehensive neuropsychological assessment.

Based on these antecedents, we hypothesized that: 1) Participants with different attachment patterns will show variations in emotional processing, as indexed by a differential modulation of ERP amplitudes while viewing face stimuli; 2) Individuals with insecure attachment will exhibit larger amplitudes in the P1 and in the N170 in response to face stimuli and exhibit a differential modulation of emotional valence; 3) Groups varying in attachment pattern will also differ at the neuropsychological level; improved performance is expected for the secure attachment group.

Methods

Ethics Statement

Participants and their parents read and signed an informed consent in agreement with the Declaration of Helsinki before beginning the study. The ethical committee of the Psychology Faculty, Pontificia Universidad Católica approved the study.

Participants

The present study is part of the Attachment Adoption Adolescents Research Network (AAARN), an international project focusing on attachment representation in adolescents and their parents. Participants were recruited from several sources, such as social networks (Facebook groups, chain letters) and institutions [Servicio Nacional de Menores (SENAME), Fundación Chilena para la Adopción and Fundación San José]. The final sample consisted of 40 adolescents between 11 and 16 years of age. After the child's neuropsychological evaluation, parents were offered a copy of the report. The sample included two groups: adolescents with secure attachment (SAG) and adolescents with insecure attachment (IAG). In both groups, some participants (6 for SAG and 8 for IAG) presented late adoption history (after 6 months). As requested by one reviewer, we

covariate all results (behavioral and ERP measures) with age of adoption. No significant effect of covariance was observed.

A semi-structured interview, the Friends and Family Interview (FFI) (Steele, et al., 2005), was used to evaluate the representations of adolescent attachment patterns. The FFI has 8 dimensions, each one with several subcomponents: coherence, truth, economy, relation, manner and overall coherence; reflective function [developmental perspective, theory of mind (mother, father, sibling, friend and teacher), and diversity of feelings (mother, father, sibling, friend, and teacher)]; evidence of secure base (father, mother, other significant figure); evidence of self-esteem: social and school competence; peer relations (frequency and quality of contact); sibling relations (warmth, hostility and rivalry); anxieties and defenses [idealization (self, mother and father), role reversal (mother and father), anger (mother and father), derogation (self, mother and father) and adaptive response]; and differentiation of parental representations. The interview also contains a non-verbal code to evaluate fear/distress and frustration/anger and contains a global attachment classification. The assessments are scored on a 4-point Likert scale (1 = no evidence and 4 = marked evidence) (Steele, et al., 2009).

Four global attachment categories were used in this study: secure attachment, insecure-dismissing attachment, insecure-preoccupied attachment and disorganized attachment. The duration of each interview averaged 35 minutes (minimum of 18 minutes and maximum of 1 hour 40 minutes). Every interview was video-recorded and transcribed. Interviews were coded using both video and transcription materials. To assess for potential interviewer bias, two trained evaluators coded 6 interviews, which had a Cohen's Kappa = 0.94. A trained evaluator coded the other 44 interviews. The validity of this measure as an indicator of security and organization of attachment has been previously tested and confirmed across countries (Stievenart, Casonato, Muntean, & van de Schoot, 2012).

The final sample included 20 secure (50%), 15 insecure-dismissing (37%), and 5 insecure-preoccupied (13%) participants (none were disorganized). Due to the small sample size, the insecure-dismissing and insecure-preoccupied attachment styles were

combined into a single “insecure attachment group” following previous research methods (Jacobsen & Volker Hofmann, 1997; Teo, et al., 1996). The IAG ($n = 20$; mean age = 12.15 years, $SD = 1.26$) was contrasted with the SAG ($n = 20$; mean age = 13.10 years, $SD = 1.29$). The IAG consisted of 13 males and 7 females, and the SAG consisted of 9 males and 11 females. We controlled for between group differences in age ($F(2, 37) = 0.22, p = 0.81$), sex ($X^2(2) = 1.81, p = 0.40$), and education level ($F(2, 37) = 1.54, p = 0.22$). Participants had no history of physical or mental disorders, according to institutional records and a neuropsychiatric interview with the parents. Participants along with their parents gave informed consent in agreement with the Declaration of Helsinki. The Ethics Committee of the Institute of Cognitive Neurology approved all experimental procedures.

Instruments

Neuropsychological assessment

All participants completed a neuropsychological battery assessing attention, speed processing, visual-spatial abilities, and EF. In the verbal fluency task, participants were given a category or a letter and asked to state all of the words that came to mind in one minute. In the digit span subtest (Wechsler, 2003), participants were asked to repeat a given set of numbers in the same order (digit span forward) or in reverse order (digit span backward). The block design task (Wechsler, 2003) required participants to arrange cubes of red, white, or red and white sides to form a specific pattern. For the picture arrangement task (Wechsler, 2003) participants were required to piece together a misarranged story into the correct order. In the symbol search task (Wechsler, 2003), participants were asked to decide whether a given symbol was present in a line-up of other symbols. The coding subtest (Wechsler, 2003) required participants to decipher a numerical code using symbols. To measure attention and speed processing, we incorporated the trail making test (Partington & Leiter, 1949), which entails connecting numbers in sequential order (test A) or letters and numbers (test B) spread out randomly on sheet of paper.

Emotional processing

Dual Valence Task (DVT). The DVT (Ibanez, Petroni, et al., 2011; Ibanez, Riveros, et al., 2012; Ibanez, Urquina, et al., 2012; Petroni et al., 2011) is an adaptation of the Implicit Association Task designed specifically for ERP measurements [40]. The DVT assesses the emotional valence (positive or negative) of faces and words. Participants are asked to categorize words as either pleasant or unpleasant and faces as either happy or angry, and to make these judgments as fast and as accurate as possible. The DVT allows for behavioral measures through reaction time of responses and electrophysiological measures through activation of early ERP components. In our study, participants were presented with a series of four blocks on a computer screen: 3 practice blocks and one test block. Practice blocks used different face and word stimuli than test blocks. Trials began with a fixation cross presented for 1000 ms followed by the stimulus, which was shown for 100 ms. Immediately after, a fixation cross appeared on the screen and disappeared either after 2000 ms or the participant's response, whichever came first. After a response, there was an interstimulus interval (ISI) of 1000 ms. Each stimulus was centered horizontally and vertically on the screen subtending a visual angle of $4.5^{\circ} \times 3.15^{\circ}$ at a viewing distance of approximately 80 cm. Eighty happy and angry facial expressions and 142 pleasant and unpleasant word stimuli were included. The happy and angry sets of pictures depicted the same people. Faces were previously controlled for arousal, valence, emotion (angry vs. happy), and physical properties, and words were controlled for arousal, valence, predictability, content, length, and frequency (for details see (Ibanez, Hurtado, et al., 2011)).

Control variables

Family data form and history of adoption. Parents were questioned on socio-demographic family data (socioeconomic level, parent's educational level, and child's educational level), age at adoption, health history of child birth and subsequent complications, health information prior to the adoption, and the child's medical or mental health history and current health information.

Procedure

Once the family was contacted, participants and their parents signed a consent form. Next, an interview with the participant's mother was conducted. The attachment interview with the participant took place later on. Interviews were administered at the participants' homes. In the first session, participants were completed the neuropsychological battery in order to test general cognitive processes. Lastly, during the second interview (taken within 10 days) the electroencephalographic (EEG) was recorded while participants performed the DVT.

EEG Recordings and Preprocessing

EEG signals were recorded with HydroCel Sensors from a GES300 Electrical Geodesic amplifier at a rate of 500 Hz using a system of 129-channels. Data that were outside a frequency band that ranged from 0.1 Hz to 100 Hz were filtered out during the recording. Later, the data were further filtered using a band-pass digital filter with a range of 0.3 to 30 Hz to remove any unwanted frequency components. During recording, the vertex was used as the reference electrode by default, but signals were offline re-referenced to average electrodes. Two bipolar derivations were designed to monitor vertical and horizontal ocular movements (EOG). Continuous EEG data were segmented during a temporal window that began 200 ms prior to the onset of the stimulus and concluded 800 ms after the offset of the stimulus. Eye movement contamination and other artifacts were removed from further analysis using both an automatic (ICA) procedure and a visual procedure. No differences were observed between groups regarding the number of trials. All conditions yielded a least 87% of artifact-free trials.

Region of Interest (ROIs)

Based on previous DVT reports (Ibanez, Petroni, et al., 2011; Ibanez, Riveros, et al., 2012; Ibanez, Urquina, et al., 2012; Petroni, et al., 2011), ROIs were used to analyze the scalp topography of the ERP components. The ROIs were chosen by visual inspection

of the right N170 component, comprised of four electrodes placed near the canonical locations for the N170 component (T6 and T7: (Rossion & Jacques, 2008)). Consequently, we included 4 electrodes (the canonical locations and 3 adjacent electrodes) for each hemisphere (left: 58, 59, 64, and 65; right: 90, 91, 95 and 96). We also performed an additional data-driven electrode choice on the basis of the maximum peak amplitude of the N170 component to confirm that the selected electrodes did in fact generate the N170 modulation. This is an expected result because the canonical locations of the N170 component (T6 and T7) and the electrodes that are adjacent to them often yield the maximum peak amplitude (Rossion & Jacques, 2008).

Mean amplitude

P1 measures were computed by using a fixed temporal window (90–130 ms), after which the mean amplitude of the P1 signal was obtained for the mean of each category and each subject. The same procedure was computed for the N170 at 140–190 ms time window. The ERP modulation that is observed in the DVT is very sensitive to mean amplitude and is not sensitive to latency (Ibanez, Hurtado, et al., 2011; Ibanez, Petroni, et al., 2011; Ibanez, Riveros, et al., 2012; Petroni, et al., 2011).

Data Analysis

ANOVAs and Tukey's HSD post-hoc comparisons (when appropriate) were used to compare the demographic, neuropsychological, and reaction time data across all of the groups. Repeated measures ANOVAs and Tukey's HSD post-hoc comparisons (when appropriate) were performed to analyze the DVT and ERP data. Three within-subjects factors, stimulus type (ST: faces vs words) and two valences scores (separately for each stimuli, face valence and word valence: positive vs negative), were included. One between-subjects factor with 2 levels was considered (group: SAG, IAG). The Matlab software program and the EEGLab toolbox were used for the offline processing and analysis of the EEG data. Finally, global scores of significant between-group effects (ST: face-minus-word) at P1 as well as face (total score) and face valence (face positive

and face negative at left and right hemisphere) at N170 were correlated with the neuropsychological performance of participants.

Results

Neuropsychological Assessment

The SAG performed better than the IAG on coding ($F(1, 38) = 11.45, p < 0.01$), block design ($F(1, 38) = 7.10, p < 0.05$), and Trail Making Test B ($F(1, 38) = 4.86, p < 0.05$). A trend for significance was observed on the digits ($F(1, 38) = 3.16, p = 0.08$) and symbol search ($F(1, 38) = 3.78, p = 0.06$) tasks, with the SAG scoring higher than the IAG. No significant differences between groups were observed on the verbal fluency task, picture arrangement task, or Trail Making Test A. See Table 1.

Table 1. Neuropsychological assessment

	SAG		IAG		SAG vs. IAG
	M	SD	M	SD	
Neuropsychological Assessment					
Coding	54.10	9.21	45.55	6.55	0.01
Picture Arrangement	23.65	6.05	22.10	8.36	0.01
Cube Construction	46.85	9.48	38.30	10.78	0.06
Symbol Search	26.40	6.31	23.05	4.41	0.08
Digits	12.05	3.35	10.40	2.46	NS
Verbal Fluency	16.08	3.45	14.75	3.90	NS
TMTA	44.10	11.57	47.25	11.72	0.04
TMTB	96.50	23.30	126.55	56.31	0.01

DVT (Behavior)

Stimulus type. A main effect of ST ($F(1, 38) = 27.74, p < 0.01$) evidenced that participants performed better on face stimuli recognition than word stimuli recognition.

A main effect of ST ($F(1, 38) = 22.75, p < 0.01$) was also observed for reaction time, indicating that participants responded faster to face stimuli than word stimuli. In addition, an effect of group ($F(1, 38) = 4.05, p < 0.05$) revealed that the IAG had slower reaction times than the SAG.

Valence effects. An interaction between valence \times group was significant ($F(1, 38) = 6.30, p < 0.05$). Post-hoc comparisons (Tukey HSD $MS = 57863, df = 52.36$) revealed that participants in the IAG tended ($p = 0.06$) to respond slower to negative words than participants in the SAG. See Table 2.

Table 2. DVT behavioral measures

Category	Accuracy (%)			
	SAG		IAG	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Face	86.59	11.21	83.91	12.33
Word	81.75	12.13	76.06	15.99
Face Negative	87.62	11.23	84.31	14.64
Word Negative	81.38	12.93	75.56	15.38
Face Positive	85.56	12.17	83.56	12.24
Word Positive	82.12	12.25	82.12	76.56
Category	RT (ms)			
	SAG		IAG	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Face	707.51	126.83	789.20	205.57
Word	873.00	201.07	988.92	237.30
Face Negative	700.87	108.86	807.81	232.05
Word Negative	819.78	239.74	1013.05	240.63
Face Positive	714.14	166.85	770.59	216.25
Word Positive	926.23	180.09	964.80	289.21

DVT (ERPs)

Figure 1 shows the P1 and N170 effects for both groups and conditions.

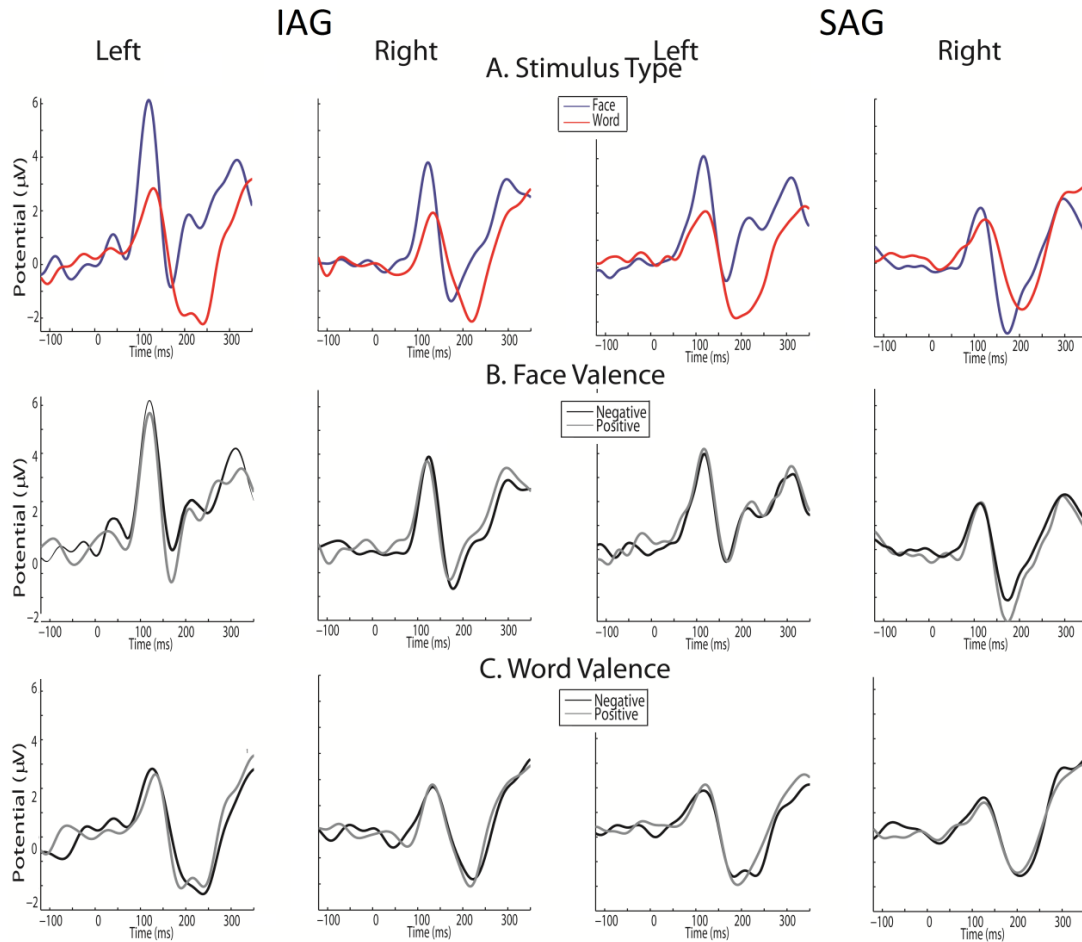


Figure 1. P1 and N170 results. A) Stimulus type (ST) effects at left and right hemispheres for both groups. B) Face valence (FV) effects at left and right hemispheres for both groups. C) Word valence (WV) effects at left and right hemispheres for both groups. IAG: Insecure attachment group. SAG: Secure attachment group. doi:10.1371/journal.pone.0070247.g001

P1 effects. A main effect of ST (Face>words; $F(1, 38) = 37.03, p < 0.001$) and hemisphere (left>right, $F(1, 38) = 12.37, p < 0.001$) evidenced an early facilitation of faces and left hemispheric dominance. Differences among groups (ST \times group $F(1, 38) = 4.49, p = 0.04$) followed by post hoc interactions (MSE = 2.11, df = 65.71) revealed that faces elicited higher amplitude in the IAG than the SAG ($p < 0.05$). ST effects in

both groups evidenced also a face dominance (face>word; IG: $p<0.0001$; SG: $p<0.05$). See figure 2A.

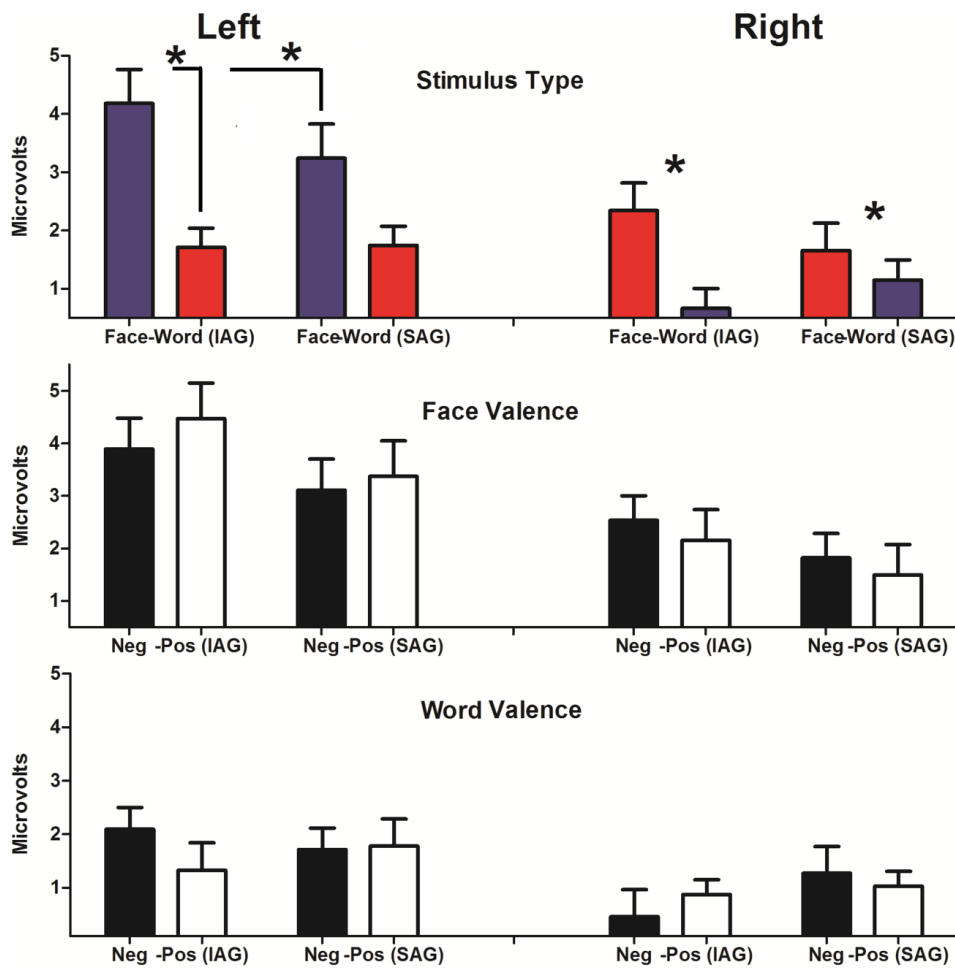


Figure 2. Mean amplitude values for P1. A) Stimulus type (ST) effects at left and right hemispheres for both groups. B) Face valence (FV) effects at left and right hemispheres for both groups. C) Word valence (WV) effects at left and right hemispheres for both groups. Asterisks indicate significant differences. IAG: Insecure attachment group. SAG: Secure attachment group. doi:10.1371/journal.pone.0070247.g002

The same effect of hemisphere (left>right; $F(1, 38) = 9.30, p<0.005$) was observed for face valence (FV). No other effects were observed (figure 2B).

As for face valence, hemisphere modulated the P1 elicited by word valence (WV; left>right; $F(1, 38) = 14.93, p<0.001$). No other significant results were observed (figure 2C).

N170 effects.

A hemisphere \times ST interaction ($F(1, 38) = 9.17, p < 0.005$; post hoc Tukey HSD MSE = 8.62, $df = 38.00$) evidenced a left lateralized effect for semantic (words > face; $p < 0.05$) and a non-significant right effect for facial processing (face > word; $p = 0.71$). Also, hemisphere \times group interaction ($F(1, 38) = 4.32, p < 0.05$), followed by post hoc comparisons (Tukey HSD, MSE = 3.37, $df = 63.23$) evidenced significant hemispheric (right > left) differences in the SAG only ($p < 0.05$) but not in the IAG. Finally, a trend of hemisphere \times ST \times group ($F(1, 38) = 3.67, p = 0.053$, post hoc Tukey HSD MSE = 7.05, $df = 66.02$) indicates that in the SAG, a right face dominance (face > word, $p < 0.05$) and a left word dominance (word > face; $p < 0.05$) were significant (figure 3A).

Regarding face valence (FV), an interaction of hemisphere \times group ($F(1, 38) = 7.82, p < 0.005$; post hoc Tukey HSD, MSE = 7.43, $df = 63.16$) revealed a right dominance (right > left) in the SAG only ($p < 0.001$). Finally, a trend of valence \times group \times hemisphere ($F(1, 38) = 3.37, p = 0.06$) followed by post hoc comparisons (MSE = 6.73, $df = 55.81$) evidenced valence effects (positive > negative) at right hemisphere in the SAG ($p < 0.05$). Conversely, the IAG presented the opposite valence effect (negative > positive) at left (trend: $p = 0.08$) and right hemispheres ($p < 0.05$). See figure 3B.

Finally, for word valence (WV), no significant effects were observed at N170 window (figure 3C).

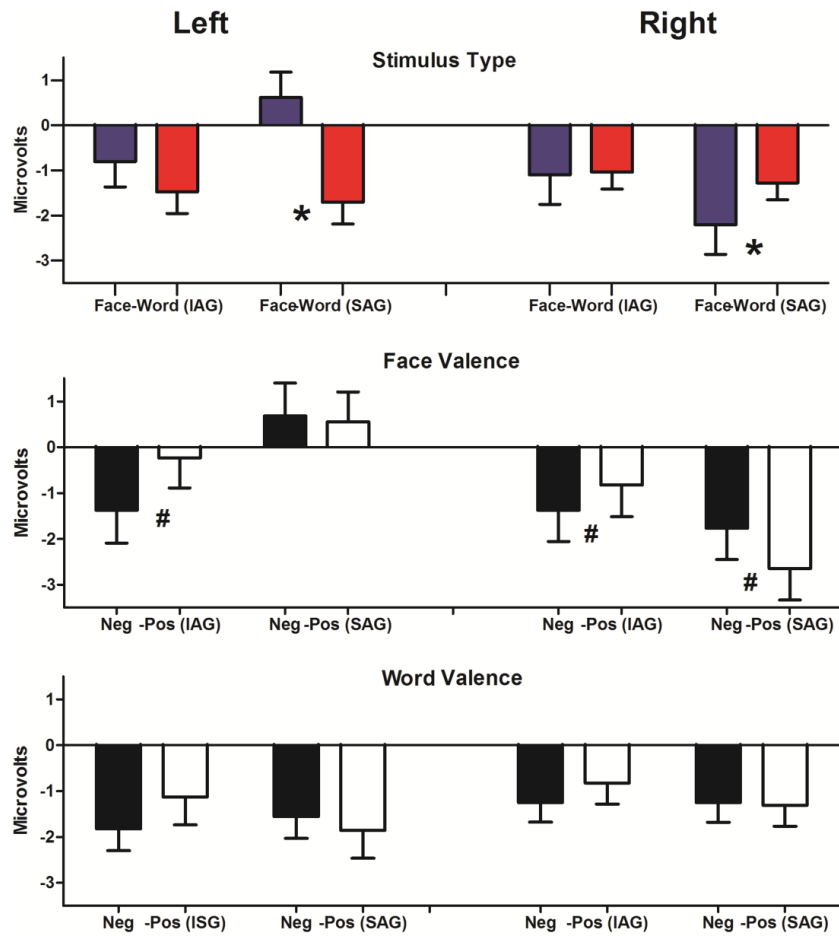


Figure 3. Mean amplitude values for N170. A) Stimulus type (ST) effects at left and right hemispheres for both groups. B) Face valence (FV) effects at left and right hemispheres for both groups. C) Word valence (WV) effects at left and right hemispheres for both groups. Asterisks indicate significant differences. IAG: Insecure attachment group. SAG: Secure attachment group. doi:10.1371/journal.pone.0070247.g003

Correlations

Global scores of significance between-group effects (ST at P1; face and face valence at N170) were correlated with the neurocognitive profile of participants. Figure 4 lists the correlations for both groups.

P1. Enhanced ST discrimination at P1 was correlated with better WM performance ($r = 0.32$; $p < 0.001$, figure 4A).

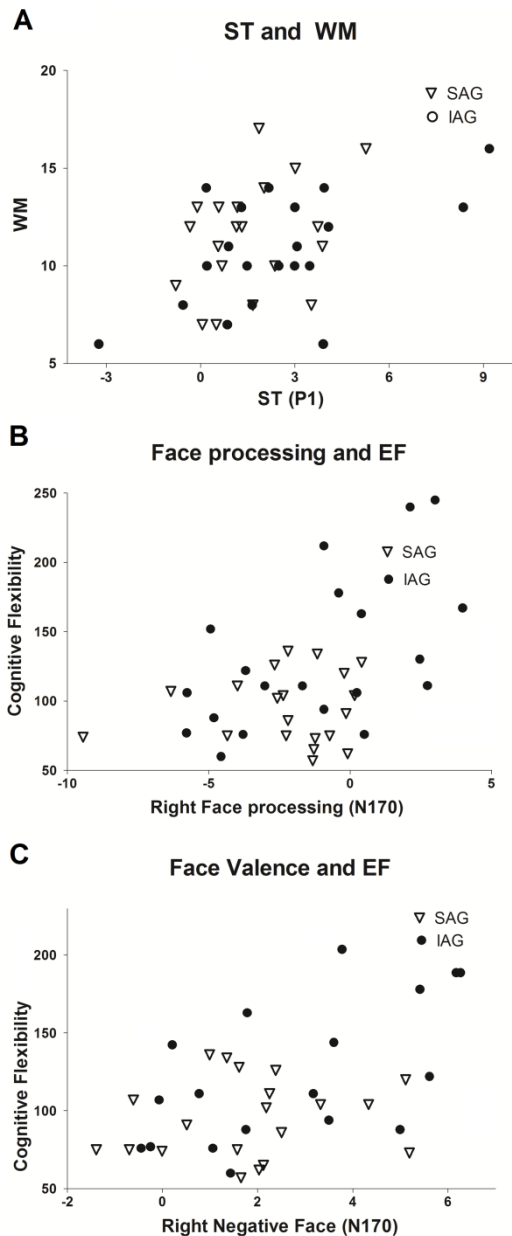


Figure 4. Association between individual differences and ERP results. A) ST at P1 and WM performance. B) Right hemisphere face processing (enhanced when more negative) correlated with cognitive flexibility. C) Face negative valence associations with cognitive flexibility at right hemisphere. D) Split analysis of IAG presented association between face negative valence and cognitive flexibility TMTB. IAG: Insecure attachment group. SAG: Secure attachment group. doi:10.1371/journal.pone.0070247.g004

N170. Right hemisphere face processing (enhanced when more negative) was correlated with reaction times of cognitive flexibility ($r = 0.37$, $p < 0.001$; figure 4B). Right

hemisphere negative face valence was also associated with reaction times of cognitive flexibility at ($r = 0.37, p < 0.05$, figure 4C). In addition, when a split analysis by group was performed, the IAG presented associations between negative-face valence and cognitive flexibility (TMTB) at left ($r = 0.45, p < 0.005$) and right hemispheres ($r = 0.45, p < 0.005$).

Discussion

The aim of the present study was to examine the behavioral and ERP correlates of emotional processing in adolescents with different attachment orientations and to explore the potential relationship between behavioral and ERP correlates and neuropsychological profiles. Previous studies have evidenced these relationships in adults (Chavis & Kisley, 2012; Dan & Raz, 2012; Fraedrich, et al., 2010; Vrticka, et al., 2008; Vrticka, et al., 2012; Vrticka & Vuilleumier, 2012; Zhang, et al., 2008). However, few studies have researched emotional processing in adolescents (White, Wu, Borelli, Mayes, & Crowley, 2013; White et al., 2012). These results expand on previous theories in developmental neuroscience and attachment. Moreover, these findings suggest that the attachment process impacts multiple cognitive domains, such as emotional processing and EF.

We confirmed our hypothesis that individuals with varying attachment patterns process emotional information differently. This observation is evidenced by an early modulation of ERP amplitude followed by behavioral and neuropsychological effects. In sum, early cortical markers of face processing diverged in IAG relative to the SAG. The IAG exhibited larger P1 for face stimuli and attenuated the N170 component over the right hemisphere, indicating that they did not differentiate between emotions. Contrasting the amplitude of the N170 between the IAG and the SAG elicited by word and valence stimuli evidenced a negative bias for the IAG. Finally, the amplitude of the N170 elicited by face stimuli was correlated with EF in both groups (and negative valence with EF in the IAG).

Neuropsychological Findings

As predicted from previous reports, the SAG scored higher than the IAG on neuropsychological evaluations. The IAG performed significantly worse on measures of attention and processing speed. Moreover, the IAG had a lower performance on tests of visuospatial abilities and cognitive flexibility. These data are consistent with previous research suggesting that individuals with secure attachment style perform better than those with insecure attachment on EF tasks (Bernier, et al., 2012). These results also correspond with previous findings on the relationship between maternal attachment and child attachment with EF (von der Lippe, Eilertsen, Hartmann, & Killèn, 2010). Overall our results suggest that attachment experiences may influence cognitive abilities.

Behavioral Measures of Emotion Processing

The IAG performed worse on behavioral measures of emotion processing as assessed by the DVT. The IAG exhibited poorer accuracy and slower RTs for negative valence. This result is consistent with previous studies demonstrating that insecure individuals were slower and less accurate at differentiating angry faces from neutral ones (Dan & Raz, 2012; Dewitte & De Houwer, 2008; Fraedrich, et al., 2010). For example, Dan and Raz (2012) found that only the avoidant attachment group demonstrated slower RTs for angry faces compared to neutral faces. Anxious individuals, on the other hand, had poorer accuracy when differentiating angry faces from neutral ones; this effect was not presented in avoidant or secure participants (Dan & Raz, 2012). In the current study, the IAG consisted of 15 insecure-dismissing (avoidant-like pattern) adolescents and 5 insecure-preoccupied (anxious-like pattern) adolescents. Due to the small sample size, especially in terms of insecure-preoccupied individuals, we cannot make definitive conclusions on this topic. Nevertheless, this behavioral pattern reaffirms the relationship found in prior studies between attachment security and abnormal processing of emotional valence.

Neural Signatures of Stimulus Type and Emotion

No significant differences between the groups and ST were found for electrophysiological measures. We observed an early amplitude modulation of visual P1 elicited for face stimuli compared to word stimuli, which is consistent with previous research (Rossion, et al., 2003; Schendan, et al., 1998). In particular, these two studies found a significant difference between P1 for words and P1 for faces, but the P1 elicited by faces was the same as that for stimuli similar in complexity. The authors concluded that these dissimilarities did not reflect specialization (i.e.: linguistic vs. non-linguistic), but rather low-level differences between stimuli (i.e.: spatial frequency or size). Moreover, P1 amplitude has also been affected by the amount of attentional resources dedicated to a visual stimulus (Hillyard & Anllo-Vento, 1998). In this report, the face-elicited P1 showed a significant group effect. In other words, the IAG exhibited larger P1 amplitudes than with SAG.

Furthermore, abnormal P1 components elicited by faces have been observed in clinical populations. For example, anxious individuals exhibit larger P1s than non-anxious individuals (Mueller et al., 2009). This effect, known as hypervigilance, has been observed in recent studies. For instance, adult individuals with atypical attachment were found to have greater arousal after viewing scenes with negative emotional content (Dan & Raz, 2012; Rognoni, Galati, Costa, & Crini, 2008; Vrticka, et al., 2008; Vrticka, et al., 2012; P. Vrticka & Vuilleumier, 2012; Zilber, Goldstein, & Mikulincer, 2007). In our study, face stimuli elicited larger P1 for the IAG compared to the SAG in the left hemisphere. Nevertheless, different emotions were undistinguishable within this time window. In this context, we interpreted a larger face-elicited P1 in the IAG to indicate (a) a general state characterized by higher vigilance or (b) less efficient early structural face processing. Given that no valence differences were observed in the P1, alternative (b) seems to be the more likely explanation. However, further research is needed before any conclusion can be drawn.

In our study, the observation of a larger N170 for the SAG matched previously reported effects of ST (Rossion & Jacques, 2008; Rossion, et al., 2003) and valence (Ibanez,

Hurtado, et al., 2011; Schacht & Sommer, 2009). Specifically, larger right N170 was observed for faces than for words, and larger N170 for positive compared to negative valence was detected. For the IAG, the ST effect at this time window was absent. This impaired discrimination at the N170 window could be interpreted as difficulty in semantic access. Supporting this claim, a meta-analytic study (M. H. van IJzendoorn, et al., 1995) showed that attachment styles were correlated with language abilities. The development of verbal capabilities and the use of language are closely related to the way children connect to their caregivers. Moreover, adults with insecure attachment exhibit greater difficulty in semantic processing of emotional faces than secure adults, which has been demonstrated by smaller N400 amplitudes during the presentation of emotion types (Zhang, et al., 2008). In the present study, the impaired discrimination observed in the IAG suggests that the semantic skills learned in early relationships are maintained throughout adolescence.

As mentioned, the ST effect is also characterized by a lateralization in the right hemisphere, with a larger amplitude to face stimuli than to word stimuli (Schacht & Sommer, 2009). In the present study this pattern was explicitly observed for the SAG. The IAG, however, showed abnormal right hemisphere activity within this time window. Previous reports on schizophrenia (Ibanez, Riveros, et al., 2012) bipolar disorders (Ibanez, Urquina, et al., 2012) and ADHD (Ibanez, Petroni, et al., 2011) have evidenced similar abnormalities in right hemisphere when assessing ERPs with the DVT. The impaired emotional processing indexed by N170 has been considered a useful biomarker of potential genetic deficits underlying these disorders. The presence of a similar pattern in our study raises the question whether potential environmental factors (i.e., attachment) modulate maturational pathways or whether a genetic predisposition independently causes this effect.

The N170 was larger in the IAG than in the SAG when viewing negative face stimuli. Previous studies have reported a similar negative bias in adult participants with insecure-avoidant attachment but at a different temporal window (Chavis & Kisley, 2012). This finding stands in line with previous studies that have reported insecure

individuals as more prone to a negative bias because they are more skilled at detecting threatening stimuli early and eliciting avoidant behaviors, (Dan & Raz, 2012; Maier et al., 2005; Niedenthal, et al., 2002; Sonnyby-Borgstrom & Jonsson, 2004). Moreover, poor quality face-to-face interactions, as described by Beebe et al. (2010), may disrupt an adequate development of face affective processing. A bias for processing emotions accurately later on in life could be related to a difficulty in regulating emotions during early caregiver-child interactions. However, the N170 negativity bias is not specific to attachment patterns. It is also found in other populations with psychiatric disorders. For example, BD patients exhibited a negative bias at the N170 (Ibanez, Urquina, et al., 2012). The presence of this bias in healthy adolescents with an insecure attachment pattern emphasizes the need to consider environmental and maturational factors in socio-emotional processing.

Previous research has suggested that facial and emotional processing involves parallel mechanisms that are partially dissociated over time (Vuilleumier & Pourtois, 2007). Other studies have supported this claim. For instance, emotional N170 impairments were observed independent of deficits in facial structural processing (Ibanez, Petroni, et al., 2011). In the present study, we found the IAG to have a deficient modulation of the N170 (reduced amplitude modulation of the N170 to faces compared to words). An abnormal modulation of negative facial emotion processing was also observed in the IAG.

In sum, adolescents in the IAG exhibited less efficient processing of negative-valence emotional information, particularly in faces. This effect was indicated by behavioral and electrophysiological measures. The IAG also exhibited an aberrant functional hemispheric lateralization that was less defined than in the SAG.

Brain-behavior Associations

Electrophysiological measures were found to correlate with neuropsychological evaluations. EF (cognitive flexibility), particularly working memory (WM), was positively associated with the amplitude of P1 and N170. This P1, as previously stated,

can be interpreted as attention allocation to stimuli (Hillyard & Anllo-Vento, 1998; Luck, Heinze, Mangun, & Hillyard, 1990). In other words, the greater the attention to external stimuli, the better the performance in WM tasks. The positive association between N170 amplitude and EF performance matches previous findings (Ibanez, et al., 2013; Petroni, et al., 2011). For example, our study confirmed the association between secure attachment and performance in EF tasks (Bernier, et al., 2012). Moreover, the IAG presented an association between negative valence and EF, which is consistent with current models of emotion-cognitive interactions (Ibanez & Manes, 2012; Agustin Ibanez, et al., 2012; Millan et al., 2012; Pessoa, 2008).

Compared with most attachment studies using ERPs, this report shows an early time window effect. The N170 plays an important role in indexing stimuli affected by top-down factors in a bottom-up fashion. Our results suggest that a relative automatic bias may be triggered by attachment patterns and may affect subsequent (later and controlled) cognitive processes.

Dramatic changes at both biological and psychological levels occur during adolescence. Studies have shown that important maturational changes in the social brain and developments in the face-processing areas of the brain also take place during this period (Blakemore, 2008a). Several neurobiological, endocrine, and psychosocial variables are known to affect these processes. The findings in our study suggest that attachment style is an important factor in adolescence, because attachment is associated with emotion recognition and higher psychological functions such as EF, language, and socio-affective abilities (Bernier, et al., 2012; Gillath, Giesbrecht, & Shaver, 2009; Jacobsen, Edelstein, & Hofmann, 1994; van IJzendoorn, et al., 1995; West, Mathews, & Kerns, 2012). Studies using adult participants have demonstrated the continuity of IWMs from adolescence into adulthood (Waters, Hamilton, & Weinfield, 2000; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000; Waters, Weinfield, & Hamilton, 2000). In addition, the present findings correspond with past research on adults and attachment orientations and provide new data on emotional information processing in adolescents.

Furthermore, these findings can help fill the gap between different levels of analysis (socio-emotional, neuropsychological and electrophysiological) in adolescence.

Limitations and Further Assessment

The present study has some limitations. First, our sample size is smaller than typical ERP studies on attachment styles in adults (Chavis & Kisley, 2012; Dan & Raz, 2012; Fraedrich, et al., 2010; Zhang, et al., 2008). Second, in an effort to gather a larger sample of participants with insecure attachment, we grouped two patterns of attachment into one, failing to distinguish between the types of insecure attachment (dismissive and preoccupied). Although this approach has been previously employed in other studies (Aviezer, Sagi, Resnick, & Gini, 2002; Jacobsen & Hofmann, 1997), we could not detect whether the two attachment patterns affect social information processing differently. Previous studies in adults have found differences in the electrophysiological correlates of emotional processing between anxious and avoidant insecure individuals. As our study lacks statistical power, it is impossible to determine any differences in the insecure-preoccupied attachment pattern. Future studies should include the different insecure attachment patterns (insecure-dismissing, insecure-preoccupied, and disorganized).

Conclusions

Confirming previous findings, the present study suggests that individuals with varying attachment patterns process facial emotional information differently (Fraley, et al., 2006; Donges, et al., 2012; Niedenthal, et al., 2002; Steele, Steele, & Croft, 2008; Suslow, et al., 2010; Suslow, et al., 2009; Vrticka, et al., 2008), and that these differences also affect other cognitive functions, such as EF (Bernier, et al., 2012). Our study is the first to our knowledge to replicate these findings in adolescent populations. This study has several implications. First, it provides more in-depth understanding of the effects attachment patterns on social information processing, and adds to the knowledge on implementation of attachment patterns at the neural level (e.g., modulating the activity elicited by semantic and facial emotional stimuli). Second, this

study emphasizes the importance of secure attachment in early life stages, as it may contribute to socio-emotional development in adolescence. Because adolescence involves seeking independence and distance from primary caregivers and a desire for new relationships, this life stage is crucial in the study of socio-emotional development. Furthermore, unforeseen environmental factors may affect the adoption of a particular attachment pattern. Consequently, thorough knowledge of relevant socio-affective and cognitive effects could aid in designing interventions that promote secure attachment. Finally, the present study contributes to the literature on adolescence, which has not been explored as thoroughly as other life stages.

Author Contributions

Conceived and designed the experiments: MJE AI. Performed the experiments: MJE AR DH EH SB FM VL MS EM JFC AC AI. Analyzed the data: AR EH SB AI. Contributed reagents/materials/analysis tools: MJE AR DH EH SB FM VL MS EM JFC AC AI JD. Wrote the paper: MJE EH SB VL AI JD.

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3. GENERAL CONCLUSION AND DISCUSSION

This study assessed, from a multilevel approach, adopted adolescents with a history of early deprivation compared with teenagers who grew up in their biological families. The findings showed that early social deprivation has an impact on the emotional, cognitive and neurophysiological development of the adolescent. The study highlights the potential impact of early deficiencies, which often occur in institutions. These deficiencies are for instance little stimulation, lack of availability of a caregiver, treatment gaps, less face-to-face social contact as well as little stability of caregivers. Finally, based on the results, the importance of post-adoption processes for timely intervention and support during the different periods of development is highlighted. The following pages will present a synthesis of the main findings of this dissertation.

First, in terms of the hypothesis regarding attachment, as expected, adopted adolescents with a history of early deprivation showed more insecure attachment than their peers who grew up in their biological families. Also, it has been confirmed that the age of adoption is a risk factor for the development of insecure attachment. Both results are in agreement with the reviewed researches (Chisholm, 1998; Chisholm, et al., 1995; O'Connor & Rutter, 2000; Vorria, et al., 2006; Zeanah, et al., 2005). The predominant attachment of the adopted adolescent was insecure-avoidant attachment. This could be because adolescents of this study had early deprivation experiences (institution or foster care) where they probably did not receive personal attention to their demands, so they adaptively learned to be independent, to not rely on the availability of the other. This makes them more vulnerable to difficult situations because they do not trust others to support them and secure attachment is considered a protective factor in the development.

Finding an attachment style is consistent in part with some of the data found in the Parental Development Interview (PDI) with the mothers when the reflective function is assessed (see Appendix 7). A few differences were found between adoptive mothers and birth mothers. Among the results that relate to attachment patterns, it was found that

adoptive mothers scored significantly lower on mother's warmth and child affection compared with biological mothers. Both items relate primarily to the affection expressed through skin contact, but "warmth" also encompasses the love expressed in terms of sympathy and empathy. The explanation for these results can be twofold. The first interpretation would suggest that because of having a characteristically less affective mother the child could maintain the avoidance attachment style that had been developed in the period prior to the adoption. A second hypothesis that can be formulated from the results is that the adoptive mothers were perhaps more affectionate, but over time, in the face of avoidance behaviors of their children and not receiving affection from them, the mothers develop less affectionate behavior patterns. Both situations highlight the importance of post-adoption services, providing support and advice for the adoptive parents, mainly at the beginning of the relationship, but also at the different stages of development.

In addition, in the PDI were found that adoptive mother scored significantly lower than biological mothers on "competence" and "parent reflection" (See Appendix 7). "Competence" assesses the range of strategies for coping with difficult behaviors or interactions, flexibility, the realistic nature of their aims and goals for the child (Henderson et al. 2007). And, the "parent reflection" assesses parent's empathy, understanding and sensitivity towards their child and their relationship with that child (Henderson et al. 2007). These results reinforce the need of post-adoption services.

In contrast to our hypothesis and the previous researches (Bimmel, et al., 2003; Van IJzendoorn & Juffer, 2006; Wierzbicki, 1993), the results did not show significant differences between adopted adolescents and non-adopted adolescents in both the perception of the mothers and the perception of the adolescents. This finding allows destigmatizing adopted adolescents as "difficult teenagers". However, when comparing the adopted groups (by age of adoption) they showed a statistically significant difference on the "social behaviors" scale in their self-reports. The adolescents who were adopted after the age of two had more social behavior problems than adolescents adopted before the age of two. This result suggests that the age of adoption, again,

appears as a risk factor for adolescent social behaviors. The age of adoption was also highlighted in the cross-cultural study; the results showed that age of adoption was associated with more symptoms of attention deficit and hyperactivity disorder. Both results coincide with other studies (Hawk & McCall, 2011; Merz & McCall, 2010). These last results regarding age of adoption together with the results regarding attachment patterns reinforce the importance of encouraging early adoption. This way the situation of a child who has already suffered adversity (prenatal, perinatal or postnatal) and is more vulnerable due to insecure attachment and therefore has more behavior problems, and who has wait a long time in a transitional place before being adopted, can be avoided.

In addition, there was a greater discrepancy between the perceptions of adopted adolescent and their mothers about the adolescents' behavioral problems, compared to mothers with their biological adolescent children. Data shows that adoptive mothers score higher than their children on almost all the scales. This opens the possibility of interpreting the data from two points of view. The first has to do with adoptive mothers and the second with adoptive children. The first explanation could be related with the status of "adoptive" mother. Most of the adoptive parents experienced previous difficulties (decision to adopt a child, accept infertility problems, going through psychologists and /or social assistants) and are very motivated to be parents. All of these situations could cause the adoptive mothers to be much more alert to any symptoms or behaviors of their child. Another possibility is to explain it from the adolescent point of view. Maybe the adolescent scored less because he/she is trying to respond to social desirability, or because people with an insecure avoidant attachment style have difficulty connecting with their own negative characteristics (Zennah et al. 1996).

The hypothesis that a secure attachment style may act as a protective factor for behavioral problems in the adopted adolescents in this study could not be corroborated. There was an interaction between thought problems and insecure attachment in the control group. Nevertheless, this probably suggests that this kind of symptomatology is more evident in adolescents with insecure attachment who grew up in their biological

families. Other possibility is that with adopted adolescents there are other variables that were not taken into consideration in this study, which leads to the question which variables should be taken into consideration with adopted adolescents, apart from attachment.

Regarding the experimental results found in this study, no differences were found either in accuracy or in reaction time in the “emotional morphing” task between adopted adolescents and non-adopted adolescents (see Appendix 8). This could be explained because older children do not fail in emotion recognition tasks because they are simple tasks while early deprivation children would present a delay in the ability to recognize facial emotions but it is not a deficit (Tarullo, et al., 2007). This delay recovers over time when conditions improve. This would explain the case in our study because no differences between groups of adolescents were found.

In addition, in the emotional processing task no differences were seen in the modulation of ERPs between adopted and non-adopted adolescents. However, differences were found in the group’s total sample (adopted adolescents and non-adopted adolescents) by attachment pattern (secure attachment vs. insecure attachment). It was found that early cortical markers of face processing diverged between individuals with insecure attachment patterns compared to individuals with secure attachment patterns. These findings confirm the results of others studies (Chris Fraley, et al., 2006; U. S. Donges et al., 2012; P. M. Niedenthal, M. Brauer, L. Robin, & A. H. Innes-Ker, 2002; H. Steele, M. Steele, & C. Croft, 2008; T. Suslow et al., 2009; Vrticka, Andersson, Grandjean, Sander, & Vuilleumier, 2008). Individuals with an insecure attachment pattern showed more difficulty in processing negative-valence emotional information, particularly angry faces. This result is supported by previous studies that have reported insecure individuals as being more prone to a negative bias because they are more skilled in detecting threatening stimuli early on and in eliciting avoidant behaviors (Dan & Raz, 2012; Maier et al., 2005; P. M. Niedenthal, et al., 2002; Sonnby-Borgstrom & Jonsson, 2004). It was also found that the performance of adolescents with insecure attachment was worse in executive functions than with adolescents with secure attachment. These

results correspond with previous studies (Bernier, Carlson, Deschenes, & Matte-Gagne, 2012; von der Lippe, Eilertsen, Hartmann, & Killèn, 2010). This finding emphasizes the importance of secure attachment in early life stages as it may contribute to the socio-emotional development and cognitive abilities in adolescence.

Furthermore, these results emphasize the relevance that attachment styles could have in the studies of the effects of early institutionalization. Although an institutional environment might have consequences of its own with regard to brain development, some of the findings attributed to this antecedent could well be explained by the attachment style. The promotion of secure attachment could be a potential contribution to these children, especially regarding socio-emotional development.

Although no differences between adolescents with early deprivation and those who grew up in their biological families were found in emotional recognition as mentioned above, differences between groups were found in the task that was used to assess moral sensitivity. The results suggest that the simplest tasks of social cognition, such as facial emotion recognition, are achieved. However, tasks requiring more complexity failed (Tarullo, et al., 2007). That is why differences with regard to the moral sensitivity task were observed in the brain's electrical activity, in this study, as it is more complex than the emotional recognition task.

No significant differences with regard to behavioral measures of the moral sensitivity task between adopted adolescents and non-adopted adolescents were found. The behavioral result was expected as it had been reported as a simple task at different ages and from an early age children recognize intentionality (Decety & Cacioppo, 2012; Decety, et al., 2012). Nevertheless, the moral sensitivity task is sensitive to the neurodevelopmental changes in the process of acquiring moral cognition. Atypical early/late cortical markers associated with an intentionality attribution during moral decision making were observed in adopted adolescents, and in particular regarding intentional situations involving people. In adolescents with an early deprivation experience, evoked neural responses (mainly in frontal ROIs) failed to discriminate rapid moral decisions regarding actions involving intentionality. Besides, no neural

facilitation moral was observed for person intentional situations in the frontal regions, in contrast to non-adopted adolescents. Thus, the fact that the “person intentional” stimuli did not produce a stronger cortical activity suggests an immature mechanism of emotional moral processing in these adolescents.

Based on an estimate of the source analysis, adolescents with early deprivation experiences showed reduced activation in the right prefrontal cortex, the bilateral ventromedial prefrontal cortex (vmPFC) and right insula when they saw “person intentional” stimuli. These results are consistent with neurodevelopmental effects observed in previous studies with institutionalized children (Chugani, et al., 2001). Additionally, in adolescents with early deprivation experiences, the right vmPFC activation was correlated with externalizing behavioral problems. These results add to studies that found the right vmPFC to be one of the most important regions associated with emotional regulation and social emotions (Koenigs et al. 2007), decision making (Bechara et al, 2000; Bechara et al, 2001; Clark et al, 2008; Hoper et al. 2004), and moral values (Thomas et al, 2011). Similarly, lesions in the vmPFC induces maladaptive social behaviors (Beer et al, 2003; Damasio et al, 1990; Eslinger et al, 2004; Eslinger et al 1992). Thus, once again our results point to a delayed maturation of processes in the PFC involved in both, the abnormal neural responses to moral sensitivity and their association with externalization problems. In addition, support the idea that the lack of individualized interactions with a stable and responsive caregiver would cause a delay in the neurodevelopment that has an impact on the social skills (Marshall, et al., 2004; McLaughlin, et al., 2010; Moulson, et al., 2009; Slopen, et al., 2012; Tarullo, et al., 2011).

Finally, the neuropsychological outcome exhibited only minimal differences in visuomotor abilities and cognitive flexibility between groups. This result is consistent with our previous studies (see in appendix 1: Cardona, Manes, Escobar, López & Ibañez, 2012) and others studies which showed that institutionalized children perform worse in executive functions (Colvert, Rutter, Kreppner, et al., 2008; Pollak et al., 2010). Together with the previously shown results, the importance of

neurodevelopmental assessments must be emphasized because of the implications they may have on the development of social as well as cognitive skills.

In terms of the limitations of the investigation, the first one is the relatively small sample size. This is due to the difficulty in accessing the sample, the confidentiality of the adoption records, the fact that the families prefer not to talk about adoption with their children and the lack of follow-up of the families, and added to this the demographic changes over time. For future research, it would be interesting to assess a greater number of families and take the father's perceptions into consideration too. Nevertheless, to be the first study with these features in Chile is a contribution and an exploratory approach that allows discussing issues that are just beginning to be addressed at the national level.

A second limitation, common in all adoption studies, was that participation in the study was voluntary, the parents had to give permission for the adolescents to participate, and then the adolescents had to accept to participate. Often, those who agreed to participate were well adapted adopted teens with a good relationship with their parents (Gleitman & Savaya, 2011). Therefore any generalization of the data should be treated with caution.

Another limitation frequently found in the adopted population is the scarce information about care previous to the adoption, such as prenatal risk factors like prenatal nutrition, maternal stress during pregnancy, prenatal exposure to alcohol (Slopen, McLaughlin, Fox, Zeanah, & Nelson, 2012; Tottenham et al., 2010). These experiences could explain at least in part some consequences that are attributed to early social deprivation (Tarullo & Gunnar, 2005). Similarly, in this study the data about pre-adoptive care was obtained from the adoptive parents. In general they did not know about the characteristics of institutions, number of places where their child was prior to the adoption. For future research projects, it would be desirable to do a longitudinal study, and the first evaluations would be when the child is in the institution to control other variables.

Our results corroborate that it is a priority to think of policies in order to facilitate and support early adoption. However, sometimes it is inevitable and sometimes perhaps it might be a good alternative that the children are in institutions during a period of their lives. That is why two lines of thought should be opened about the suggestions arising from the results of this thesis. The first reflection is about the possibility of improving the conditions of the institutions. These improvements include the importance of a more personalized care, having fewer children per caregiver, avoiding rotations of caregivers, and giving the children the stimulation they need. This requires developing a rigorous study of the reality of the institutions that comprise SENAME in Chile.

In this regard, the revised background on neurological development showed that foster care is a better option than institutions, as this kind of intervention improved some developmental delays. In the present study only 4 children had been in foster care so these differences could not be corroborated. However, it is necessary to make these comparisons in order to assess the possibility of increasing the number of children in foster care and reducing the number of children who are institutionalized.

Second is the importance of post-adoption services for adoptive families. Pathologizing adoption is just as inadequate as considering adoption as being ideal and seeing only the positive aspects. (Palacios, 2010). It cannot be ignored that adoptive families face many challenges. Adoptive children bring significant prior experiences of loss, separation, and stories of adversity (genetic, prenatal, perinatal, post-natal). Moreover, parents have to deal with situations such as infertility, the possibility of adoption, relationships with professionals in order to adopt, integrating a child with a previous negative background, talking about adoption. While most adoptive families successfully manage themselves, other families need help or some support (Palacios, 2010).

Post-adoption services do not exist in the form of standardized programs in Chile and each institution responds differently to the demands that arise. Post-adoption services should ideally consider three types of services as a right for adoptive families. First, there should be a minimum follow-up policy for all cases of adoption during the first 6 months because most adoptive families say this is the period of time needed to adapt

(see appendix 5). However, it really important a lengthy follow-up processes for evaluate the child's neurodevelopment. Besides, it is important elaborating good screening tools and specializing of proper professionals in this matter. The follow-up of a child by no means implies pathologizing the child. Nevertheless, there is enough evidence that the experiences of early deprivation have an impact on neurodevelopment, manifesting itself at the behavioral, relational and cognitive level. For cases where the professional deems it appropriate, the period should be extended. The central objective of monitoring should be detecting early relational problems and the presence of deficits or developmental delays in order to intervene and advise the family. The second objective is to ensure that the family does not feel "abandoned" by the institution that gave them the child. This is an experience that came up in this study in the interviews with mothers, mainly in later adoptions.

There should also be the possibility for adoptive families to have consulting support and advice regarding the different stages that children go through. It may be beneficial to work in groups on specific topics according to the stage of development. For both parents and their children, the topics that appear most necessary are promoting secure attachment, impulse control, search for origins, among others, always looking for topics that cut across all adopted children-adolescents.

Finally, if necessary, therapeutic interventions to treat relational issues, and considering the neurodevelopmental intervention programs we have reviewed, focusing primarily on reinforcing and stimulating executive functions as well as control and emotional regulation.

In conclusion, the results emphasize the importance of post-adoption work, mainly in regards to later adoption, and the achievement of a positive relationship with the adoptive parents. This will not only provide the possibility of protection in case of needing help, but it will also influence the neurophysiological level in processing emotions. These findings allow de-stigmatizing adopted adolescents as teenagers with more behaviors problems than non-adopted adolescents. Furthermore, the results suggest that the impact of early deprivation produces a delay in neurodevelopmental

maturation, and this has an impact on the behavioral level as well as on the development of moral cognition and behaviors problems. Therefore highlights the importance to assess the neurodevelopment and detect early presence of problems in adopted children and adolescents.

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5. APPENDIX

5.1. Appendix 1. Others publications related with the thesis

5.1.1. Published manuscript in: *Behavioural Neurology* 25(4): 291-301(2012). *ISI Journal*.

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Potential consequences of abandonment in preschool-age: Neuropsychological findings in institutionalized children

Juan F. Cardona^{a,d,f,g}, Facundo Manes^a, Josefina Escobar^{b,c}, Jéssica López^e and Agustín Ibáñez^{a,c,d,*}

^aLaboratory of Experimental Psychology and Neuroscience, Institute of Cognitive Neurology, Favaloro University, Buenos Aires, Argentina

^bPsychology School, Pontificia Universidad Católica de Chile, Santiago, Chile

^cLaboratory of Cognitive and Social Neuroscience, Universidad Diego Portales, Santiago, Chile

^dNational Scientific and Technical Research Council, Buenos Aires, Argentina

^eFaculty of Psychology, Universidad Abierta Interamericana, Buenos Aires, Argentina

^fPsychology School, Universidad Surcolombiana, Neiva, Colombia

^gUniversidad Autónoma del Caribe, Barranquilla, Colombia

Abstract. Objective: Several longitudinal studies had shown that early deprivation and institutionalization during the first six months of life affects the emotional, cognitive, social and neurophysiologic development. Nevertheless, our understanding of possible similar effects of delayed institutionalization, in preschool-age remains unclear to this day. The goal of this study is to evaluate the cognitive performance of institutionalized children with history of preschool-age physical abandonment.

Method: 18 male institutionalized children with history of abandonment during the preschool-age (2–5 years old) and comparison group matched by age, handedness, gender, educational and socioeconomic level were tested on multiple tasks of attention, memory and executive functions.

Results: We found a cognitive impairment in the institutionalized children in several measures of attention, memory and executive functions. This is the first report of cognitive impairment related to late abandonment and institutionalization effects (after 2 years old), extending the already known effects on early institutionalization.

Conclusions: This preliminary study suggests that environmental factors including abandonment and institutional care, can affect not only the infancy period, but also the preschool period providing new insights into our understanding of neurocognitive development.

Keywords: Abandonment, institutionalization, plasticity, preschool-age, attention, memory, executive functions

1. Introduction

The negative impact of parental deprivation and institutional rearing in childhood has been a growing area of scientific and clinical interest since the mid-20th

century. Pioneering work of Provence and Lipton [1] has shown that maternal deprivation and institutional rearing during the first years of life produces a negative effect and triggers development abnormalities. Several reports has suggested that deficient parental care in this sensitive period is associated with physiological dysregulation of the developing human brain [2,3].

Most of the recent information we have concerning the impact of child neglect and institutionalization on neurodevelopment has been after 1989, with the devastating effect of the Romania institutionalization project,

*Corresponding author: Dr. Ibáñez, Laboratory of Experimental, Psychology and Neuroscience Institute of Cognitive Neurology (INECO) and CONICET, Pacheco de Melo 1854/60 (C1126AAB) Buenos Aires, Argentina. Tel./Fax: +54 11 4812 0010; web: <http://www.ineco.org.ar/>; E-mail: aibanez@ineco.org.ar.

and the consequent development of The Bucharest Early Intervention Project (BEIP). Now, the neurocognitive effects of the early institutionalization are widely recognized in children [4–6].

Several longitudinal studies had shown that early institutionalization including the first six months of life affects dramatically the emotional, cognitive, social and neurophysiologic development [7–11]. Numerous investigations [12–16] have shown long-term impairments on the emotional, cognitive and social development in children with history of early institutionalization. Vorria et al. [17], found a deficient performance on cognitive development, attachment, emotional processing as well as abnormal behavior in 61 institutionalized children (during the two first years of life) compared to non institutionalized controls. Other studies reported similar results [4,18]. Nevertheless, our understanding of possible similar effects of delayed institutionalization in preschool-age is not well known. The goal of this study is to evaluate the cognitive performance of children abandoned and institutionalized after the second year of life.

1.1. Attention, working memory and executive function in abandoned children

One recent study [5] focused on cognitive outcomes of adopted children with a history of institutional care at 8–10 years old. Neuropsychological assessment included memory, learning, attention, and executive function. Three groups were considered: post-institutionalized adopted children (infants adopted after 12 months of age, with 75% of their lives under institutional care), early adopted children (defined as children adopted prior to 8 months of age, with 2 months or less under institutional care) and a control group. Post-institutionalized children obtained lower scores in visual memory and attention, as well as impairments on visually mediated learning and inhibitory control, compared with the other two groups.

Bos et al. [19] using the Cambridge Neuropsychological Test and Automated Battery (CANTAB), reported impairments in visual memory, spatial working memory and executive functions in children with history of early institutional care. Symptoms of attention deficit and hyperactivity disorder (ADHD) related to history of institutionalization has been reported elsewhere [20]. In addition, Vorria et al. [17], and Roy et al. [21], reported deficits in attention and hyperactivity behavior in institutionalized children (see also Kreppner et al. [8]).

1.2. Institutionalization onset

Infancy is recognized as the period between the second postnatal month and two years, previous to the mid-childhood. In humans the period is extremely sensitive to maternal investment mother dependence for survival, and is characterized by rapid neural growth [22]. Several reports cited above show that the early institutionalization induces dramatic biological and cognitive disorders, especially when the institutionalization period begins during the first year of life. This is consistent with the neurodevelopment approaches which suggest the existence of sensitive or critical periods of growth [23]. These critical periods are sensitive to specific environmental influences which are required for the normal development of anatomical and functional properties of the brain [24,25].

Studies considering the effects of institutionalization after the infancy are scarce. Recently, late plasticity effects and a life span developmental process have been established [26,27]. Those findings indicate that adverse early experience can have long-term impact on brain development. In this sense, similar cognitive deficits are predicted in children institutionalized after the infancy period.

In Latin America, multiple factors affect the normal development of numerous children [28–30]. In Colombia, the Familiar Welfare Colombian Institute [31] reported 4500 institutionalized children during the 2006. This phenomenon is a consequence of a multitude of problems such as physical maltreatment, childhood neglect, parental inadequacy, parent's death. Nevertheless, one of the most influential causes is the extremely poor socioeconomic conditions of the family.

In this pilot study, we examined cognitive functioning using a battery of neuropsychological tests measuring attention, learning and memory, visual-spatial processing, executive functions and psychomotor functioning, in institutionalized infants with a history of abandonment in preschool-age and sociodemographically similar comparison children who had not been emotionally and/or physically deprived.

2. Methods

2.1. Participants

2.1.1. Preschool-age physically abandoned children (PPAC)

Table 1 shows sample characteristics of eighteen children from the south of Colombia, with a history

Table 1

Descriptive characteristics of the two groups studied						
	Institutionalized Children <i>N</i> = 18		Comparison Group <i>N</i> = 18		T value or Chi-square value	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Age (years)	11.5	2.52	11.5	2.52	$X^2_{(8)} = 0.53$	> 0.05
Gender (male)*	18	–	18	–	–	–
Education (years)	5.28	2.30	5.61	2.50	–0.41	0.68
Handedness (L/R)*	(1/17)	–	(1/17)	–	–	–
Abandonment (age)	3.50	1.50	–	–	–	–
Institutionalization (years)	7.56	2.68	–	–	–	–
CDI†	8.40	3.25	6.20	1.22	3.02	0.006

† A cut-off value of 11 was established for distinguishing depressed children from non-depressed children [32].

* In both, gender and handedness no statistical comparison was performed because SD and group differences were absent.

CDI: Children's Depression Inventory.

of abandonment after the second year of life ($M = 3.5$; $SD = 1.52$); reasons for placement were extremely poverty conditions (i.e., inability to satisfy basic needs in food, clothing, shelter, and health) with no indicators of physical (e.g. absence of cutaneous and mucosal, dental, osteo-articular, organic internal lesions or intoxication) or sexual abuse (e.g. absence of genital or rectal lesions, sexual transmitted diseases); with a history of institutionalization greater than three years ($M = 7.56$; $SD = 2.68$); and 7 to 15 years old ($M = 11.5$; $SD = 2.52$). It should be noted that we couldn't rule out with total certainty any antecedent of physical or sexual abuse because those indicators tend to be underdiagnosed [32]. See discussion regarding this issue. All children were in school at the time of the study ($M = 5.28$; $SD = 2.30$), with normal weight/size and affiliated to a health care system. Children without a history of developmental or behavioral disorders were included in this study, in order to discard any possible confounder.

2.1.2. Comparison Group (CG)

Eighteen healthy children were recruited at the same school. They were living with their biological parents, and had no history of institutional care. All the children in comparison group come from a low socioeconomic environment, according to the guidelines of the Colombian State belonged to the stratum 1. In Colombia, social status is classified through socio-economic levels called stratum; the lowest corresponds to level 1 defined by living in poor quality housing, living in a place that lacks utilities, or living in overcrowded, defined as three or more persons per room. This groups was matched to PPAC group in terms of age ($M = 11.5$; $SD = 2.52$), educational level ($M = 5.61$; $SD =$

2.50) and handedness. No history of physical or psychological abuse was present in the CG, as confirmed by a social worker.

In order to test the possible mood disorders present in both groups, the Children's Depression Inventory (CDI) [33] was included in the neuropsychological assessment. No children coming from both groups which presented scores indicative of depression were included in the present study (See Table 1). Since that CDI scores were significant different between groups (Table 1), we performed an ANCOVA in order to establish if CDI have an impact on neuropsychological groups' differences. When CDI was introduced as covariate in the between groups comparisons, all neuropsychological differences were still significant. Based on this result we concluded that CDI have not effect in the between groups differences.

Both groups included only subjects with normal IQ assessed with the Kaufman Brief Intelligence Test [34] (mean IQ scores over 85 points for composite, fluid and crystallized intelligence). Nevertheless, IQ individual scores were not computed and we are unavailable to recover those scores. Because of that, we did not report IQ distribution.

All participants signed a voluntary consent form in accordance with the Declaration of Helsinki, in addition to the approval granted by the ethical committee of the institution. The ethical committee of the orphanage approved this research and the director of the institution signed the voluntary consent together with the institutionalized children. All parents and children from the comparison group signed the voluntary consent in agreements with the declaration of Helsinki.

For both groups the following exclusion criteria were considered: mental deficiency, neurologic antecedents (stroke, epilepsy or lesions) or psychiatric antecedents

(history of hospitalization, diagnosis of developmental); substance abuse, AIDS, malnutrition, physical or sensorial limitations. All this information was obtained simultaneously by the parents and by the clinical history.

2.2. Characteristics of orphanage

The orphanage is an institution of the National Family Welfare System in Colombia, which welcomes children between 3 and 14 year, without severe mental or physical disabilities (e.g., Down syndrome or cerebral palsy), in situation of social risk-shifting, abuse or abandon, from a marginal sector of the country. This institution has a care capacity (including medical care, nutrition, sanitation) and free elementary school up to 200 children.

The institution includes medical personnel, clinical psychologists, special teachers, social workers, nutritionist and caregivers who are present all the time. In addition, voluntary professionals from the community (e.g., teachers, specialist for physical education, psychology and caregivers), support the work at the orphanage. Children are grouped homogeneously with respect to age, and each group has its daily prescribed schedule of group sleeping, feeding, and indoor/outdoor plays times. In addition, the institution has a five class rooms, two playgrounds, food preparation room, and a dining room for all the infants.

2.3. Neuropsychological battery

The NEUROPSI Attention and Memory Battery [35] was administered to participants in order to evaluate orientation, attention, concentration, executive functions, working memory, verbal memory and visual memory (immediately and delayed). This battery combines a set of international validated measures and has been validated and standardized for Spanish populations. Subtests were grouped in order to obtain a global index of attention, executive function and memory, as well as a global score of attention, executive functions and memory. Raw scores were transformed to normalized *t*-scores based on age, according to scoring procedure of the neuropsychological instrument. Details of the NEUROPSI battery can be found in the supplementary data.

2.4. Data analysis

Different neuropsychological subtests from PPAC and CG were compared using independent samples *t*-

tests since both groups were homogeneous regarding age, educational level, socioeconomic level, and handedness. For all analysis, a level of $p = 0.05$ was considered for statistical significance. Means and SD were calculated for confidence intervals of 95%, which represents ± 2 SD. The global scores were correlated with age in both groups using Spearman's rank correlations.

3. Results

Table 2 presents the overall results for both groups. PPAC obtained significantly poorer results compared to CG on all cognitive scores.

Temporal and spatial orientation was impaired in PPAC group compared with CG, however, person orientation was preserved in both groups. In the domains of attention and concentration, PPAC group presented an impaired performance in those measures (i.e., digit forward span, mental control and spatial forward span).

The PPAC group performed more poorly than CG on executive functions subdomains, mainly in abstraction or concept formation ability (i.e., category formation test), and inhibitory tasks administered, including the Stroop color and word test color/word, a stimulus-response reversal task, and a motor programming task. By contrast, no significant differences between groups were found on verbal fluency tasks (e.g., phonological and semantic).

The immediately memory scores from the PPAC group presented also a deficit compared to CG in several subtest, including tasks that require recall of semantically unrelated material (i.e., word list learning); retention of information test (i.e., logical memory retained) and measures of visuospatial function (i.e., Rey-Osterreith complex figure and face recognition test).

In addition, PPAC performed poorly than CG on tasks that require recognition of previously presented items (i.e., word list recall and cued recall, verbal paired associated; and logical memory)

Finally, working memory task was impaired in PPAC in comparison to CG in the digit backward span subtest.

3.1. Correlations

In the CG, age correlated with attention and executive functions total score ($r = 0.6$; $p < 0.05$); and with memory total score ($r = 0.4$; $p < 0.05$). In the PPAC, similar to CG, age correlated with attention and executive functions total score ($r = 0.6$; $p < 0.05$); and with memory total score ($r = 0.8$; $p < 0.05$). No other significant correlations were found.

Table 2
Neuropsychological test scores of institutionalized children and comparison group

Cognitive domain	Institutionalized children		Comparison children		Analysis		
	M	SD	M	SD	df	t	p
Orientation							
Time (4)	3.17	1.15	3.94	0.23	18	-2.810	0.008
Place (2)	1.44	0.70	1.89	0.32	23	-2.432	0.01
Person (1)	1.00	0.00	1.00	0.00	-	-	0.2
Attention and concentration							
Digit forward span (9)	4.44	1.04	6.11	0.58	26	-5.924	< 0.001
Digit detection (10)	8.72	1.67	9.39	0.77	24	-1.533	0.12
Mental control (3)	1.33	1.37	2.94	0.24	18	-4.910	< 0.001
Spatial forward span (9)	5.06	0.80	6.11	1.13	34	-3.228	0.002
Visual search (24)	13.56	5.11	16.44	3.99	34	-1.890	0.05
Executive functions							
Category formation test (25)	9.22	3.19	17.94	4.18	34	-7.037	< 0.001
Semantic verbal fluency	16.61	4.90	18.83	3.05	34	-1.633	0.10
Phonological verbal fluency	9.56	4.50	10.39	3.24	34	-0.638	0.52
Design fluency (35)	10.28	4.64	11.78	4.88	34	-0.945	0.34
Motor functions (20)	17.89	2.27	19.33	0.90	22	-2.505	0.01
Stroop (time)	2.11	1.28	2.44	0.98	34	-0.877	0.03
Stroop (correct) (36)	1.44	0.86	2.17	1.09	32	-2.201	0.03
Working memory							
Digit backward span (8)	3.00	1.03	4.28	1.02	34	-3.746	< 0.01
Spatial backward span (8)	4.72	1.02	5.28	1.48	30	-1.308	0.186
Immediate memory							
Word list (12)	5.89	1.32	7.00	1.41	34	-2.434	0.02
Verbal paired associated (12)	7.44	2.45	8.44	1.38	34	-1.506	0.13
Logical memory (16)	8.16	2.30	12.06	1.66	34	-5.803	< 0.001
Rey-Osterreith complex figure (36)	23.16	9.15	31.27	3.23	21	-3.548	< 0.01
Faces (4)	2.72	1.01	3.72	0.67	34	-3.483	0.001
Delayed memory							
Word list (free recall) (12)	7.00	1.32	8.39	1.91	30	-2.529	0.01
Word list (cued recall) (12)	6.83	2.09	8.61	1.82	34	-2.719	0.01
Word list (recognition) (12)	10.39	1.75	11.06	0.99	26	-1.623	0.15
Verbal paired associates (12)	8.89	2.27	10.44	1.82	34	-2.266	0.03
Logical memory (16)	8.17	2.03	11.77	1.63	34	-5.875	< 0.001
Rey-Osterreith complex figure (36)	16.66	6.33	20.98	3.82	27	-2.471	0.03
Faces (2)	1.61	0.60	1.67	0.59	34	0.338	0.76
Attention and executive functions total score	73.44	15.90	110.83	11.26	34	-8.139	< 0.001
Memory total score	82.05	19.89	114.39	8.78	23	-6.308	< 0.001
Attention, executive functions and memory total score	74.78	17.23	115.55	9.78	26	-8.732	< 0.001

Numbers within parenthesis are indicative of maximum score.

4. Discussion

The present study examined the profile of neuropsychological measures of attention, memory and executive functions in institutionalized participants with history of abandonment during the preschool-age (2–5 years old) and age, education, socioeconomic status, handedness and gender-matched controls. Results indicate a poor performance in the PPAC group compared to CG in virtually all subtests of attention, memory and executive functions. Our results support an extended view of early life stress (ELS), indexed by adverse care

and lack of an adequate socio-emotional attachment, as having an impact on neurocognitive development. Probably, the stress induced by institutionalization can affect the neurobiology of stress and the neurobiology of rapid threat appraisal and response [36]. The consequences of our results are twofold. At theoretical level, our data suggest that late institutionalization can trigger similar effects as ELS, stressing the role of more delayed critical periods of development. At practical level, our result highlights the importance of intervention program developments for late institutionalized children.

This report confirms previous studies performed with early institutionalized children [5,18–20,37]. These deficits in the neuropsychological assessment hint at a possible involvement of abnormal processing of prefrontal cortex and medial temporal areas, as hippocampus, in a similar vein with early institutionalization previous studies [5,12,13,36,38].

However, the PPAC group presented a normal performance in some tasks which evaluate verbal (phonological and semantic fluency test) and visual fluency functions (design fluency test). Similar results have been reported in other studies [5,39]. Presumably these functions are less vulnerable to institutionalization experiences. It can be speculated that delayed maturation of select aspects of frontal circuitry, and perhaps reduced functional connectivity of frontal cortex with other cortical and subcortical regions [5] would explain those differences.

Attention, executive functions and memory were correlated with age in both groups, suggesting that those cognitive functions are sensitive to age effects. This suggests that cognitive evolution can be considered similar in both groups even with a delayed and impaired performance in PPAC. Similar results have been reported in other studies [5,13,19], that describe alterations in attention, memory and executive functions affected by the age of participants.

To our knowledge, this is the first report of cognitive effects of abandonment in preschool-age. Moreover, this is the first study which shows similar cognitive impairments of attention, memory and executive functions to those already reported in institutionalized children exposed to early parental deprivation. Our results suggest that deprivation/ disruption of parental care in the preschool-age still constitute an important risk factor in the development of attention, memory and executive functions. Furthermore, institutional rearing seems to be an adverse caregiving environment.

Several pathways suggest that parental care plays an important role in the development of neural system in early and late infancy. For instance, it has been shown that: (a) parents trained to control behavior problems increases the secure attachment behavior for preschooler; (b) the adverse care from institutionalization and other caregivers increases the risk of psychopathology; (c) children exhibits larger cortisol stress responses when parent are rated as low in sensitivity; and (d) foster parents' who provide supportive care improves the behavioral functioning of preschoolers (all reviewed in Loman & Gunnar [36]). At the same time, the absence of parent care increases the risk of aggressive and

dangerous interactions with adults and peers. Thus, parental care and attachment process (physiologically indexed by the stress, the neuroendocrine and neurotransmitter systems), would have a deeper effect not only in the early, but also in the late infancy.

Our results are consistent with current views of development and neurodevelopment. The current consensus is that the parental care plays a critical role in the development of the neural systems [36]. In that sense, the nervous system has long periods of development, with myelination and synaptogenesis continuing through puberty in animals and humans. The neural reorganization (adaptive or deficitary) is not limited to the early stages of development [27]. In the last decade, several reports have evidenced continued development of the brain through late childhood, adolescence and even young adulthood [40–42]; for review see Rice and Barone [43]. At the same time, theories of development involve a lifespan perspective encompassing different stages of development [26].

Previous studies in early institutionalized children had shown that impaired executive functions are frequently accompanied with deficits in theory of mind and emotion processing [44]. At the same time, attention, memory and executive function deficits have strong effects on the emotional development [10,45]. Recently, has been proposed that basic frontal executive function is affected by and affecting the emotional, motivational and social process [46]. Complex cognitive behaviors have their basis in dynamic coalitions of neural networks related to executive as well as affective process. Thus, a relatively early impairment of executive function and memory would impair the elemental mosaics of social and emotional cognition, affecting the progressive socio-emotional development. Future studies on late institutionalized children should include evaluation of emotion processing and theory of mind measures.

4.1. Limitations and further assessment

There are several limitations that make our result preliminary. The same size of our report is small. Nevertheless, our study did include a comparison group which was precisely matched on a number of different factors. We strongly recommend that future studies be conducted on larger samples including both genders. Furthermore, we were unable to retrieve a detailed history of children prior to their institutionalization (i.e., psychological and physical abuse, witnessing partner violence). Additionally, we do not know if our find-

ings are related to abandonment, institutionalized or a combination of both factors.

Despite these limitations, our results are consistent with previous reports [19,47,48] showing the damaging effects of physical abandonment and institutional rearing during the infancy period. Our result, extending those reports during the infancy, provides new insights into the understanding of neurocognitive development. Future studies will be needed to further examine whether the same potential effects of child neglect can be observed in abandoned, institutionalized children in foster homes.

5. Conclusion

This preliminary report shows a strong cognitive impairment among institutionalized children with a history of preschool-age abandonment in core process as attention, memory and executive functions.

To our knowledge, there are no previous reports of preschool abandonment effects on the cognitive development, extending the already known effect on early institutionalization. This study suggests that parental deprivation and environmental factors including institutionalization can affect not only the infancy period, but also preschool age and mid-childhood, requiring a revised model of neurocognitive development.

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Supplementary data

The following sections are included in the Neuropsychological Attention and Memory Battery.

Orientation

This task comprises general information regarding subject's orientation in time, space and person and includes declarative memory for personal relevant information (e.g., date, age) (maximum score = 7 points). Subject must respond to questions regarding personal knowledge (e.g., day of the week, neighborhood, age, etc.).

Attention and concentration

a. Auditory/verbal

- I) Digit forward span. This consisted of pairs of random number sequences that the examiner read aloud, at the rate of one per second. The subject's task was to repeat each sequence exactly as it was given. Task is stopped by the examiner after two incorrect answers (maximum score = 9 points).
- II) Digit detection. This vigilance test examined the ability to sustain and focus attention. It involved the sequential presentation of digits over a period of time with instructions for the patient to tap only when the target item 5 was preceded by the item 2 (maximum score = 10 points).
- III) Mental control. This task required the subject to count from 1 to 40, in 3s, within a time limit (maximum score = 3 points).

b. Visual/nonverbal

- I) Spatial forward span. This consisted of a board with blocks attached in an irregular arrangement. In the test, each time the examiner tapped the blocks in a prearranged sequence, the patient attempted to copy this tapping pattern exactly. Task is stopped after two incorrect answers (maximum score = 9 points).
- II) Visual search. This test required visual selectivity at fast speed on a repetitive motor response task. It consisted of rows of figures randomly interspersed with a designated target figure. The subjects were requested to cross out those figures equal to the one presented as a model. The person indicates when finished, or is stopped after 60 seconds. Two scores were obtained: total number of correct responses (maximum score = 24), and number of intrusions.

Memory

a. Working memory

- I) Auditory/verbal: Digit backward span. This consisted of pairs of random number sequences that the examiner read aloud, at the rate of one per second, and the subject's task was to repeat each sequence in an exactly reversed order. Task is stopped after two incorrect answers (maximum score = 8).

II) Visual/nonverbal: Spatial backward span. This consisted of a board with blocks; each time the examiner tapped the blocks in a pre-arranged sequence, the patient attempted to copy the tapping pattern in an exactly reversed order. Task is stopped after two incorrect answers (maximum score = 9).

b. Auditory/verbal immediate and delayed recall

I) Auditory/verbal immediate and 20-minute delayed recall of word list (three learning trials of 12 words). Immediate presentation consisted of three presentations with recall of a 12-word list. Each of the 12 items belonged to one of three semantic categories (animals, fruits, or body parts). After each presentation, the subject repeated those words that he/she remembered. The total score was the average number of words repeated in the three trials (maximum score = 12). The delayed presentation provided one first free recall after 20 minutes (maximum score = 12). The second long term recall trial utilized the item categories as cues, asking the subject for items in each of the three categories (maximum score = 12). A recognition trial was also provided, in which the examiner asked the subject to identify as many words as possible from the list from a new list of 24 words. This new list contained all the items from the original list, as well as words that were semantically associated or phonemically similar (maximum score = 12 points). In addition, intrusions, perseverations, and false positive error scores were noted in delayed trials.

II) Verbal paired associates. Twelve word pairs, four that were not readily associated (i.e., coche – payaso), four forming phonetic associations (i.e., camion–melon), and four forming semantic associations (i.e., fruta– uva). The list was read three times, with a memory trial following each reading. The words were randomized in each of the three learning trials to prevent positional learning. The total score was the average number of correct word pair repeated by the participant in the three trials (maximum score = 12). A 20-minute delayed recall was also provided (maximum score = 12). In addition, intrusions, perseverations, and errors were noted.

b. Logical memory I and II. Prose learning that allowed scores of thematic recall and factual knowledge. The examiner read two stories, stopping after each reading for an immediate free recall. In the two paragraphs, subject must recall many details as possible, in both immediately, and after delay. Each story contained 16 story units and 5 thematic units. A delayed recall trial after 20 minutes was also given. For instance, correct scores are the sum of the correctly recalled story and thematic units.

c. Visual/nonverbal immediate and delayed recall

I) Rey-Osterreith Complex Figure. Subjects were shown a card with a design to be copied. A delayed recall was also provided after 20 minutes in which subjects were asked to recall what they had drawn on the administration trial. The figure is broken down into 18 scorable elements: between 0.5 and 2.0 points are awarded for each element, depending on the accuracy, distortion, and location of its reproduction. Two points are awarded if the unit is correct and is placed properly, 1 point if the unit is correct but placed poorly, 1 point if the unit is distorted but placed correctly, 0.5 points if the unit is distorted and placed poorly, and no points if the unit is absent or not recognizable. There is a 5-minutes time limit (maximum scores = 36).

II) Faces. On the immediate trial subjects were shown two photographs with their respective names. After seeing each of them for 5 seconds, subjects were asked to repeat the names (maximum score = 4 points). On the delayed recall subjects were asked to remember the names of the persons (maximum score = 8 points) and to identify the previously shown persons from among a set of four photographs (maximum score = 2 points). In addition, false positive errors were noted.

Executive functions

a. Category Formation Test. This consisted of five visually presented sets, each one containing four figures of common objects. Each set was organized on the basis of different principles. On each set trial the subjects were asked to form as many categories as they could. The subject indicates when finished, or is stopped after 5 minutes (maximum score = 25).

- b. **Verbal fluency.** This measured the number of words produced within a time limit of 1 minute and consisted of a semantic as well as a phonological trial. On the semantic trial subjects were required to generate items in a category (animals), whereas on the phonological trial they were required to generate words according to an initial letter ("P"). Total number of correct word pair, intrusions, perseverations, clusters, and switching were scored in both tests.
- c. **Design fluency.** The subject was instructed to draw different patterns by connecting dots in a five-dot matrix using four lines, with a 3 minute time limit. Total number of correct designs, intrusions, and perseverations were quantified.
- d. **Stroop Test.** Subjects were required to read, as fast as they could, a set of colour words printed in black ink. On the second trial, subjects were required to call out, as fast as they could, the colour names of coloured ovals. On the third trial subjects were asked to call out, as fast as they could, printed colour names when the print ink was a different colour from the name of the colour word. In the three trials, the total number of correct answers were recorded (maximum score = 36).
- e. **Motor functions**
- I) **Conjugate eye movement.** A pencil was shown to the subjects and they had to follow it with their eyes to the left and then to the right (maximum score = 4 points).
 - II) **Conflicting commands.** Subjects were asked to hit the table once when the administrator hit it twice, or to hit the table twice when the administrator hit it only once. To ensure the subject had clearly understood the task, a practice trial was performed in which the administrator first hit the table once, three times in succession, and then twice, three more times (maximum score = 2 points).
 - III) **Go/No-Go.** Subjects were told that now, when the test administrator hit the table once, they should hit it once as well, but when the examiner hit twice, they should do nothing. To ensure the subject had clearly understood the task, a practice trial was performed in which the administrator hit the table once, three times in succession, and then twice, three more times (maximum score = 2 points).

- IV) **Luria's Hand Sequences.** The examiner made a fist with his right hand, then extended his fingers holding his hand horizontally, and finally turned his hand by 90° with the extended fingers still pointing forward. After seeing this sequence of movements, subjects had to repeat it with their right hand exactly as shown. In a second trial the examiner repeated the sequence in an exactly reversed order with his left hand and subjects had to repeat it with their left hand exactly as shown (maximum score = 4).
- V) **Alternating pattern.** This task requires copying a drawing without lifting the hand from the paper. The test required alternating between peaks and blocks (maximum score = 8).

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The effect of institutionalization in attachment and develop in adopted preschool children in the Chilean context: A review

El efecto de la institucionalización en el apego y el desarrollo en niños preescolares adoptados en el contexto chileno: Una revisión

María Josefina Escobar & María Pía Santelices

ABSTRACT

This work aims to make a review of longitudinal studies that address the history of adoption in preschool children after spending a period of time in juvenile institutions. We analyze the impact of this experience in the child's attachment and child development. It makes a discussion among national and international studies that address the issue and concluded that among the side effects would be found in these children, are mentioned less attachment security, lower cognitive development and less ability to understand emotions compared with control groups without experience of institutionalization or institutionalization less than six months. They also discovered that these children show indiscriminate friendliness, that is does not exhibit an attitude of vigilant against unknown persons. Also discusses the issue in the Chilean context, in which there is few research. Finally, it briefly addresses the issue of characteristics of adoptive families evaluated in different studies reviewed, as a fundamental fact, since the relevance of knowing the effect of the institutionalization of children adopted lies in the contribution of knowledge to the design of preventive interventions for children and their families.

Keywords: attachment in preschool children, adoption, institutionalization

RESUMEN

Este trabajo busca hacer una revisión de estudios longitudinales que aborden la historia de adopción en niños preescolares luego de haber pasado un período de tiempo en instituciones para menores. Se analiza el impacto de esta experiencia en el apego del niño y en su desarrollo infantil. Se realiza una discusión entre los estudios nacionales e internacionales que abordan la temática, concluyendo que entre los efectos adversos que se encontrarían en estos niños, se menciona la menor seguridad en el apego, menor desarrollo cognitivo y menos habilidad para la comprensión de las emociones en comparación con grupos control sin experiencia de

institucionalización o con una institucionalización menor a seis meses. Además se encontró que estos niños presentan amistad indiscriminada, esto es que no presentan una actitud de alerta frente a las personas desconocidas. Además se analiza el tema en el contexto chileno, en el cual hay escasa investigación. Finalmente se aborda brevemente el tema de características de las familias adoptivas evaluadas en los distintos estudios revisados, como un dato fundamental, ya que la relevancia de conocer el efecto de la institucionalización de niños adoptados radica en el aporte del conocimiento para el diseño de intervenciones preventivas para los niños y sus familias.

Palabras clave: *apego en niños preescolares, adopción, institucionalización*

INTRODUCCIÓN

El estudio del impacto de la institucionalización en los niños y en su salud mental es de larga data. Podría ubicarse como precursores a René Spitz (1945), en una primera etapa, quien a partir de observaciones a niños institucionalizados, demostró los efectos negativos tanto afectivamente como cognitivamente que tendrían a causa de la deprivación vincular; y en un segundo momento el auge que se generó en el estudio del impacto de la institucionalización fue con la caída del régimen de Ceausescu en Rumania en 1989, en la que miles de niños quedaron abandonados en orfanatos, los mismos se encontraban en condiciones de alta deprivación vincular y malas condiciones nutricionales (Lecannier, 2005; Zeanah et al., 2003).

Las publicaciones que se generaron a partir de esta realidad respecto a las carencias y deprivación sufrida por estos niños, tuvieron como consecuencia la mejora de las condiciones de institucionalización, en la calidad de algunas de las instituciones a nivel internacional y, asimismo, se generó una amplia investigación en torno al impacto en el desarrollo de estos niños. Sin embargo, en la actualidad diversos estudios longitudinales siguen mostrando que el antecedente de institucionalización en los primeros momentos de la vida de un niño, durante al menos los 6 primeros meses de vida, afecta en la infancia en diversos ámbitos: afectivo, cognitivo, social y fisiológico (O'Connor & Zeanah, 2003, Smyke, Carlson & the BEIP Core Group, 2005; Lecannelier, 2006).

En el caso de Chile, más del 90% de los niños que van a ser adoptados son puestos en instituciones desde el nacimiento hasta ser entregados, sumándose a esta situación lo prolongados que son los procesos de adopción, siendo por lo general tardíos y colocando al niño en una situación de alta deprivación (Lecannelier, 2006).

La realidad chilena es común a distintos países, sin embargo, investigadores nacionales en el área manifiestan que existe una carencia en cuanto a investigaciones o producciones científicas en el tema de institucionalización y de adopción en Chile; siendo la mayor producción científica en este tema proveniente del hemisferio Norte (Lecannelier, 2006; Spencer & Fresno, 2008; Fundación Chilena para la adopción, 2006).

Por todo esto, es de interés conocer que se sabe respecto al impacto de la institucionalización en los niños adoptados en Chile, y más específicamente que se sabe sobre el niño adoptado en su etapa preescolar. La etapa preescolar es escogida, considerando que el periodo que pasa entre la concepción a los tres años de edad no tiene precedentes en el ciclo de la vida humana por la rapidez, la complejidad y profundidad del cambio evolutivo, en los tres primeros años de vida el infante progresa de la completa dependencia de su cuidador a la independencia en el movimiento, en lo verbal, presenta gran desarrollo cognitivo que consigue (Zeanah et al., 2003).

Es por ello, que la presente revisión pretende comprender los efectos de la institucionalización en el apego y el desarrollo infantil en niños preescolares, incorporando una mirada longitudinal que integre también la experiencia de reparación en las familias adoptivas. Todo esto mirado desde el contexto chileno y complementando la información con estudios internacionales. Así mismo, se realiza un breve apartado respecto a medidas que se hicieron en las madres adoptivas en los estudios revisados, como una variable que no puede dejarse fuera de la discusión. De este modo se busca hacer un aporte del conocimiento para el diseño de intervenciones preventivas para los niños preescolares y sus familias adoptivas.

ANTECEDENTES

La adopción en Chile

Desde la entrada en vigencia en octubre de 1999, la Ley de Adopción (Nº 19.620) se constituyó en un nuevo marco legal que respalda el trabajo que se venía realizando en esta área desde 1991; el Servicio Nacional de Menores (SENAME) funciona como el organismo que posee facultades normativas, de asesoría y de fiscalización de las políticas nacionales e internacionales en la materia de adopción (SENAME, 2006). En Chile, actualmente solamente pueden intervenir en programas de adopción el SENAME y los siguientes organismos acreditados ante éste: Fundación chilena para la adopción, Fundación San José para la adopción y Instituto de Colonias y campamentos (Fundación Chilena para la adopción, 2006). Los mismos están constituidos por instituciones para menores y casas de acogida, que buscan disminuir los efectos

negativos de la institucionalización, con un trato mucho más cercano e individualizado de los niños.

Según los datos entregados por los informes del SENAME, en el período del 2000 a mayo del 2006, la cantidad de adopciones nacionales realizadas en Chile fueron un total de 2.997 y 625 adopciones internacionales (Carmona, 2006).

El primer estudio realizado en Chile con una metodología empírica y sistemática en bebés institucionalizados data del año 2005; en este estudio se evaluaron a 76 bebés institucionalizados, en un rango de edad de 3 a 7 meses. Las medidas cuantitativas que se tomaron fueron para evaluar el desarrollo psicomotor, con la Escala de Evaluación del Desarrollo Psicomotor (EEDP) y el apego con la escala de apego madre-bebé en situaciones de stress de Massie-Campbell. Los resultados de esta investigación revelaron que en el desarrollo psicomotor, el 60,3% de los bebés presentaban un desarrollo psicomotor normal, el 25,6% de riesgo y sólo el 9% con retraso, mostrando que en este ámbito los bebés de entre 4 y 6 meses no presentaban problemas en el desarrollo psicomotor, y en lo que se refiere al apego, se obtuvieron datos de dos tipos, en una clasificación dicotómica, la proporción apego seguro fue de 37,2% y de apego inseguro de 46,2% y en una clasificación politómica los resultados mostraron 37,2% apego seguro, el 42,3% apego evitativo, el 1,3% ambivalente y el 2,6% apego desorganizado; mostrando la muestra de bebés chilenos una alta representación de estilo de apego evitativo (Lecannelier, 2006). Cabe destacar, además, que en el informe final presentado al Servicio Nacional de Menores por el equipo de investigadores que realizó dicho estudio, señalan algunas características particulares del estilo de apego evitativo encontrado en estos niños; según lo expresan los investigadores del estudio, se diferencia tanto clínicamente como cuantitativamente al observado en los niños con estilo de apego evitativo que no tienen antecedente de institucionalización, pertenecientes a familias relativamente estables. Entre las diferencias que mencionan se encuentran: el desplegar conductas de extrema inhibición, independencia, falta de reacción, carencia de vocalizaciones y expresión de dolor y necesidades, y una carencia de habilidades para relacionarse afectivamente con los otros. De esta manera los investigadores dejan abierta la pregunta respecto a si el nivel de evitación de muchos de estos niños pudiesen ser considerados como desorganizados si se utilizara un instrumento más específico (Lecannelier, 2005).

Además dentro de este estudio se presentan en los resultados diferencias según la institución a la que pertenecían los niños. Poniendo énfasis en la posibilidad de mejorar las condiciones en las que se encuentran los bebés.

Efectos de la institucionalización en el preescolar

Si bien se encuentran muchos estudios en el tema de adopción, son pocos los estudios longitudinales que aborden y evalúen a los niños preescolares, que es la etapa que nos interesa revisar. Entre los estudios longitudinales con niños adoptados, que tomaron medidas en niños preescolares, sólo se encuentran dos. Ambos estudios son estudios internacionales, el más recientes es uno realizado en Atenas, publicado en el 2006 y un segundo estudio realizado con niños adoptados de Rumania, en 1998.

En el estudio longitudinal realizado en Atenas (Vorria, et al, 2006), se estudiaron 61 niños de 4 años que habían pasado sus dos primeros años de vida en una institución y se compararon con un grupo control de 39 niños que vivieron siempre con sus padres biológicos. A éstos niños se les evaluó desarrollo cognitivo, apego, timidez, comprensión emocional y problemas conductuales; y a sus padres se les evaluó salud y stress parental. En los niños emplearon los siguientes instrumentos: The attachment Q-Sort (AQS), The Attachment Story Completion Task (ASCT), McCarthy Scales of Children's Abilities (MSCA), British Picture Vocabulary Scale (BPVS), Denham Puppet Scenario; dentro de los cuestionarios sobre el niño que debieron completar las madres se encontraban: Colorado Children's Temperament Inventory (CCTI), Strengths and Difficulties Questionnaire (SDQ) y por último un cuestionario que debía completar la maestra que se encontrará al cuidado del niño en caso de que éste asista a alguna centro de cuidados: Student-Teacher Relationship Scale (STRS). Los objetivos de la investigación consistían en ver las diferencias entre el grupo de niños adoptados y el grupo control y, como un segundo objetivo comparar a los niños adoptados en dos momentos en los que fueron medidos, entre los 12 y los 18 meses, que fue la primer medida en el periodo en el que se encontraban institucionalizados y a los 4 años.

Los resultados de este estudio revelaron que a los 4 años los niños que habían sido adoptados todavía presentaban bajos puntajes en el desarrollo cognitivo, menor seguridad en el apego y menos habilidad para la comprensión de las emociones en comparación con el grupo control, manteniéndose la diferencia que había sido observada en la primera medición. Los niños adoptados en relación al grupo control no mostraron diferencias significativas en lo que respecta

a problemas de comportamiento, ni en la relación con la maestra del centro de cuidados diarios, además no hubo diferencias en cuanto a la timidez.

En relación con los datos del desarrollo cognitivo, los resultados hallados en dicho estudio coinciden con lo encontrado por Rutter & The English and Romanian Adoptees Study Team (1998), donde se reportó que el desarrollo cognitivo de los niños adoptados de los orfanatos de Rumania, que habían tenido la experiencia de privación durante los 24 primeros meses de vida, obtenían a los 4 años puntajes fuera del rango normal en el desarrollo cognitivo.

En lo que respecta a las características del apego que se presentaron en la evaluación con el ASCT, se encontró en las narrativas de los niños adoptados, menos interacciones pro-sociales entre las figuras parentales y ellos, además historias con menor coherencia y más evitativas, mostrando así una menor internalización de modelos operativos internos de apego seguro. Además dificultad en la resolución de conflictos o desorganización en el relato, los autores interpretan estos datos como signos de apego inseguro (Vorria, et al, 2006).

El segundo estudio longitudinal que se encuentra según el criterio de búsqueda, es el reportado por Chisholm (1998), en este caso, se estudiaron a niños adoptados de Rumania. El mismo tuvo como objetivos evaluar el apego y la amistad indiscriminada (indiscriminate friendliness). La muestra estuvo comprendida por un grupo de 46 niños que habían pasado por lo menos 8 meses en un orfanato de Rumania (RO), un grupo de 30 niños que fue adoptado tempranamente, es decir, antes de los 4 meses (EA) y un tercer grupo de 46 niños nacidos en Canadá sin historia de institucionalización (CB). Tanto el grupo EA, como el CB, fueron matcheados con el grupo RO en sexo y edad. Los instrumentos empleados fueron: para medir apego: *Wates and Deane Attachment Q-Sort* (entrevista a los padres) y *Preeschool Assesment of attachment* (Instrumento de observación diseñado por Crittenden); además se empleó para ver la amistad indiscriminada el *Five items indiscriminate friendly behaivior measure (5IF)*.

Los resultados que se encontraron en el reporte de los padres respecto de la seguridad del apego, no mostraron diferencias significativas en ninguno de los grupos. Sin embargo, mediante los resultados obtenidos por el instrumento de observación, se encontró que el grupo RO presentó más patrones de apego inseguro, además puntúo más alto en las conductas de amistad indiscriminada que los otros dos grupos, que no difirieron entre ellos en ninguna de las dos pruebas. Otro aspecto que se señala en esta investigación es que se encontró que en el grupo RO las diferencias en apego no se relacionaron a ninguna característica de las instituciones, sino a características individuales y de las familias adoptivas. También reportaron que el estilo de

apego inseguro se asociaba a mayores problemas de conducta y que puntuaban bajo en las escalas de inteligencia de Standford-Binett.

Otro hallazgo, respecto a las dos medidas realizadas en el grupo RO, fue que en la segunda medición presentaron un puntaje más alto de apego seguro. Esto es relevante ya que los autores lo interpretan como una prueba de que los niños a pesar de la experiencia de institucionalización, son capaces de generar relaciones de apego.

Respecto a la amistad indiscriminada, en el segundo momento esta característica no disminuyó, lo que hace que los autores sugieran que ésta sería una característica de los niños que tuvieron la experiencia de estar institucionalizados tempranamente.

Asimismo, la amistad indiscriminada también ha sido descrita por otros autores como consecuencia de la experiencia de institucionalización (Rutter, et al., 2007).

Por último, en lo que respecta al estudio de Chisholm (1998), el no haber encontrado diferencias significativas entre los grupos EA y CB reafirma lo que se ha postulado en diversas investigaciones respecto a el tiempo de la institucionalización (Rutter, et al. 2007; O'Connor & Zeanah, 2003), donde se sostiene que el impacto en el estilo de apego y en las habilidades cognitivas se hace evidente en los niños que son adoptados después de los 6 meses, siendo el grupo de niños que se adoptan tempranamente (antes de los 6 meses) menos vulnerables.

Respecto a los estudios nacionales, se encuentra una tesis doctoral realizada por Rosario Eulliet en la Universidad de Toulouse, Francia, con una muestra de familias chilenas. La muestra con la que trabajó fueron 25 niños preescolares adoptados (12 niños y 13 niñas), que habían estado institucionalizados en centros del SENAME y de la Fundación San José para la adopción y que habían sido adoptados entre el año 2000 y 2002. Y un grupo control con características sociodemográficas similares a las familias adoptivas de 20 niños (9 niñas y 11 niños) sin experiencia de institucionalización; el instrumento con el que evaluaron el apego en los niños fue el The Attachment Story Completion Task (ASCT). Encontrando apego seguro en el 60% de los niños adoptados, esta proporción es mayor (70% de los casos) en los niños que se encuentran con sus padres biológicos (Spencer & Fresno, 2008; Eulliet, Spencer, Troupel-Cremel, Fresno & Zaouche-Gaudron, 2008).

Estudios en familias adoptivas

El dato respecto a las familias adoptivas es una variable que ha sido considerada por los investigadores que abordan el impacto de la institucionalización; la importancia que tienen las mismas es primordial, ya que éstas pueden ser consideradas como un espacio de reparación de las experiencias de deprivación vividas por los niños adoptados.

Las familias adoptivas, en los estudios que revisan modos de intervención en niños adoptados, son consideradas como el lugar privilegiado que permitiría al niño reparar representaciones internas negativas a partir de una lectura apropiada que podrían realizar los padres adoptivos de las señales del niño (Cornell & Hamrin, 2008, Lieberman, 2003), poniéndose en juego de esta manera la sensibilidad de los mismos.

Ligada a esta idea son las conclusiones a las que arriban Van IJzendoorn & Juffer (2006) en un meta-análisis de 270 estudios en adopción, que afirman que la adopción es en sí una intervención efectiva y que es esta situación la que muestra la plasticidad que hay en el desarrollo de los niños para recuperarse de situaciones tempranas adversas, insistiendo nuevamente sobre el lugar de las familias adoptivas como un espacio de reparar, y la necesidad de apoyar y acompañar a estas familias en este proceso.

Respecto a las características que se han estudiado sobre las familias adoptivas, se encuentran los siguientes datos; en el estudio anteriormente citado de Vorria, et al. (2006) evaluaron salud y stress en las madres de los niños adoptados y el grupo control, empleando dos instrumentos: Parenting Stress Index Questionnaire (PSI) y General Health Questionnaire (GHQ). Una primera diferencia encontrada es que las madres adoptivas fueron mayores a las madres del grupo control (media de las madres adoptivas 41,8 años y las madres del control 35,7 años), al respecto cabe mencionar, que esta característica parecería ser común también en la población chilena, ya que la adopción ocurre luego de intentos infructuosos de tener hijos biológicos y largos procesos de tratamiento para fecundar. En los resultados arrojados por los instrumentos empleados, encontraron que en el PSI no mostró diferencias significativas entre ambos grupos y en cambio, el GHQ presentó diferencias significativas, mostrando puntajes menores en las madres adoptivas en las siguientes escalas: sintomatología somática, ansiedad e insomnio, pero puntuaron más alto en depresión. No se encontraron diferencias en disfunciones sociales.

En el estudio longitudinal de Chisholm (1998), con el grupo de niños de Rumania se encontró asociado en las madres adoptivas de los niños adoptados que presentaron apego inseguro, mayor

estrés parental, que aquellas que presentaron apego seguro. Esto, según lo interpretan los autores, se podría explicar porque un mayor nivel de stress puede afectar a la sensibilidad de la madre para leer las señales de su hijo, y así, hacer que el niño manifieste más conductas de acting-out y provocar un círculo de conductas que facilitan el desarrollo de estos patrones inseguro de apego.

En lo que respecta al estudio nacional citado no habrían realizado medidas en las madres adoptivas.

DISCUSIÓN

Las investigaciones revisadas reportan un impacto negativo tanto en el apego como en el desarrollo cognitivo de aquellos niños que tienen historia de institucionalización, así mismo se plantea la plasticidad de los niños en cuanto a la posibilidad de reparación de estas experiencias tempranas de privación y de este modo se hace hincapié en la posibilidad de intervenir oportunamente.

Las investigaciones presentadas muestran que entre los efectos adversos en estos niños se encontrarían, la menor seguridad en el apego; este es un factor estudiado en gran medida y pudo ser observado tanto en los estudios internacionales, como en el estudio nacional presentado. Un aspecto importante a tener en cuenta es que tanto el estudio de Vorria et al. (2006), como el estudio con población chilena (Spencer & Fresno, 2008; Euillet, et al., 2008), emplean el mismo instrumento para evaluar apego, lo que enriquece las comparaciones, ya que permite sugerir que el impacto sobre el apego provocado por la institucionalización es transversal a diferentes culturas.

Además cabe destacar que se presentan en ambos estudios con muestras chilenas, tanto el realizado en bebés, como en preescolares una menor frecuencia de apego seguro que en la población general. Siendo de este modo un foco para atender en el diseño e implementación de las políticas de adopción.

Entre los otros efectos negativos que se encontrarían en estos niños, estarían los bajos puntajes en el desarrollo cognitivo y menor habilidad para la comprensión de las emociones en comparación con grupos control sin experiencia de institucionalización o con una institucionalización menor a seis meses.

Este punto que es revisado en estos estudios, tiene implicancias en el tema de la adopción tardía, es decir aquella que se realiza después de los 6 meses de vida; los estudios revelan que serían en éstas en las que se encuentran claros signos del impacto de la institucionalización en el apego y el desarrollo del niño preescolar. Lo que hace poner sobre la mesa la importancia de las adopciones tempranas y de políticas de adopción que agilicen estos procesos.

Por último, se destacó que en estos niños se presentaba como una característica particular la amistad indiscriminada, entendiendo por ella el hecho de que estos niños no presentan una actitud de alerta frente a las personas desconocidas, sin mostrar miedo, ni cautela ante extraños. Colocando al niño preescolar con antecedente de institucionalización en una situación de mayor vulnerabilidad.

Los datos sobre las familias adoptivas si bien no son concluyentes, aparecen índices de stress, ansiedad, entre otros. Estas características son de alta relevancia ya que obstaculizarían una buena lectura de las señales del niño, esto, afecta de manera directa a la sensibilidad de la madre adoptiva, que es la que permite reparar las experiencias de privación afectiva que ha experimentado el niño que estuvo institucionalizado.

Tal como se destacó la importancia del rol de la familia es fundamental en estos niños, por lo que se necesita del acompañamiento a dichos padres, los investigadores presentan a la adopción en sí misma como una intervención positiva y como la mejor opción para reparar los modelos operativos internos del niño. Siendo por ello, importante destacar las diferencias positivas encontradas en el estudio de respecto a la primera y segunda medición en las puntuaciones de apego en el estudio de Chisholm (1998), así mismo es relevante tener presente que el aporte que brindan en este sentido los estudios longitudinales, es que nos permiten ver cómo evolucionan los niños con sus nuevas familias. Ya que los estudios revelan la capacidad del niño de crear nuevos vínculos positivos con sus padres adoptivos.

Siendo, además, oportuno el abordaje con los padres adoptivos para trabajar las ansiedades que esta nueva situación representa para ellos y brindar herramientas que les permitan estar atentos y ser oportunos en las respuestas ante las necesidades particulares de cada niño.

En lo que respecta a los estudios encontrados sobre institucionalización en niños, la población mayormente estudiada en la temática es la de Rumania, por su realidad histórica sociopolítica (Lecannelier, 2005; Zeanah et al., 2003), sin embargo sólo se encontraron dos estudios longitudinales que hagan una de las mediciones en los niños preescolares.

En Chile es poca la publicación sobre el tema de adopción. Esto puede hablarnos de: una falta de seguimiento y de una carencia en los sistemas de políticas de adopción en cuanto a la capacidad de poder evaluar el desarrollo del niño una vez que este sale de la institución o de una escasa producción de investigaciones que reflejen la realidad chilena. Se destaca también la carencia de estudios con población chilena que evalúen a los niños adoptados en diferentes dimensiones, además del apego; así como la ausencia de estudios longitudinales que tengan alguna medida en los niños adoptados preescolares.

Otra carencia que se puede observar en estos estudios es la ausencia descriptiva de las instituciones de las que provenían las muestras de niños adoptados. Ya que existen estudios que afirman que las características de las instituciones tendrían relación con el impacto de la institucionalización en los niños adoptados (Lecannelier, 2005). Sin embargo, el estudio de Chisholm (1998) revelaría que parecería no estar relacionado el estilo de apego con características de la institución.

Además, no se encuentran estudios que reporten las diferencias, si es que las hubieran como es esperable, entre el impacto en el apego y el desarrollo del niño preescolar adoptado que tiene el antecedente de haber estado institucionalizado, con aquellos niños que estuvieron en las casas de acogida. Esto es de suma importancia ya que es un aporte el conocer los beneficios, si es que hubieran, que estas implementaciones tendrían en estos niños.

Se hace evidente que, por el impacto a largo plazo de la institucionalización en niños, existe una imperiosa necesidad de realizar intervenciones preventivas para los niños adoptados y para los padres adoptivos, además de un seguimiento de estos niños que permitan conocer como se desempeñan en diversos ámbitos. De este modo, se concluye que es una necesidad real y presente la de intervenir en este grupo de niños, ya que son un grupo vulnerable, y desde las políticas públicas el poder hacer promoción de apego seguro con las familias adoptivas es de real importancia. Además, se hace necesario el seguimiento de estos niños en su desarrollo, ya que se ha visto que el impacto de la institucionalización no sólo se ve reflejado en los primer año, sino también, como lo muestran los estudios revisados, a la edad del preescolar. Buscando de este modo atenuar el impacto de la institucionalización, no sólo en el aspecto vincular del apego. Finalmente se considera que el acompañar en esta tarea a los padres adoptivos, por el rol fundamental que ejercen como un espacio de reparación de las experiencias tempranas del niño es una tarea fundamental para quienes trabajamos en el área de la salud mental infantil.

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5.2. Appendix 2. Letter of Ethics Committee of the School of Psychology of the Pontificia Universidad Católica de Chile approved the study



FACULTAD DE CIENCIAS SOCIALES / ESCUELA DE PSICOLOGIA

Santiago, 10 de noviembre de 2010

Señores
Presentes

Estimados Señores:

El Comité de Ética de la Escuela de Psicología de la Pontificia Universidad Católica de Chile, conformado por los académicos Marcela Cornejo, Andrés Haye y Vladimir López, ha revisado en detalle el proyecto "*Estudio multinivel del apego, problemas de comportamiento, empatía y reconocimiento de emociones en adolescentes adoptados con antecedentes de institucionalización temprana*", presentado como proyecto de tesis doctoral en el programa de Doctorado en Psicoterapia de esta escuela y cuya investigadora responsable es María Josefina Escobar. El profesor guía de tesis de este proyecto es María Pía Santelices.

Habiendo discutido el proyecto con la investigadora, declaramos que el protocolo del proyecto se ajusta a los criterios de bioética y ética de investigación científica vigentes en FONDECYT en relación a los requerimientos de estudios con humanos y a la Ley N°20120. Adicionalmente, damos constancia que la investigadora responsable ha considerado detenidamente las dimensiones éticas de su proyecto y ha generado una reflexión acerca de cómo asumir responsablemente las potenciales consecuencias de su trabajo de investigación. A continuación se señalan las principales razones en que se basa esta certificación.

El objetivo de este proyecto es describir y analizar, desde un abordaje multinivel, el impacto del tiempo de institucionalización temprana, en los trastornos de comportamiento y en las habilidades sociales (reconocimiento facial de



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emociones y empatía), de adolescentes adoptados con antecedentes de institucionalización y adolescentes sin antecedentes de adopción ni institucionalización, evaluando el rol moderador de la historia de apego. Respecto a su **relevancia**, la investigadora argumenta que radica en su eventual contribución al mejor conocimiento acerca del impacto de la institucionalización temprana en los adolescentes -un ámbito poco explorado tanto a nivel nacional como internacional-, de la incidencia de problemas de comportamiento en adolescentes adoptados con antecedentes de institucionalización tardíamente, y del potencial rol moderador del apego de estos adolescentes con sus familias adoptivas. El estudio, al explorar desde una aproximación múltiple, a nivel socio-emocional, neuropsicológico y electrofisiológico esta temática representaría, de acuerdo a la Investigadora, una alternativa ideal para estudiar los efectos de la institucionalización en la cognición social. Cabe señalar con respecto a la relevancia científica del proyecto, que este ha sido aprobado por el comité de tesis del programa de doctorado en psicoterapia.

En segundo lugar, respecto de la **evaluación de riesgos y beneficios** para los participantes del estudio, cabe indicar que la investigadora no prevé riesgos asociados a la participación, de salud, costos económicos y otros, y se asegura la libertad de participación y el derecho de suspensión de esta participación sin que esto tenga ningún efecto. Eventualmente, como se administrarán cuestionarios que permiten detectar sintomatología, en caso que dicha sintomatología fuera de riesgo para el adolescente, la Investigadora ha previsto realizar una devolución y asesoramiento a los padres y a los adolescentes; en caso de ser pertinente, la investigadora realizará personalmente la derivación que corresponda. Asimismo, por ser el tema de la adopción una temática delicada de tratar, en caso de abrir temas que no estén completamente elaborados o que se contacten con emociones negativas, dudas, culpas o temores en torno a la historia vincular tanto en padres como adolescentes, la Investigadora ha previsto ofrecer asesoramiento y en el caso de ser necesario, realizar las derivaciones correspondientes. La Investigadora argumenta que no existirían beneficios directos para los participantes del estudio.



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En tercer lugar, respecto de la **protección de los participantes**, la Investigadora ha previsto cartas de autorización para las instituciones (de adopción y educacionales) que serán contactadas para el reclutamiento de los participantes. También, se han previsto para los participantes del grupo experimental y del grupo control, cartas de consentimientos para los padres y de asentimiento para los adolescentes. Todas estas cartas se ajustan a los requerimientos y consideraciones éticas necesarias, incluyendo información clara respecto al estudio, sus objetivos y alcances. También aseguran la libertad de participación y de abandonar esta participación sin ningún prejuicio para el participante. Las cartas incluyen información de contacto de la Investigadora Responsable y del Comité de Ética. Se prevé entregar un duplicado firmado de los consentimientos y asentimientos a los participantes.

Es importante señalar que la investigadora ha fundamentado adecuadamente los procedimientos que le permitirán resguardar la confidencialidad de toda la información obtenida. En particular, respecto a la protección de la identidad de los participantes, se asegura un mecanismo de codificación de la información para así proteger su identidad. Tendrán acceso a la información la Investigadora, así como miembros del equipo de investigación transcultural en esta temática del cual forma parte este estudio. En toda publicación o divulgación de resultados relativos al estudio, el nombre de los participantes será mantenido en reserva.

Marcela Cornejo

Secretaria Ejecutiva

Comité de Ética

Escuela de Psicología

Pontificia Universidad Católica de Chile

CC. Sr. Patricio Cumsille, Subdirector de Investigación y Postgrado Escuela de Psicología.
Archivo Comité de Ética EPUC.

5.3. Appendix 3. Informed consent letter

5.3.1. Parents informed consent letter (Spanish version)



CARTA DE CONSENTIMIENTO

Usted ha sido invitado a participar en el estudio *“Estudio multinivel del apego, problemas de comportamiento, empatía y reconocimiento de emociones en adolescentes adoptados con antecedentes de institucionalización temprana”* a cargo del investigador María Josefina Escobar, PhD © alumna del Doctorado Internacional en Psicoterapia dictado por la **Pontificia Universidad Católica de Chile**, en colaboración de la **Universidad de Chile** y la **Universidad de Heidelberg**. El objeto de esta carta es ayudarlo a tomar la decisión de participar en la presente investigación.

El propósito general del estudio es aportar a un área de investigación poco explorada en Chile, acerca de la institucionalización temprana y el desarrollo social de los adolescentes adoptados.

Los resultados esta investigación buscan enriquecer el conocimiento sobre el desarrollo social en adolescentes adoptados en la infancia, además de entregar elementos esclarecedores en temas que continúan siendo controversiales acerca del impacto de la institucionalización temprana. Por lo mismo se espera que las conclusiones de la investigación favorezcan a aumentar los conocimientos en un área en la que faltan respuestas y espera poder aportar datos que aporten en la temática de adopción.

Si usted decide participar en el estudio, se le solicitará que firme esta carta de consentimiento. Su participación consistirá en responder una serie de cuestionarios y se realizará una entrevista semiestructurada. La entrevista y completar los cuestionarios será realizado en **un encuentro** que debiera tomar aproximadamente una hora y media.

Además se le solicitará **autorización para entrevistar a su hijo(a)**, al que también se le aplicarán unos cuestionarios y una entrevista. Además, posiblemente, su hijo será invitado a que se le realice un Electroencefalograma (procedimiento inocuo para su persona). Si usted da la autorización de entrevistar a su hijo(a), su hijo también será invitado a que participe **voluntariamente** y también firmará un documento como este. Posiblemente con su hijo tendremos dos reuniones de una hora y media cada una, aproximadamente.

Su participación en el estudio no implica riesgos para usted, ni para su hijo(a), salvo la posibilidad de sentirse incomodo(a) al contestar ciertas preguntas o a sentir que se remueven temas que son delicados para usted. Por lo mismo, en caso de necesitar orientación respecto a sus vivencias y temas conversados durante la entrevista y cuestionarios, la investigadora se encuentra disponible a responder sus dudas y orientarlos en caso de ser necesario. Si el tema es muy específico, se le referirá a quien corresponda.

En el caso de su hijo(a), si se detectara sintomatología relevante, a través de cuestionarios o en la entrevista, se realizará un informe y la derivación correspondiente en caso de ser necesario.

En relación a los beneficios por participar, no existen beneficios directos para usted o su hijo(a), participando en este estudio. Sin embargo los resultados obtenidos en esta investigación favorecerán el desarrollo del conocimiento científico.

Se le ha pedido participar en esta actividad en forma **voluntaria**. Usted, y su hijo, tienen el derecho a abandonar el estudio sin necesidad de dar ningún tipo de explicación y sin que ello signifique ningún perjuicio para usted, ni para su hijo. Además tiene el derecho a no responder preguntas si así lo estima conveniente.

Toda la información generada será **confidencial**, para lo cual sus respuestas serán identificadas solamente con un código y su nombre no será escrito en ningún cuestionario. La entrevista será grabada y una vez transcrita (por el mismo investigador), **la grabación será borrada**, de manera que su identidad será preservada y nadie podrá reconocer que el texto de la entrevista corresponde a su vivencia. No se compartirá con nadie la información particular de usted o de su hijo(a). Los análisis de los resultados y de la información de los instrumentos serán discutidos en privado con personas relacionadas a la investigación y no serán conocidos por personas ajenas a la investigación.

La investigación a la que ha sido invitado a participar forma parte a su vez de un proyecto Transcultural: “Adopted adolescents: Attachment and behavior problems” que actualmente liderado por Lausanne University Child and Adolescent Psychiatry Dept. (SUPEA), Suiza. Esto implica que los datos serán trabajados y analizados por investigadores internacionales.

Sin embargo, la investigadora se compromete a codificar previamente los datos, para así resguardar la confidencialidad de los mismos.

Si usted lo requiere, una vez que se hayan analizado todos los datos, se le entregará un resumen con los resultados generales de la investigación.

El informe final, sobre los resultados generales recogidos en esta investigación, será difundido solo en revistas y congresos profesionales, publicaciones científicas y en docencia, **respetando su anonimato y manteniendo la confidencialidad**. Por formar parte de un Proyecto de investigación transcultural, los datos también serán utilizados en publicaciones a nivel internacional, comparando los datos generales chilenos con los de otros países.

Si tiene preguntas respecto a esta investigación, puede contactarse con el investigador responsable: **María Josefina Escobar PhD ©** al mail: mjescoba@uc.cl o al teléfono **+56-2-3541242**. Si tiene preguntas respecto de sus derechos como participante puede contactarse con el **Comité de Ética de la Escuela de Psicología de la Pontificia Universidad Católica de Chile (+56-2-3545883) Vicuña Mackena 4869, Comuna Macul, Santiago**.

Muchas gracias por su valiosa cooperación.

Investigador _____

CONSENTIMIENTO

Declaro que he leído el presente documento, se me ha explicado en que consiste el estudio y mi participación en el mismo, he tenido la posibilidad de aclarar mis dudas y tomo libremente la decisión de participar en el estudio. Así mismo, autorizo la participación de mi hijo, siempre y cuando él/ella acepte participar libre y voluntariamente. Además se me ha entregado de un duplicado firmado de este documento.

Acepto participar en el presente estudio _____

(firma o nombre)

Fecha: _____

5.3.2. Adolescents informed consent letter (Spanish version)



CARTA DE ASENTIMIENTO

Usted ha sido invitado a participar en el estudio *“Estudio multinivel del apego, problemas de comportamiento, empatía y reconocimiento de emociones en adolescentes adoptados con antecedentes de institucionalización temprana”* a cargo del investigador María Josefina Escobar, PhD © alumna del Doctorado Internacional en Psicoterapia dictado por la **Pontificia Universidad Católica de Chile**, en colaboración de la **Universidad de Chile** y la **Universidad de Heidelberg**. El objeto de esta carta es ayudarlo a tomar la decisión de participar en la presente investigación.

El propósito general del estudio es aportar a un área de investigación poco explorada en Chile, acerca de la institucionalización temprana y el desarrollo social de los adolescentes adoptados.

Los resultados esta investigación buscan enriquecer el conocimiento sobre el desarrollo social en adolescentes adoptados en la infancia, además de entregar elementos esclarecedores en temas que continúan siendo controversiales acerca del impacto de la instucionalización temprana. Por lo mismo se espera que las conclusiones de la investigación favorezcan a aumentar los conocimientos en un área en la que faltan respuestas y espera poder aportar datos que aporten en la temática de adopción.

Si bien previamente ha sido autorizado por su padre y/o madre, la decisión de participar en el estudio es de usted. Si usted decide participar en el estudio, se le solicitará que firme esta carta de asentimiento. Su participación consistirá en responder una serie de cuestionarios y se realizará una entrevista semiestructurada. Además, posiblemente, también será invitado a que se le realice un Electroencefalograma (procedimiento inocuo para su persona). Posiblemente su participación se realice en dos reuniones de una hora y media cada una, aproximadamente.

Su participación en el estudio no implica riesgos para usted, salvo la posibilidad de sentirse incómodo(a) al contestar ciertas preguntas o a sentir que se remueven temas que son delicados para usted. Por lo mismo, en caso de necesitar orientación respecto a sus vivencias y temas conversados durante la entrevista y cuestionarios, la investigadora se encuentra disponible a responder sus dudas y orientarlos en caso de ser necesario. Si el tema es muy específico, se le referirá a quien corresponda.

En el caso de que se detectara sintomatología relevante, a través de cuestionarios o en la entrevista, se realizará una devolución verbal para usted respecto al tema. Y en caso de ser necesario, se le entregará un informe sus padres y se realizará la derivación correspondiente

En relación a los beneficios por participar, no existen beneficios directos para usted, participando en este estudio. Sin embargo, los resultados obtenidos en esta investigación favorecerán el desarrollo del conocimiento científico. Además en caso de solicitarlo se le pagará la movilidad hasta el lugar de encuentro.

Se le ha pedido participar en esta actividad en forma **voluntaria**. Usted tiene el derecho a abandonar el estudio sin necesidad de dar ningún tipo de explicación y sin que ello signifique ningún perjuicio para usted. Además tiene el derecho a no responder preguntas si así lo estima conveniente.

Toda la información generada será **confidencial**, para lo cual sus respuestas serán identificadas solamente con un código y su nombre no será escrito en ningún cuestionario. La entrevista será grabada y una vez transcrita (por el mismo investigador), **la grabación será borrada**, de manera que su identidad será preservada y nadie podrá reconocer que el texto de la entrevista corresponde a su vivencia. No se compartirá con nadie la información particular de usted. Los análisis de los resultados y de la información de los instrumentos serán discutidos en privado con personas relacionadas a la investigación y no serán conocidos por personas ajenas a la investigación.

La investigación a la que ha sido invitado a participar forma parte a su vez de un proyecto Transcultural: “Adopted adolescents: Attachment and behavior problems” que actualmente liderado por Lausanne University Child and Adolescent Psychiatry Dept. (SUPEA), Suiza. Esto implica que los datos serán trabajados y analizados por investigadores internacionales. Sin embargo, la investigadora se compromete a codificar previamente los datos, para así resguardar la confidencialidad de los mismos.

Si usted lo requiere, una vez que se hayan analizado todos los datos, se le entregará un resumen con los resultados generales de la investigación.

El informe final, sobre los resultados generales recogidos en esta investigación, será difundido solo en revistas y congresos profesionales, publicaciones científicas y en docencia, **respetando su anonimato y manteniendo la confidencialidad**. Por formar parte de un Proyecto de investigación transcultural, los datos también serán utilizados en publicaciones a nivel internacional, comparando los datos generales chilenos con los de otros países.

Si tiene preguntas respecto a esta investigación, puede contactarse con el investigador responsable: **María Josefina Escobar PhD ©** al mail: mjescoba@uc.cl o al teléfono **+56-2-3541242**. Si tiene preguntas respecto de sus derechos como participante puede contactarse con el **Comité de Ética de la Escuela de Psicología de la Pontificia Universidad Católica de Chile (+56-2-3545883) Vicuña Mackena 4869, Comuna Macul, Santiago**.

Muchas gracias por su valiosa cooperación.

Investigador _____

ASENTIMIENTO

Declaro que he leído el presente documento, se me ha explicado en que consiste el estudio y mi participación en el mismo, he tenido la posibilidad de aclarar mis dudas y tomo libremente la decisión de participar en el estudio. Además se me ha entregado un duplicado firmado de este documento.

Acepto participar en el presente estudio _____

(firma o nombre)

Fecha: _____

5.3.3. Parents informed consent letter for experimental procedure (Spanish version)



CARTA DE CONSENTIMIENTO. EEG

Su hijo ha sido invitado a participar en la segunda fase del estudio que se denomina: *“Estudio multinivel del apego, problemas de comportamiento, empatía y reconocimiento de emociones en adolescentes adoptados con antecedentes de institucionalización temprana”* en el marco de la tesis realizada en el Doctorado Internacional en Psicoterapia dictado por la **Pontificia Universidad Católica de Chile**, en colaboración de la **Universidad de Chile** y la **Universidad de Heidelberg**. El objeto de esta carta es ayudarlo a tomar la decisión de dar la autorización para que su hijo participe en esta fase del estudio.

El propósito general del estudio es aportar a un área de investigación poco explorada en Chile, acerca de la institucionalización temprana y el desarrollo social de los adolescentes adoptados.

Los resultados de esta investigación buscan enriquecer el conocimiento sobre el desarrollo social en adolescentes adoptados en la infancia, además de entregar elementos esclarecedores en temas que continúan siendo controversiales acerca del impacto de la institucionalización temprana en el desarrollo social. Por ello, se espera que las conclusiones de la investigación favorezcan a aumentar los conocimientos en un área en la que faltan respuestas y espera poder aportar datos a la temática de adopción.

Si usted **autoriza la participación de su hijo(a)**, se le aplicarán unos cuestionarios y se le realizará Electroencefalograma (EEG). Este procedimiento permite ver la actividad cerebral mientras ejecuta una actividad simple en un computador, y es totalmente inocuo para su hijo. El registro tomará aproximadamente dos horas.

El EEG se realizará en el Laboratorio de Neurociencias Cognitivas de la Facultad de Psicología de la Universidad Diego Portales. Ubicado en Vergara 275, Santiago Centro. En caso de solicitarlo se enviará un taxi para que retire a su hijo de donde usted nos indique y lo llevará de regreso a la dirección que usted lo indique. La investigadora se hará cargo de los costos de la movilidad.

La participación en esta fase del estudio no implica riesgos para su hijo(a). En relación a los beneficios por participar, no existen beneficios directos para usted o su hijo(a) participando en este estudio. Sin embargo, los resultados obtenidos en esta fase serán innovadores y *exploratorios* ya que no hay precedentes de estudios a nivel neurofisiológico con adolescentes adoptados. Por ello los datos favorecerán el desarrollo del conocimiento científico.

La participación de su hijo en esta fase será **voluntaria**. Su hijo tiene el derecho a abandonar el estudio sin necesidad de dar ningún tipo de explicación y sin que ello signifique ningún perjuicio para usted, ni para su hijo.

Toda la información generada será **confidencial**, para lo cual sus respuestas serán identificadas solamente con un código y su nombre no será escrito en ningún cuestionario. No se compartirá con nadie la información particular de su hijo(a). Los análisis de los resultados del EEG y la información de los instrumentos serán discutidos en privado con personas relacionadas a la investigación y no serán conocidos por personas ajenas a la investigación.

El informe final, sobre los resultados generales recogidos en esta investigación, será difundido solo en revistas y congresos profesionales, publicaciones científicas y en docencia, **respetando su anonimato y manteniendo la confidencialidad**.

Si tiene preguntas respecto a esta investigación, puede contactarse con el investigador responsable: **María Josefina Escobar PhD ©** al mail: mjescoba@uc.cl o al teléfono **+56-2-3541242** o al celular **+ 56- 9- 94378947**. Si tiene preguntas respecto de sus derechos como participante puede contactarse con el **Comité de Ética de la Escuela de Psicología de la Pontificia Universidad Católica de Chile** al mail: comite.etica.psicologia@uc.cl.

Muchas gracias por su valiosa cooperación.

Investigador _____

CONSENTIMIENTO

Declaro que he leído el presente documento, se me ha explicado en qué consiste esta fase del estudio y autorizo la participación de mi hijo(a), siempre y cuando él/ella acepte participar libre y voluntariamente. Además se me ha dado entrega de un duplicado firmado de este documento.

Acepto participar en el presente estudio _____(firma o nombre)

Fecha: _____

5.4. Appendix 4. Adoption policies in Chile

5.4.1. Statistics about adoption in Chile

Currently, there are two types of adoption taking place in Chile, national adoptions and international adoptions (UNICEF, 1999). While research on adoption has reached the level of the scientific community, in recent decades mainly international adoptions have been studied. However, in Chile and in other Latin American countries national adoptions continue to dominate. Over 81% of cases of adoptions of country applicants are resident in Chile (SENAME 2012). Most international adoptions are children leaving the country to be placed for adoption, mainly, in Italy followed by Norway as countries of destination. According to SENAME in 2011 there were 538 national adoptions against 122 international adoptions. In relation to the age of adoption, in 2011 there were 218 adoptions of children under 1 year old and 442 adoptions of children of over a year (SENAME 2012).

Currently there are 4 accredited national organizations to develop adoption programs for the Servicio Nacional de Menores (SENAME). These organisms are: Fundación Chilena de la Adopción, Fundación San José para la Adopción; Fundación mi Casa and el Instituto chileno de Colonias y campamentos. At present there are no post-adoption monitoring policies, although it has been recommended and the procedure depends on the organism responsible for the adoption.

4.1. Institutions in Chile

In Chile there is a predominance of residential centers versus the alternative of Foster Care, as reported by the Statistical Bulletin boys/girls and adolescents from the Department of management planning and control (SENAME, 2010). The dominant programmatic lines of protection for children and adolescents seriously violate their rights and when they are separated from their families of origin they must remain in Residential Centers. In 2010, 15,403 children and young people at the national level

between 0 and 18 years old attended residential centers, whereas Foster Care Programs in the same period only attended to 4,199 children who were victims of situations of abuse, neglect or intra-family violence. In terms of the quality of these centers, in 2011 Resolution 0765 established some norms about the ratio children - caregivers. Regarding the standards set on the number of caregivers for children, a system of care for children and adolescents through the SENAME network of collaborators was established as well as a subsidy scheme. During the day the residence must have a staff of educators of 1 for every 7 children and adolescents working in shifts. During the night, the number of educators that should remain in the residence must allow for effective protection of the integrity of children and adolescents, preferably keeping proportion indicated for daytime, in order to ensure the children and adolescents' permanent protection.

Despite the conditions stipulated by the state on the conditions in which the residential centers must operate, there are controversies regarding the conditions in which some residential centers operate and there are few economic resources which results in a high turnover of caregivers. The following links are journalistic reports that go deeper into this matter:

<http://ciperchile.cl/2013/07/04/ninos-protegidos-por-el-estado-los-estremecedores-informes-que-el-poder-judicial-mantiene-ocultos/>;

<http://ciperchile.cl/2013/07/09/ninos-protegidos-por-el-estado-ii-la-falta-endemica-de-recursos-que-los-deja-sin-la-minima-asistencia/>

5.5. Appendix 5. Sample description

5.5.1. Sample description and procedure

Adopted adolescents that matched the inclusion criteria were found in the adoption registration and contacted through three authorized adoption agencies in Chile: “*Servicio Nacional de Menores*” (SENAME), “*Fundación Chilena para la Adopción*” and “*Fundación San José para la Adopción*”. The adoption agencies made the first contact with the families and invited them to participate in the study. Researchers only had access to the data of 37 families who had authorized being contacted for the study. Of these, seven families were excluded from the study because they finally decided not to participate. The reasons for not participating were: in three cases they felt that they did not want to stir up past issues, in three other cases the adolescent refused to participate and in one case the mother said she would only participate if the adolescent wouldn't be interviewed because he did not know yet he was adopted. And five cases were excluded because they did not meet the criteria for inclusion in the study. In one case the adolescent had a developmental disorder and in four cases the adoptions were early (before the age of 6 months). Finally, the sample consisted of 25 adoptive families.

The adopted groups differed in terms of age at adoption: one group of adolescents who at the time of adoption were at least 6 months old and less than 24 months old ($N=14$; 5 female); and the second group of adolescents who at the time of adoption were at least 24 months old and less than 6 years old ($N= 11$; 6 female).

Both groups before being adopted were in the institutional system except 4 adolescents who were both in the institutional system and foster care system.

The control group were non-adopted adolescents who were born and raised in their biological families ($N=25$; 11 female). The members of the non-adopted group were

matched for sex, age, educational level and socioeconomic status with the members of the adopted group.

Table 1: Descriptive analysis of the sample

	Adopted from ≥ 6 to 23 months		Adopted from ≥ 2 to 6 years		Non-adopted		Total	
	No.	%	No.	%	No.	%	No.	%
Sex								
Male	9	64.3	5	45.5	14	56	28	56
Female	5	35.7	6	54.5	11	44	22	44
Total	14	100	11	100	25	100	50	100
	<i>M</i>	DS	<i>M</i>	DS	<i>M</i>	DS	<i>M</i>	DS
Age at assessment	13.21	1.88	12.36	1.43	12.96	1.79	12.9	1.74
Age at adoption	10.14	5.09	46.09	14.61	...	...	25.96	20.85
Age of mother	50.21	5.29	47.27	5.57	41.32	10.67	45.12	9.25
Age of father	54.64	9.45	47.55	5.77	42.92	11.53	47.22	10.99

Exclusion criteria used in this study included adolescents with mental disabilities or a serious psychiatric illness in their medical history reported by the mother. And the inclusion criteria were that all the adopted adolescents had been placed in an institution or foster care and had been adopted at least 6 months old and less than 6 years old, that the adolescents were aged 11 to 18 years and that their mother had to participate in the study.

The family's socio-economic level was defined according to the parents' level of education and their occupation in the following way: high socio-economic level (38%); middle socio-economic level (58%); low socio-economic level (4%). Marital status was considered in a dichotomous manner to contrast two-parent families with parents who lives together (adoptive families $N=23$, 92%; biological families $N=16$, 64%) and alternative situations of single parenthood with the parent living alone because of being single, divorced or widowed (adoptive families $N=2$, 8% and biological families $N=9$, 36%). With regard to the family structure of the adoptive families: 6 had only one child, 14 had 2 children, 3 had 3 children and 2 families had 4 children. In families with more than one child, 7 families had both adopted children and biological children; 8 had only adopted children, 4 had adopted biological siblings. In non-adoptive families, only 2

cases had only one child, 23 had more children (9 had two children, 7 had 3 children and 7 had 4 children).

Regarding the process of adopting, the mothers answered two questions, namely how long did the process of adaptation take and how had the adaptation process been.

Table 2. Adaptation process

Adaptation time		Grade of difficulty	
0-6 months	18	Difficult	6
6 months to 1 year	2	Good, but with some difficult	6
1 to 3 years	1	Good	3
Still in the process	4	Very good	10
Total	25	Total	25

5.2. Sample for experimental procedure

For the experimental activity 40 adolescents who were born in Chile participated. The age range was 11 to 15 years. The adopted groups differed in terms of age at adoption: one group of adolescents who at the time of adoption were at least 6 months old and less than 24 months old ($N=10$; 3 female); and the second group of the adolescents who at the time of adoption were at least 24 months old and less than 6 years old ($N= 10$; 6 female). The control group were non-adopted adolescents who were born and raised in their biological families ($N=20$; 9 female). The members of the non-adopted group were matched for sex, age, educational level and socioeconomic status with the members of the adopted group.

5.6. Appendix 6. T-test for the comparison codes of the Friends and Family Interview between adopted mothers and non-adopted mothers.

	Statistic by group			T-test for mean equality		
	Group	Mean	SD	T	Fd.	Sig. (bil)
Coherence/Truth	Adopted	2.96	.84	-2.249*	48	.029
	Non- Adopted	3.40	.50			
Coherence/Economy	Adopted	2.44	.92	-1.960	48	.056
	Non- Adopted	2.92	.81			
Coherence/Relation	Adopted	2.44	.71	-2.541*	48	.014
	Non- Adopted	2.96	.73			
Coherence/Manner	Adopted	3.52	.77	-.842	48	.404
	Non- Adopted	3.68	.56			
Coherence/Overall	Adopted	2.88	.60	-.496	48	.622
	Non- Adopted	2.96	.54			
Reflective Functioning/Development Perspective	Adopted	2.60	.91	-1.633	48	.109
	Non- Adopted	3.00	.82			
Reflective Functioning/ Theory of Mind/ mother	Adopted	2.44	.92	-.158	48	.875
	Non- Adopted	2.48	.87			
Reflective Functioning/ Theory of Mind/ father	Adopted	2.36	.86	.845	48	.402
	Non- Adopted	2.12	1.13			
Reflective Functioning/ Theory of Mind /friend	Adopted	2.48	1.05	-.308	48	.759
	Non- Adopted	2.56	.77			
Reflective Functioning/ Theory of Mind /teacher	Adopted	2.08	.95	-2.128*	48	.039
	Non- Adopted	2.60	.76			
Reflective Functioning/ Diversity of Feeling /self	Adopted	3.12	.93	-1.823	40.528	.076
	Non- Adopted	3.52	.59			
Reflective Functioning/ Diversity of Feeling /mother	Adopted	2.32	1.25	-1.536	48	.131
	Non- Adopted	2.84	1.14			
Reflective Functioning/ Diversity of Feeling /father	Adopted	2.40	1.12	-1.535	48	.131
	Non- Adopted	2.88	1.09			
Reflective Functioning/ Diversity of Feeling /friend	Adopted	2.00	1.19	-1.769	48	.083
	Non- Adopted	2.56	1.04			
Reflective Functioning/ Diversity of Feeling /sibling	Adopted	2.20	1.58	-2.608*	35.054	.013
	Non- Adopted	3.12	.78			
Reflective Functioning/ Diversity of Feeling /teacher	Adopted	1.36	.76	.000	48	1.000
	Non- Adopted	1.36	.70			
Evidence of Safe Haven/Secure Base /mother	Adopted	2.88	.88	-1.176	48	.245
	Non- Adopted	3.16	.80			
Evidence of Safe Haven/Secure Base /father	Adopted	2.08	.81	-1.169	48	.248
	Non- Adopted	2.32	.63			
Evidence of Safe Haven/Secure Base /other	Adopted	.64	1.19	1.440	39.687	.158
	Non- Adopted	.24	.72			
Evidence of Self Esteem/ Social competence	Adopted	3.08	.76	-.602	48	.550
	Non- Adopted	3.20	.64			
Evidence of Self Esteem/School competence	Adopted	2.52	.65	-.228	48	.820
	Non- Adopted	2.56	.58			
Evidence of Self Esteem/Self regard	Adopted	2.92	.64	-.226	48	.822
	Non- Adopted	2.96	.61			
Peer Relations/ Frequency of contact	Adopted	2.04	1.27	.554	48	.582
	Non- Adopted	1.84	1.28			
Peer Relations/Quality of Contact	Adopted	2.80	.91	-.840	48	.405
	Non- Adopted	3.00	.76			
Sibling Relations/Warmth Sibling 1	Adopted	2.20	1.53	-1.470	38.629	.150
	Non- Adopted	2.72	.89			
Sibling Relations/Hostility Sibling 1	Adopted	1.32	.99	-1.321	48	.193
	Non- Adopted	1.64	.70			
Sibling Relations/Rivalry Sibling 1	Adopted	1.04	.98	-.728	48	.470
	Non- Adopted	1.20	.50			
Anxieties and Defense/ Idealization /self	Adopted	1.40	.71	1.225	38.400	.228
	Non- Adopted	1.20	.41			
Anxieties and Defense// Idealization /mother	Adopted	1.84	.99	3.333**	33.172	.002
	Non- Adopted	1.12	.44			
Anxieties and Defense// Idealization /father	Adopted	1.60	.82	3.331**	26.870	.003
	Non- Adopted	1.04	.20			
Anxieties and Defense/Role reversal /mother	Adopted	1.32	.75	1.807	27.411	.082
	Non- Adopted	1.04	.20			
Anxieties and Defense/Role reversal /father	Adopted	1.12	.33	1.033	48	.307
	Non- Adopted	1.04	.20			
Anxieties and Defense/anger /mother	Adopted	1.32	.63	.000	48	1.000
	Non- Adopted	1.32	.56			
Anxieties and Defense/anger /father	Adopted	1.64	1.04	.932	48	.356
	Non- Adopted	1.40	.76			
Anxieties and Defense/Derogation /self	Adopted	1.20	.58	.551	48	.584
	Non- Adopted	1.12	.44			
Anxieties and Defense/Derogation /mother	Adopted	1.00	.00	-1.000	24.000	.327
	Non- Adopted	1.08	.40			
Anxieties and Defense/Derogation /father	Adopted	1.16	.62	.000	48	1.000
	Non- Adopted	1.16	.62			
Anxieties and Defense/ Adaptive response	Adopted	2.68	.85	-1.051	48	.298
	Non- Adopted	2.92	.76			
Differentiation of Parental Representations	Adopted	3.36	.91	.534	48	.596
	Non- Adopted	3.24	.66			
Non-Verbal Codes/Fear-Distress	Adopted	1.24	.44	.335	48	.739
	Non- Adopted	1.20	.41			
Non-Verbal Codes/Frustration-anger	Adopted	1.16	.47	1.693	24.000	.103
	Non- Adopted	1.00	.00			

* Significant differences at the 0.05 level (2-tailed). ** Significant differences at the 0.01 level (2-tailed).

5.7. Appendix 7. T-test for the comparison codes of the Parental Development Interview between adopted mothers and non-adopted mothers.

	Statistic by group			T-test for mean equality		
	Group	Mean	SD	T	Fd.	Sig. (bil)
Parent Affective Experience Codes/Anger Degree	Adopted	2.36	.700	1.120	48	.268
	Non- Adopted	2.16	.554			
Parent Affective Experience Codes/Anger Expression	Adopted	2.32	.802	1.126	48	.266
	Non- Adopted	2.08	.702			
Parent Affective Experience Codes/Need for support/Level of need	Adopted	1.96	.790	-1.092	48	.280
	Non- Adopted	2.20	.764			
Parent Affective Experience Codes/Need for support/Satisfaction with support	Adopted	2.84	1.143	.000	41.308	1.000
	Non- Adopted	2.84	.746			
Parent Affective Experience Codes/Guilt	Adopted	1.96	.611	-1.087	48	.283
	Non- Adopted	2.16	.688			
Parent Affective Experience Codes/Joy/Pleasure	Adopted	2.96	.889	-1.344	48	.185
	Non- Adopted	3.28	.792			
Parent Affective Experience Codes/Competence	Adopted	2.72	.843	-2.098*	48	.041
	Non- Adopted	3.16	.624			
Parent Affective Experience Codes/Confidence	Adopted	3.12	.726	.681	48	.499
	Non- Adopted	3.00	.500			
Parent Affective Experience Codes/Level of child focus	Adopted	3.00	.913	.176	44.229	.861
	Non- Adopted	2.96	.676			
Parent Affective Experience Codes/Disappointment/Despair	Adopted	1.68	.900	1.561	37.074	.127
	Non- Adopted	1.36	.490			
Parent Affective Experience Codes/Warmth	Adopted	2.72	.843	-2.662*	48	.011
	Non- Adopted	3.32	.748			
Parent Affective Experience Codes/Attachment awareness & promotion	Adopted	2.92	.862	-1.701	48	.095
	Non- Adopted	3.28	.614			
Parent Affective Experience Codes/Hostility	Adopted	1.68	.900	1.641	42.861	.108
	Non- Adopted	1.32	.627			
Child Affective experience codes/Child aggression/Anger	Adopted	2.00	.645	-1.572	48	.123
	Non- Adopted	2.28	.614			
Child Affective experience codes/Child Happiness	Adopted	2.72	.843	-.187	48	.853
	Non- Adopted	2.76	.663			
Child Affective experience codes/Child controlling/Manipulating	Adopted	2.24	.970	2.077*	48	.043
	Non- Adopted	1.72	.792			
Child Affective experience codes/Child affection	Adopted	3.28	.843	-2.196*	40.940	.034
	Non- Adopted	3.72	.542			
Child Affective experience codes/Child rejecting	Adopted	1.60	.707	1.395	42.726	.170
	Non- Adopted	1.36	.490			
Global Codes/Parent reflection on relationship	Adopted	2.88	.726	-2.294*	48	.026
	Non- Adopted	3.32	.627			
Global Codes/Coherence	Adopted	3.16	.473	-.268	48	.790
	Non- Adopted	3.20	.577			
Global Codes/Richness of perceptions	Adopted	3.08	.812	-1.677	48	.100
	Non- Adopted	3.40	.500			
Global Codes/Description of relationship	Adopted	3.16	1.344	-1.292	38.165	.204
	Non- Adopted	3.56	.768			

* Significant differences at the 0.05 level (2-tailed).

5.8. Appendix 8. T-test for the comparison of performance emotional morphing between adopted adolescents and non-adopted adolescents.

	Group	Statistic by group		T-test for mean equality		
		Mean	SD	T	Fd.	Sig. (bil)
Happy Accuracy	Adopted	7.75	.63	-.556	38	.582
	Non- Adopted	7.85	.48			
Disgust Accuracy	Adopted	5.40	2.30	.232	38	.818
	Non- Adopted	5.25	1.74			
Anger Accuracy	Adopted	5.85	1.75	-1.069	38	.292
	Non- Adopted	6.35	1.13			
Fear Accuracy	Adopted	5.00	2.51	-1.103	38	.277
	Non- Adopted	5.75	1.71			
Surprise Accuracy	Adopted	7.15	1.08	-.315	38	.754
	Non- Adopted	7.25	.91			
Sadness Accuracy	Adopted	4.95	1.70	-.795	38	.432
	Non- Adopted	5.40	1.87			
Happy / Reaction Time	Adopted	7014.19	2104.45	1.803	38	.079
	Non- Adopted	5934.66	1654.97			
Disgust / Reaction Time	Adopted	8596.44	1737.66	.686	38	.497
	Non- Adopted	8173.1333	2142.11			
Anger / Reaction Time	Adopted	9265.31	2071.30	.609	38	.546
	Non- Adopted	8886.58	1856.65			
Fear / Reaction Time	Adopted	8887.70	2320.10	1.122	38	.269
	Non- Adopted	8106.62	2077.51			
Surprise / Reaction Time	Adopted	8322.82	2172.19	1.687	38	.100
	Non- Adopted	7275.52	1729.40			
Sadness / Reaction Time	Adopted	10003.69	1794.28	.353	38	.726
	Non- Adopted	9764.67	2440.61			

* Significant differences at the 0.05 level (2-tailed).

5.9. Appendix 9. Instruments in Spanish version

9.1. Family data form and adoption background

Padres Adoptivos

MADRE	PADRE
Nombre:.....	Nombre:.....
Apellido:.....	Apellido:.....
Dirección:.....	Dirección:.....
Tel :.....	Tel :.....
E-mail :.....	E-mail :.....
Edad de la adopción:	Edad de la adopción:
Edad actual:.....	Edad actual:.....
Nivel de educación:	Nivel de educación:
1. Educación básica incompleta o inferior.	1. Educación básica incompleta o inferior.
2. Básica completa.	2. Básica completa.
3. Media incompleta (incluyendo Media Técnica).	3. Media incompleta (incluyendo Media Técnica).
4. Media completa. Técnica incompleta.	4. Media completa. Técnica incompleta.
5. Universitaria incompleta. Técnica completa.	5. Universitaria incompleta. Técnica completa.
6. Universitaria completa.	6. Universitaria completa.
7. Post Grado (Master, Doctor o equivalente).	7. Post Grado (Master, Doctor o equivalente).
Años de estudio después de la escuela obligatoria:	Años de estudio después de la escuela obligatoria:
Profesión actual:.....	Profesión actual:.....
Status profesional:	Status profesional:
1. Trabajos menores ocasionales e informales (lavado, aseo, servicio doméstico ocasional, “pololos”, cuidador de autos, limosna).	1. Trabajos menores ocasionales e informales (lavado, aseo, servicio doméstico ocasional, “pololos”, cuidador de autos, limosna).
2. Oficio menor, obrero no calificado, jornalero, servicio doméstico con contrato.	2. Oficio menor, obrero no calificado, jornalero, servicio doméstico con contrato.
3. Obrero calificado, capataz, junior, micro empresario (kiosco, taxi, comercio menor, ambulante).	3. Obrero calificado, capataz, junior, micro empresario (kiosco, taxi, comercio menor, ambulante).
4. Empleado administrativo medio y bajo, vendedor, secretaria, jefe de sección. Técnico especializado.	4. Empleado administrativo medio y bajo, vendedor, secretaria, jefe de sección. Técnico especializado.
Profesional independiente de carreras técnicas (contador, analista de sistemas, diseñador, músico). Profesor Primario o Secundario	Profesional independiente de carreras técnicas (contador, analista de sistemas, diseñador, músico). Profesor Primario o Secundario
5. Ejecutivo medio (gerente, sub-gerente), gerente general de empresa media o pequeña. Profesional independiente de carreras tradicionales (abogado, médico, arquitecto, ingeniero, agrónomo).	5. Ejecutivo medio (gerente, sub-gerente), gerente general de empresa media o pequeña. Profesional independiente de carreras tradicionales (abogado, médico, arquitecto, ingeniero, agrónomo).
6. Alto ejecutivo (gerente general) de empresa grande. Directores de grandes empresas. Empresarios propietarios de empresas medianas y grandes. Profesionales independientes de gran prestigio.	6. Alto ejecutivo (gerente general) de empresa grande. Directores de grandes empresas. Empresarios propietarios de empresas medianas y grandes. Profesionales independientes de gran prestigio.
Estado civil:.....	Estado civil:.....
Religión:.....	Religión:.....

¿Quién rellena el cuestionario? Madre / Padre

Los padres continúan viviendo juntos: si / no

Los padres están: viviendo juntos sin estar casados /casados / separados / divorciados

Número de años de la relación de los padres:.....

Número de años casados:..... Este es el primer matrimonio: si / no

Datos del niño

Nombre y Apellido:.....

Dirección actual:.....

Edad actual de su hijo/a:.....

Fecha de Nacimiento:.....

Edad de la adopción:.....

País de origen:.....

Nombre que tenía al nacer:.....

¿Donde estaba su hijo antes de la adopción?

- En su familia
- En una familia guardadora
- Institución
- Otros:

Hermanos y hermanas:

Fecha de Nacimiento	Genero	Adoptados	Fecha de la adopción	Edad de la adopción
		Si / No		
		Si / No		
		Si / No		
		Si / No		

Estado de Salud

¿Tiene usted información sobre el estado de salud de su hijo antes de la adopción? Si / No

¿Tiene usted información sobre el nacimiento de su hijo? Si / No

Si respondió que Si, ¿sabe si presentó?

- Prematurez
- Bajo peso
- Retraso en el crecimiento intrauterino

- Falta de atención médica
- Otros:

Al momento de la adopción, ¿su hijo sufría alguna enfermedad diagnosticada?

Si / No. Si respondió que si, ¿qué tipo de enfermedad?

.....

En el exámen medico a su llegada, ¿el médico encontró alguna patología que usted ignoraba? Si /No. Si respondió que si, ¿qué tipo?

¿Tiene su hijo alguna enfermedad médica o psicológica en este momento? Si / No.

Si respondió que si, ¿qué tipo?

.....

¿Recibe su hijo en este momento algún tratamiento médico? Si / No. Si respondió que si, ¿qué tipo?

.....

¿Su hijo ha llegado a la pubertad? Si / No / No sé

Rendimiento escolar del niño

¿En qué nivel de la escuela está su hijo/a ?.....

¿Está su hijo/a en el nivel escolar que corresponde para su edad?

- Si
- No, él/ella es un año mayor que los otros niños de su clase
- No, él/ella es dos años mayor que los otros niños de su clase

¿Qué puede decir acerca de la escuela y su hijo?

.....

Sobre la Adopción

Motivos de la adopción:

- Infertilidad: Padre / Madre
- Compromiso social
- Otros:

Historia de adopción

- Los padres tenían datos antes de la adopción: Si / No
- Antes de la adopción el niño estaba:
 - En una institución:
 - Si, ¿cuanto tiempo?
 - No
 - En una familia guardadora:
 - Si, ¿cuanto tiempo?
 - No
 - En su familia:
 - Si
 - No

¿Sabe su hijo/a que él/ella ha sido adoptado/a? Si / No

¿Cuándo supo su hijo/a que él/ella era adoptado/a?

.....

¿En qué circunstancias él/ella supo que él/ella había sido adoptado/a?

.....
.....

¿Como reaccionó él/ella?

.....
.....

¿Como ha reaccionado su hijo/a cuando usted ha hablado sobre la adopción?

.....
.....

¿Su hijo/a continúa manteniendo contacto con sus padres biológicos? Si /No

Si respondió que si, ¿con qué frecuencia?.....

¿Qué tipo de contacto su hijo/a ha mantenido con sus padres biológicos?

.....
.....

Si respondió que no, ¿Quiere su hijo/a encontrar a sus padres biológicos? Si / No

Proceso de adaptación general

¿Cuánto tiempo cree usted que ha durado el proceso de adaptación de su hijo/a?

- 0-6 meses
- 6 meses a un año
- 1 a 3 años
- Más de tres años
- Mi niño está todavía en proceso de adaptación

En general, cree que la adaptación de su hijo ha sido:

- Difícil
- Buena, pero con algunas dificultades
- Buena
- Muy buena

5.9.2. Family data form for control group

Padres

MADRE	PADRE
Nombre:.....	Nombre:.....
Apellido:.....	Apellido:.....
Dirección:.....	Dirección:.....
Tel :.....	Tel :.....
E-mail :.....	E-mail :.....
Edad actual:.....	Edad actual:.....
Nivel de educación:	Nivel de educación:
1. Educación básica incompleta o inferior.	1. Educación básica incompleta o inferior.
2. Básica completa.	2. Básica completa.
3. Media incompleta (incluyendo Media Técnica).	3. Media incompleta (incluyendo Media Técnica).
4. Media completa. Técnica incompleta.	4. Media completa. Técnica incompleta.
5. Universitaria incompleta. Técnica completa.	5. Universitaria incompleta. Técnica completa.
6. Universitaria completa.	6. Universitaria completa.
7. Post Grado (Master, Doctor o equivalente).	7. Post Grado (Master, Doctor o equivalente).
Años de estudio después de la escuela obligatoria:	Años de estudio después de la escuela obligatoria:
Profesión actual:.....	Profesión actual:.....
Status profesional:	Status profesional:
1. Trabajos menores ocasionales e informales (lavado, aseo, servicio doméstico ocasional, “pololos”, cuidador de autos, limosna).	1. Trabajos menores ocasionales e informales (lavado, aseo, servicio doméstico ocasional, “pololos”, cuidador de autos, limosna).
2. Oficio menor, obrero no calificado, jornalero, servicio doméstico concontrato.	2. Oficio menor, obrero no calificado, jornalero, servicio doméstico con contrato.
3. Obrero calificado, capataz, junior, micro empresario (kiosco, taxi, comercio menor, ambulante).	3. Obrero calificado, capataz, junior, micro empresario (kiosco, taxi, comercio menor, ambulante).
4. Empleado administrativo medio y bajo, vendedor, secretaria, jefe de sección. Técnico especializado. Profesional independiente de carreras técnicas (contador, analista de sistemas, diseñador, músico). Profesor Primario o Secundario	4. Empleado administrativo medio y bajo, vendedor, secretaria, jefe de sección. Técnico especializado. Profesional independiente de carreras técnicas (contador, analista de sistemas, diseñador, músico). Profesor Primario o Secundario
5. Ejecutivo medio (gerente, sub-gerente), gerente general de empresa media o pequeña. Profesional independiente de carreras tradicionales (abogado, médico, arquitecto, ingeniero, agrónomo).	5. Ejecutivo medio (gerente, sub-gerente), gerente general de empresa media o pequeña. Profesional independiente de carreras tradicionales (abogado, médico, arquitecto, ingeniero, agrónomo).
6. Alto ejecutivo (gerente general) de empresa grande. Directores de grandes empresas. Empresarios propietarios de empresas medianas y grandes. Profesionales independientes de gran prestigio.	6. Alto ejecutivo (gerente general) de empresa grande. Directores de grandes empresas. Empresarios propietarios de empresas medianas y grandes. Profesionales independientes de gran prestigio.
Estado civil:.....	Estado civil:.....
Religión:.....	Religión:.....

Quién rellena el cuestionario? Madre / Padre

Los padres continúan viviendo juntos: si / no

Los padres están: viviendo juntos sin estar casados / casados / separados / divorciados

Número de años de la relación de los padres:.....

Número de años casados:..... Este es el primer matrimonio: si / no

Datos del niño

Nombre y Apellido:.....

Dirección actual:.....

Edad actual de su hijo/a:.....

Fecha de Nacimiento:.....

País de origen:.....

Hermanos y hermanas:

Fecha de Nacimiento	Genero	Adoptados	Fecha de la adopción	Edad de la adopción
		Si / No		
		Si / No		
		Si / No		
		Si / No		

Estado de Salud

Sobre el nacimiento de su hijo: ¿recuerda si presentó?

- Prematurez
- Bajo peso
- Retraso en el crecimiento intrauterino
- Falta de atención médica
- Otros:

¿Tiene su hijo alguna enfermedad médica o psicológica en este momento? Si / No.

Si respondió que si, ¿qué tipo?

¿Recibe su hijo en este momento algún tratamiento médico? Si / No. Si respondió que si, ¿qué tipo?

.....

¿Su hijo ha llegado a la pubertad? Si / No / No sé

Rendimiento escolar del niño

¿En qué nivel de la escuela está su hijo/a ?.....

¿Está su hijo/a en el nivel escolar que corresponde para su edad?

- Si
- No, él/ella es un año mayor que los otros niños de su clase
- No, él/ella es dos años mayor que los otros niños de su clase

¿Qué puede decir acerca de la escuela y su hijo? (apunta al rendimiento)

5.9.3. *Friends and Family Interview (Howard Steele and Miriam Steele, 2003). Spanish version (Translation by Francisca Herreros)*

Introducción.

Me gustaría saber acerca de ti, qué tipo de persona eres, qué es lo que más te gusta hacer. También me gustaría saber acerca de tus relaciones con tus amigos y familiares. En general todos tenemos cosas que nos gustan más de nosotros mismos y de otras personas, y otras cosas que nos gustan menos (o nada) acerca de nosotros mismos o de otras personas. Podemos hablar sobre esto mientras te hago las siguientes preguntas.

[Recuérdale de su derecho a no contestar y sobre confidencialidad]

Quiero que te quede claro que está bien si no quieres contestar alguna de estas preguntas. Sólo tienes que decírmelo y pasamos a la siguiente pregunta. Y recuerda que todo lo que me digas aquí queda entre nosotros y nadie más lo va a saber, así que me puedes contar lo que quieras.

¿Tienes alguna pregunta antes de empezar?

PARTE 1: Si mismo

[Escribe los nombres para preguntar por los hermanos más adelante]

1. ¿Me podrías describir a las personas más cercanas a ti de tu familia? Los que viven en tu casa o los que son cercanos a ti pero no viven contigo.

2. Para hacerme una mejor idea de cómo eres ¿me podrías contar que tipo de cosas te gusta hacer?

[Elige una de las actividades y pide un ejemplo]

Me puedes contar de alguna vez en que estabas haciendo [X] –por ejemplo: ¿quién estaba ahí, ¿qué hiciste? ¿cómo te sentiste? ¿qué sucedió al final?

3. Me has contado acerca de lo que más te gusta hacer. ¿me puedes contar ahora como eres tú como persona?

[Busca adjetivos o frases descriptivas]

¿Que sabría acerca de ti alguien que te conoce bien?

4. ¿Qué es lo que más te gusta de ti mismo? ¿Cuál es tu característica favorita?

[Ejemplo específico]

¿Me puedes contar de alguna vez en que fuiste así/hiciste eso?

¿Qué es lo que menos te gusta de ti mismo? ¿Hay algo que no te guste mucho de ti?

[Ejemplo específico]

¿Me puedes contar de alguna vez en que fuiste así/hiciste eso?

5. ¿Qué haces usualmente cuando estas triste o preocupado?

[Ejemplo específico]

¿Qué pasa después?

¿Hay alguien con quien hablar o a quien pedir ayuda?

¿Me puedes contar de alguna vez en que estuviste triste o preocupado?

2: ESCUELA-AMIGOS

Ahora te preguntaré acerca de cómo te sientes en la escuela y como es tu relación con tus amigos.

[Descripción General]

6. ¿Cómo es para ti estar en la escuela? Como te sientes ahí?

7. ¿Has tenido exámenes últimamente?

¿Ha cambiado tu relación con tus amigos por estos exámenes?

8. ¿Te vas a cambiar de escuela luego?

¿Cómo te sientes acerca de esto?

¿Piensas que tu relación con tus amigos va a cambiar por eso?

¿Cómo crees que te vas a sentir en tu nueva escuela?

¿Crees que te será fácil hacer nuevos amigos?

9. Ahora te voy a hacer preguntas acerca de tu profesor/a

[Profesor/a favorito/a o del curso preferido]

¿Cómo es él/ella?

[Ejemplos]

¿Qué es lo que más te gusta de él/ella?

¿Me puedes dar un ejemplo de alguna vez en que el/ella fue así/hizo eso?

¿Qué crees que tu profesor/a piensa de ti?

10. Ahora hablaremos de tus amigos. ¿Me puedes nombrar a tres de tus mejores amigos?

[Obtener ideas de amigos en general. Ve si pasan tiempo fuera de la escuela también]

¿Quién dirías que es tu mejor amigo?

[SI NADIE, pregunta: ¿Te gustaría tener un mejor amigo? Si no, pregunta de algún amigo cercano]

¿Cuánto tiempo han sido amigos?

¿Qué tipo de cosas hacen juntos?

¿Cuán a menudo se ven con tu amigo?

11. ¿Qué es lo que más te gusta de tu relación con [X]?

¿Qué es lo que menos te gusta de tu amistad con [X]?

12. ¿Te has enojado alguna vez con [X]?

[*Hechos específicos*]

¿Cómo comenzó?

¿Qué hiciste tú, cómo respondiste?

¿Cómo terminó todo?

¿Cómo te sentiste? ¿Cómo crees que él se sintió?

13. ¿Has tenido alguna vez envidia de tu amigo?

¿Me puedes contar de alguna vez en que él te dio envidia?

Creas que [X] ha tenido envidia de ti alguna vez?

¿Me puedes contar de alguna vez que esto pasó?

14. ¿Qué crees que [X] piensa de ti?

3: PADRES Y HERMANOS

Ahora me gustaría preguntarte acerca de las relaciones en tu familia.

15. ¿Me puedes contar un poco acerca de tu relación con tu mamá?

[*Si no da un ejemplo específico pídele que te describa con un ejemplo*]

¿Cómo te sientes cuando tú y tu mamá están juntos?

¿Me puedes contar de alguna vez en que fue [te sentiste] así?

16. ¿Qué es lo mejor de tu relación con tu mamá?

¿Me puedes contar de alguna vez en que fue [te sentiste] así?

¿Qué es lo que menos te gusta de tu relación con tu mamá?

¿Me puedes contar de alguna vez en que fue [te sentiste] así?

17. ¿Qué crees que tu mamá piensa de ti?

18. ¿Me puedes contar un poco acerca de tu relación con tu papá?

¿Cómo te sientes cuando tú y tu papá están juntos?

¿Me puedes contar de alguna vez en que fue [te sentiste] así?

19. ¿Qué es lo mejor de tu relación con tu papá?

¿Me puedes contar de alguna vez en que fue [te sentiste] así?

¿Qué es lo que menos te gusta de tu relación con tu papá?

¿Me puedes contar de alguna vez en que fue [te sentiste] así?

20. ¿Qué crees que tu papá piensa de ti?

21. ¿Te acuerdas de la primera vez que te separaste de tus padres?

[*“Quizá la primera vez que fuiste al colegio o que pasaste la noche en la casa de un amigo...”*]

¿Qué edad tenías?

¿Te acuerdas de cómo te sentiste?

¿Cómo crees que tus padres se sintieron esa vez?

[Si el niño tiene hermanos haz pregunta 22 y 23 por cada uno, si no pasa a la pregunta 24]

22. Ahora me gustaría saber de tu relación con [tu hermano / tu hermana].

¿Cómo es cuando tu y X están juntos?

¿Qué tipo de cosas hacen juntos?

¿Me puedes dar un ejemplo?

¿Conversas con X de cosas importantes o cosas que te ponen triste o te preocupan? [Alternativa:

Puedes contar con la ayuda de X?]

¿Te pide ayuda o te cuenta cosas importantes?

¿Me puedes dar un ejemplo?

23. ¿Qué es lo que más te gusta de [X]?

¿Qué es lo que menos te gusta de [X]?

[Relaciones entre padres]

24. Ahora me gustaría preguntarte de nuevo acerca de tus padres, pero no de tu relación con ellos si no de cómo es la relación entre ellos dos.

¿Pelean entre ellos alguna vez?

¿Cómo te sientes cuando pelean?

¿Te acuerdas de alguna vez en que pelearon recientemente?

¿Me puedes contar como fue, por qué estaban peleando?

¿Cómo te sentiste?

[Solo si no menciona una pelea específica] ¿Te puedes imaginar cómo te sentirías si los vieras peleando?

25. Ahora, ¿Si miras hacia atrás en el tiempo crees que tu relación con tus padres ha cambiado desde que eras pequeño?

26. ¿Cómo crees que tu relación con tus padres será en el futuro, por ejemplo, en unos 5 años más?

[Termino de la entrevista]

Nos has contado mucho acerca de ti mismo, de tus amigos, de tu escuela y de tu familia. Nos hemos podido hacer una mejor idea de cómo eres como persona.

¿Hay algo más que te gustaría agregar? ¿Algo que pienses que es importante acerca de ti que no hemos preguntado? ¿Algo más que te gustaría contarnos?

¿Qué piensas acerca de estas preguntas?

¿Qué preguntas te parecieron más difíciles/fáciles de contestar?

¿Hubo alguna pregunta que te molestó o te puso triste?

Recuerda que todo lo que nos has contado hoy es *confidencial*, lo que significa que no le contaremos a nadie de lo que nos has dicho aquí.

¿Tienes alguna pregunta antes de terminar?

¡Muchas gracias por tu ayuda!

9.3.1. Friend and Family Interview Coding

	SCORE	Relevant line numbers
1. COHERENCE		
a. Truth		
b. Economy		
c. Relation		
d. Manner		
e. Overall		
2. REFLECTIVE FUNCTIONING		
a. Developmental Perspective		
b. Theory of Mind		
i. Mother		
ii. Father		
iii. Friend		
iv. Sibling		
v. Teacher		
c. Diversity of Feeling		
i. Self		
ii. Mother		
iii. Father		
iv. Friend		
v. Sibling		
vi. Teacher		
3. EVIDENCE OF SAFE HAVEN/SECURE BASE		
a. Mother		
b. Father		
c. Other (specific)		
4. EVIDENCE OF SELF ESTEEM		
a. Social Competence		
b. School competence		
c. Self Regards		
5. PEER RELATIONS		
a. Frequency of contact		
b. Quality of contact		
6. SIBLING RELATIONS		
a. Warmth		
b. Hostility		
c. Rivalry		
7. ANXIETIES AND DEFENSE		
a. Idealization		
i. Self		
ii. Mother		
iii. Father		
b. Roles reversal		
i. Mother		
ii. Father		
c. Anger		
i. Mother		
ii. Father		
d. Derogation		
i. Self		
ii. Mother		
iii. Father		
e. Adaptive response		
8. Differentiation Of Parental Representations		
9. ATTACHMENT CLASIFICATIONS		
a. Secure-autonomous		
b. Insecure-dismissing		
c. Insecure-preoccupied		
d. Disorganized-disoriented		
10. NON-VERBAL CODES		
a. Fear/Distress		
b. Frustration/Anger		

5.9.4. *Parental Development Interview (PDI). Spanish versión (Translation by Maite Román y Jesús Palacios, 2006).*

A. REPRESENTACIÓN DEL NIÑO/A

- 1a. Antes de ir a preguntas más concretas, ¿podrías hacerme una breve descripción de cómo es (nombre del niño/a)?
- 1b. También de forma breve, ¿cómo era (nombre del niño/a) cuando llegó?
- 1c. ¿Ha cambiado el niño desde entonces, desde su llegada?
- 2a. En un día típico, ¿cuáles crees que son los ratos o las situaciones que más le gustan?
- 2b. En un día típico, ¿cuáles crees que son los ratos o las situaciones que menos le gustan?
3. ¿Qué es lo que más te gusta de (nombre del niño/a)?
4. ¿Qué es lo que menos te gusta de (nombre del niño/a)?
5. ¿Hay algo en lo que crees que el niño se parece a ti y a tu pareja?
6. ¿Hay algo en lo que veas al niño distinto de ti y de tu pareja?

B. REPRESENTACIÓN DE LA RELACIÓN

1. Dime, por favor, cinco palabras que reflejen bien la relación que hay entre tú y (nombre del niño/a)? (Esperar a la respuesta).
¿Podrías explicarme por qué has elegido esas palabras? (Ir palabra por palabra preguntando por qué la ha mencionado).
2. Cuéntame, por favor, algún momento o alguna situación de la última semana en la que tú y (nombre del niño/a) os sentisteis muy a gusto juntos? ¿Puedes contarme algo más de esa situación? ¿Cómo te sentiste? ¿cómo te encontraste tú? ¿y cómo crees que se encontró (nombre del niño/a)?
3. ¿Podrías contarme ahora, por favor, algún momento o alguna situación en la que tú y tu hijo no os encontrasteis a gusto el uno con el otro? ¿Puedes contarme algo más de esa situación? ¿Cómo te sentiste? ¿Cómo crees que se sintió el niño?
4. A medida que la relación con (nombre del niño/a) ha ido avanzando, ¿cómo crees que vuestra relación está influyendo sobre su desarrollo y su personalidad?

C. EXPERIENCIA EMOCIONAL DE LA PATERNIDAD/MATERNIDAD

1. ¿Cómo te describirías como madre/padre? (Si la madre/el padre se pone a hablar también de otros hijos, se toman en consideración esas descripciones, pero se le pide que ponga algunos ejemplos concretos referidos al niño/a objeto de estudio)
2. ¿Qué es lo que más te satisface como madre/padre?
3. ¿Qué es lo que te resulta más difícil, lo que te da más problemas?

4. Cuando te notas preocupada por (nombre del niño/a), ¿qué cosas suelen ser las que te preocupan?
5. ¿En qué te ha cambiado ser madre/padre de (nombre del niño/a)?
6. ¿Hay alguna ocasión en que notas que necesitas que alguien te apoye emocionalmente como madre? (Si hace falta, indaga un poco). ¿En qué tipo de situaciones te sientes así? ¿Qué haces ante esos sentimientos?
7. ¿Te sientes alguna vez irritada o enfadada como madre/padre? (Indaga un poco si hace falta). ¿Qué tipo de situaciones te hacen sentir así? ¿Qué haces ante esos sentimientos? ¿Cómo crees que afectan al niño estas situaciones? ¿Y cómo afectan al niño esos sentimientos de enfado tuyos?
8. ¿Algunas vez te sientes culpable como madre? (Indaga un poco si hace falta). ¿Qué tipo de situaciones te hacen sentir así? ¿Qué haces ante esos sentimientos? ¿Cómo afectan esos sentimientos tuyos a (nombre del niño/a)?
9. Cuando (nombre del niño/a) se enfada ¿qué hace? ¿Cómo te sientes tú cuando le pasa eso? ¿Qué haces?
10. ¿Cómo de fácil o difícil es saber de antemano si algo va a disgustar o no a (nombre del niño/a)?
11. ¿Cómo te sientes cuando (nombre del niño/a) se niega a hacer lo que le pides, o deliberadamente te provoca?
12. Cuéntame un momento o una situación de la última semana en la que (nombre del niño/a) actuó agresivamente contigo, con un juguete, con otros, con él mismo (Indagar un poco si hace falta). ¿Cómo te sentiste en esa situación o en ese momento? ¿Qué hiciste?
13. ¿Crees que (nombre del niño/a) se siente rechazado/a por ti en algún momento o alguna situación?

D. ADAPTACIÓN DEL NIÑO/A A LA FAMILIA ADOPTIVA

1. ¿Le resulta fácil a (nombre del niño/a) mostrarte físicamente su cariño? (Para el entrevistador: nunca/ sólo con ocasión de alguna rutina diaria, como el beso antes de ir a la cama/ alguna expresión de cariño ocasional/ mucha expresión física de afecto)
2. ¿Le es fácil aceptar tus caricias y abrazos? (Para el entrevistador: el niño lo evita/ acepta alguna expresión física de afecto/ le es fácil aceptarlo o responde fácilmente o él mismo busca ese afecto). ¿Ha cambiado mucho en esto desde que llegó?
3. ¿Es creativo en sus juegos? (Para el entrevistador: casi exclusivamente juegos repetidos siempre igual/ la madre cree que es juego más bien repetitivo, pero observa algún juego más creativo/ la mayor parte del tiempo de juego es creativo, imaginativo, espontáneo). ¿Tratas de

ayudarle a jugar más creativamente? ¿Qué tipo de cosas haces? ¿Ha cambiado mucho en esto desde que llegó?

4. ¿Qué ocurre si (nombre del niño/a) trata de hacer alguna cosa y no lo consigue o no le sale bien? Para el entrevistador: sigue intentándolo/ se da por vencido y lo deja/ pide ayuda en seguida/ se enfada/ se siente culpable)

5. ¿Te ha preocupado alguna vez ver a (nombre del niño/a) comportándose de forma muy amistosa con desconocidos, actuando como si los conociera mucho (en una tienda, en el autobús...)? (Para el entrevistador: claramente trata a los desconocidos como conocidos/ a la madre le preocupa un poco/ no hay preocupación al respecto) ¿Han cambiado las cosas desde que llegó?

6. Si (nombre del niño/a) se hace daño (un golpe en la rodilla, por ejemplo) ¿busca a alguien en concreto para que le consuele? ¿O suele más bien no buscar a nadie para que le consuele? (Para el entrevistador: una o dos personas preferidas/ cualquier adulto adecuado/ no suele buscar consuelo). ¿Ha cambiado en esto desde que llegó?

7. ¿Le resulta fácil dejarte hacer de madre? ¿Ha cambiado en esto desde su llegada?

8. ¿En qué medida trata de controlarte a ti y lo que tú haces? ¿Qué hace? (Mandón/ controlador/ es el niño quien cuida del padre o la madre/ el niño hace de padre o madre/ no trata de controlar). ¿Ha cambiado en esto desde su llegada?

9. ¿Qué tal se lleva con los hermanos? ¿Ha habido algún cambio en quién manda entre ellos?

9.4.1. Parent Development Interview Coding

PARENT AFFECTIVE EXPERIENCE CODES		
CODE	SEE ESPECIALLY LINES	RATED
1. Anger		
a) Degree		
b) Expression		
2. NeedforSuport		
a) Level of need		
b) Satisfaction with support		
3. Guilt		
4. Joy/Pleasure		
5. Competence		
6. Confidence		
7. Level of ChildFocus		
8. Disappointment/Despair		
9. Warmth		
10. AttachmentAwareness &Promotion		
11. Hostilty		
CHILD AFFECTIVE EXPERIENCE CODES		
1. Child Aggression/Anger		
2. Child Happiness		
3. Child Controlling/Manipulating		
4. Child afectione		
5. Child Rejecting		
GLOBAL CODES		
1. ParentReflectiononRelationship		
2. Coherence		
3. Richness of Perceptions		
4. Description of Relationship		
List adjectives given:		
5. Parent Discipline Style		

5.9.5. Youth Behaviour Checklist / 4-18 (Achenbach, 1991). Spanish version

CUESTIONARIO PARA JÓVENES (CBCL)

Nombre:

Sexo: Hombre Mujer

Edad:

Fecha de hoy: día mes año

Fecha de nacimiento del niño/a: día mes año

Curso actual:

No va a la escuela:

Si está trabajando, indica el tipo de trabajo:

Rellena por favor, este cuestionario expresando tu punto de vista, aunque otras personas puedan no estar de acuerdo. Puedes escribir cualquier comentario adicional en el espacio que hay al lado de cada ítem.

I. Deportes

1- Por favor enumera los deportes en los que mas te gusta participar. *Ej: nadar, patinar, pescar, ir en bicicleta.*

- Ninguno
a.....
b.....
c.....

2- Comparado con otros chicos/as de tu edad, ¿cuanto tiempo aproximadamente dedicas a cada uno?

- | | Menos que el promedio | Promedio | Por encima del promedio |
|-----|--------------------------|--------------------------|--------------------------|
| a. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c.. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

3- ¿Comparado con otros chicos/as de tu edad, cuál es tu nivel?

- | | Menos que el promedio | Promedio | Por encima del promedio |
|----|--------------------------|--------------------------|--------------------------|
| a. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

II. Actividades, aficiones y juegos

1- Por favor enumera tus aficiones, actividades o juegos preferidos, que no sean deportes. *Ej: sellos, libros, piano, coches, trabajos manuales, cantar (no incluyas escuchar la radio o ver la TV)...*

- Ninguno
a.....
b.....
c.....

2- Comparado con otros chicos/as de tu edad, cuánto tiempo aproximadamente dedicas a cada uno?

	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3- Comparado con otros chicos/as de tu edad, cuál es tu nivel?

	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

III. Organizaciones, clubs, equipos o grupos

1- Por favor, enumera cualquier tipo de organizaciones, clubs, equipos o grupos a los que pertenezcas.

Ninguno

a.....

b.....

c.....

2- Comparado con otros/as de tu edad, cómo te calificarías de activo?

	Menos activo	Promedio	Más activo
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IV. Trabajo o tareas

1- Por favor enumera cualquier tipo de trabajos o tareas que tengas. *Ej: repartidor de periódicos, canguro, hacerse la cama, trabajar en una tienda...* (incluya tanto trabajos pagados como no pagados)

Ninguno

a.....

b.....

c.....

2- Comparado con otros/as de tu edad, cómo los desempeñas?

	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

V. Amigos

1- Cuantos amigos/as íntimos tienes? (**no** incluyas hermanos/as)

Ninguno Uno Dos o tres Cuatro o más

2- Cuantas veces a la semana realizas actividades con los amigos/as fuera del horario escolar??

- Menos de una
- Una o dos
- Tres o más

VI. Relaciones sociales

1- Comparado con chicos/as de tu edad, cómo...

	Peor	Promedio	Mejor
a. Te llevas con sus hermanos/as?*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Te llevas con otros chicos/as?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Te llevas con sus padres?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Te desenvuelves por sí mismo?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* No tengo hermanos/as

VII. Estudios y enfermedades

1- Rendimiento en asignaturas escolares:

No voy al colegio porque

	Suspensio	Por debajo del promedio	Promedio	Por encima del promedio
a. Lenguaje	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Historia o ciencias sociales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Aritmética o matematicas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Ciencias	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otras:*				
e.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Otras asignaturas. Ej: cursos de informática, lenguas extranjeras. No incluya gimnasia, carnet de conducir...

2- Vas a clases de apoyo o a una escuela especial?

- NO
- SI- A qué tipo de clase o escuela? _____

3- Has repetido curso?

- NO
- SI- Curso y razón? _____

4- Has tenido en la escuela problemas académicos o de algún otro tipo?

- NO
- SI- Por favor, descríbelo _____

5- Cuándo empezaron los problemas? _____

6- Han acabado esos problemas?

- NO

SI- Cuando? _____

7- Tienes alguna enfermedad, problema físico o mental?

NO

SI- Por favor, descríbelo _____

8- Por favor describe cualquier tipo de preocupaciones o problemas que tengas sobre el colegio o los estudios: _____

9- Por favor describe cualquier otro tipo de preocupaciones que tengas: _____

10- Por favor describe tus mejores cualidades: _____

A continuación se enumeran diversas frases que describen algunas conductas. Cada frase describe lo que a tí te pasa ahora o durante los últimos 6 meses. Si te ocurre lo que se dice en cada frase, ponga una X en el cuadradito apropiado. Por favor responde con la mayor precisión y exactitud posible, aunque consideres que alguna frases no se adecuan totalmente a ti.

0= NO ES VERDAD

1= ALGO CIERTO O VERDAD A VECES

2= MUY VERDADERO O FRECUENTEMENTE ES VERDAD

- | | 0 | 1 | 2 |
|--|--------------------------|--------------------------|--------------------------|
| 1. Me comporto como si tuviera menos edad de la que tengo | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Tengo alguna alergia (describelos) | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Discuto mucho | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Tengo asma | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Me comporto como las personas de otro sexo | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Me gustan los animales | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Fanfarroneo, chuleo | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Tengo problemas para concentrarme o mantener la atención | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. No puedo apartar de la mente ciertos pensamientos, obsesiones (describelos) | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Me cuesta estarme quieto/a | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Dependo demasiado de los adultos | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Me siento solo/a | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Me siento confuso/a, o en un mar de dudas | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Lloro mucho | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Soy bastante honrado/a | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Soy desconsiderado/a con los demás | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. A menudo, sueño despierto/a | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Deliberadamente he tratado de hacerme daño o de suicidarme | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Quiero que estén por mí, exijo mucha atención | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Destrozo mis cosas | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Destrozo las cosas de los demás | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Desobedezco a mis padres | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Desobedezco en el colegio | ... | <input type="checkbox"/> | <input type="checkbox"/> |

24. Como poco o soy caprichoso/a con la comida
25. No me llevo bien con otros chicos/as
26. No me siento culpable después de hacer algo que no debería hacer.....
27. Siento celos de los demás
28. Estoy dispuesto a ayudar a los demás cuando lo necesitan
29. Le tengo miedo a algunos animales, situaciones o lugares – **no** incluyas el colegio- (describelos)
-
30. Tengo miedo de ir al colegio
31. Tengo miedo de pensar o hacer algo malo
32. Creo que tengo que ser perfecto/a
33. Creo que nadie me quiere
34. Creo que los demás quieren fastidiarme o hacerme daño
35. Creo que no valgo para nada o me siento inferior
36. Con frecuencia me hago daño sin querer
37. Me meto en muchas peleas.....
38. Se burlan mucho de mí
39. Ando con chicos/as que se meten en problemas.....
40. Oigo ruidos o voces que no existen (describelo)
-
41. Actúo sin pararme a pensar
42. Prefiero estar solo/a a estar con otros
43. Digo mentiras o hace trampas
44. Me muerdo las uñas
45. Soy nervioso/a o tenso/a
46. Tengo tics o movimientos nerviosos (describelo)
-
47. Tengo pesadillas
48. No caigo bien a los demás chicos/as.....
49. Puedo hacer algunas cosas mejor que la mayoría de los/las chicos/as
50. Soy demasiado miedoso/a o ansioso/a.....
51. Me dan mareos (vértigos)
52. Siento demasiada culpabilidad
53. Como demasiado
54. Me siento muy cansado/a
55. Tengo exceso de peso.....
56. Tengo problemas físicos a los que no se he encontrado una causa médica
- a) Dolores o molestias (**no** dolores de cabeza)
- b) Dolores de cabeza
- c) Náuseas, ganas de vomitar
- e) Problemas en los ojos (describa)
-
- d) Erupciones u otros problemas de la piel
- e) Dolores de barriga o retortijones
- f) Vómitos

- g) Otros (describelo).....
-
-
57. Ataco físicamente a otras personas
58. Me arranco padrastrros o me rasco diversas partes del cuerpo
(describelo)
-
-
59. Puedo ser bastante simpático
60. Me gusta probar cosas nuevas
61. Mi rendimiento escolar es deficiente
62. Tengo mala coordinación o soy patoso/a.....
63. Prefiero estar con chicos/as mayores a estar con los de
mi edad
-
64. Prefiero estar con chicos/as menores a estar con los de
mi edad
-
65. Me niego a hablar
-
66. Repito constantemente algunas acciones (describelas)
-
-
67. Me escapo de casa
-
68. Grito mucho.....
-
69. Soy reservado/a, me guardo las cosas para mí mismo/a
-
70. Veo cosas que los demás piensan que no existen (describelas)
-
-
71. Me siento inseguro/a cohibido/a con facilidad
-
72. Prendo fuegos
-
73. Tengo habilidad manual
-
74. Me gusta llamar la atención o hacer el payaso
-
75. Soy tímido/a
-
76. Duermo menos que la mayoría de los chicos/as
-
77. Duermo más que la mayoría de los chicos/as, de día
o de noche (describelo)
-
-
78. Tengo mucha imaginación
-
79. Tengo problemas de habla (describelos)
-
-
80. Sé defender mis derechos
-
81. Robo cosas en casa
-
82. Robo cosas fuera de casa
-
83. Almaceno cosas que no necesito (describelas)
-
-
84. Hago cosas que a otras personas les parecen extrañas o raras
(describelas).....
-
-
85. Tengo pensamientos que otras personas creerían que son
extraños o raros (describelos).....
-
-
86. Soy tozudo/a, cabezota
-
87. Mi humor o sentimientos cambian repentinamente
-
88. Me gusta estar en compañía de otras personas
-
89. Soy desconfiado/a
-

90. Digo palabrotas.....
91. Pienso en suicidarme
92. Me gusta hacer reír a los demás.....
.....
93. Hablo demasiado
94. Me burlo mucho de los demás
95. Tengo mal genio
96. Pienso demasiado en el sexo
97. Amenazo con hacer daño a la gente
98. Me gusta ayudar a los demás
99. Me preocupo demasiado por ir limpio/a y arreglado/a
100. Tengo problemas para dormir (describelos)
.....
101. Hago novillos o faltó a clase.....
102. No tengo mucha energía
103. Me siento desgraciado/a, triste o deprimido/a
104. Grito o hago más escándalo que los demás chicos/as
105. Consumo alcohol o toma drogas no prescritas por el médico
(describelas).....
.....
106. Procuro ser amable con los demás.....
107. Disfruto cuando alguien cuenta un buen chiste
108. Me tomo la vida con calma.....
109. Procuro ayudar a la gente cuando puedo
110. Me gustaría pertenecer al otro sexo
111. Evito relacionarme con los demás
112. Me preocupo mucho
113. Por favor, escribe a continuación cualquier otro comentario que describa tus sentimiento, conductas o intereses.

Por favor, asegúrate de haber respondido todas las preguntas.

Subraya las preguntas que más te preocupen.

5.9.6. Child Behaviour Checklist / 4-18 (Achenbach, 1991). Spanish version

CUESTIONARIO PARA PADRES (CBCL)

Nombre del niño/a:

Sexo: Hombre Mujer

Edad:

Fecha de hoy: día mes año

Fecha de nacimiento del niño/a: día mes año

Curso actual:

No va a la escuela:

Rellene por favor, este cuestionario expresando su punto de vista sobre la conducta del niño/a, aunque otras personas no estén de acuerdo. Puede escribir lo que quiera en el espacio que hay al lado de cada ítem.

Trabajo habitual de los padres, aunque no trabajen actualmente. (Por favor sea específico- por ejemplo, *mecánico de coches, maestro de primaria, vendedor de zapatos...*)

Trabajo del padre:.....

Trabajo de la madre:.....

Este cuestionario ha sido rellenado por:

- Padre (nombre):.....
- Madre (nombre):.....
- Otros (nombre):.....
(tipo de relación):.....

I. Deportes

1- Enumere los deportes en los que mas le guste participar al niño/a. *Ej: nadar, patinar, pescar, ir en bicicleta.*

- Ninguno
- a.....
- b.....
- c.....

2- Comparado con otros chicos/as de su edad, ¿cuanto tiempo aproximadamente dedica a cada uno?

	No sabe	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3- ¿Comparado con otros chicos/as de su edad, cuál es su nivel?

	No sabe	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. Actividades, aficiones y juegos

1- Enumere las aficiones, actividades o juegos preferidos del chico/a, que no sean deportes. *Ej: sellos, libros, piano, coches, trabajos manuales, cantar* (no incluya escuchar la radio o ver la TV)...

Ninguno

a.....

b.....

c.....

2- Comparado con otros chicos/as de su edad, cuánto tiempo aproximadamente dedica a cada uno?

	No sabe	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3- Comparado con otros chicos/as de su edad, cuál es su nivel?

	No sabe	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

III. Organizaciones, clubs, equipos o grupos

1- Por favor, enumere cualquier tipo de organizaciones, clubs, equipos o grupos a los que el niño/a pertenezca.

Ninguno

a.....

b.....

c.....

2- Comparado con otros/as de su edad, cómo le calificaría de activo?

	No sabe	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

IV. Trabajo o tareas

1- Enumere cualquier tipo de trabajos o tareas que el niño/a tenga. *Ej: repartidor de periódicos, canguro, hacerse la cama, trabajar en una tienda...* (incluya tanto trabajos pagados como no pagados)

- Ninguno
- a.....
- b.....
- c.....

2- Comparado con otros/as de su edad, cómo los desempeña?

	No sabe	Menos que el promedio	Promedio	Por encima del promedio
a.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

V. Amigos

1- Cuantos amigos/as íntimos tiene? (**no** incluya hermanos/as)

- Ninguno
- Uno
- Dos o tres
- Cuatro o más

2- Cuantas veces a la semana realiza actividades con los amigos/as fuera del horario escolar??

- Menos de una
- Una o dos
- Tres o más

VI. Relaciones sociales

1- Comparado con chicos/as de su edad, cómo...

	Peor	Promedio	Mejor
c. Se lleva con sus hermanos/as?*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Se lleva con otros chicos/as?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Se lleva con sus padres?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Se desenvuelve por sí mismo?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* No tiene hermanos/as

VII. Estudios y enfermedades

1- A partir de 6 años responda el rendimiento que tiene en las asignaturas escolares: (si no va a la escuela explicite las razones).

Porqué no va a la escuela?.....

	Suspense	Por debajo del promedio	Promedio	Por encima del promedio
a. Lenguaje	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Historia o ciencias sociales	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Aritmética o matemáticas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Ciencias	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Otras:*				
e.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

* Otras asignaturas. *Ej: cursos de informática, lenguas extranjeras.* No incluya gimnasia, carnet de conducir...

2- Va a clases de apoyo o a una escuela especial?

NO

SI- A qué tipo de clase o escuela? _____

3- Ha repetido curso?

NO

SI- Curso y razón? _____

4- Ha tenido en la escuela problemas académicos o de algún otro tipo?

NO

SI- Por favor, descríbalos _____

5- Cuándo empezaron los problemas? _____

6- Han acabado esos problemas?

NO

SI- Cuando? _____

7- Tiene alguna enfermedad, problema físico o mental?

NO

SI- Por favor, descríbalos _____

8- Qué es lo que más le preocupa del niño/a? _____

9- Describa las mejores cualidades del niño/a: _____

A continuación se enumeran diversas frases que describen algunas conductas. Cada frase describe lo que a su hijo/a le pasa ahora o durante los últimos 6 meses. Si a su hijo/a le ocurre lo que se dice en cada frase, ponga una X en el cuadradito apropiado. Por favor responda con la mayor precisión y exactitud posible, aunque considere que alguna frases no se adecuan totalmente a su hijo/a.

0= NO ES VERDAD

1= ALGO CIERTO O VERDAD A VECES

2= MUY VERDADERO O FRECUENTEMENTE ES VERDAD

- | | 0 | 1 | 2 |
|---|----------|--------------------------|--------------------------|
| 1. Se comporta de forma infantil para su edad | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Tiene alguna alergia (describa)..... | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Discute mucho | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Tiene asma..... | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Se comporta como si fuera de otro sexo | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Hace sus necesidades fuera del retrete..... | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Es fanfarrón/a presuntuoso/a | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. No puede concentrarse o prestar atención durante mucho rato | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. No puede apartar de su mente ciertos pensamientos,
obsesiones (describa)..... | | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. No se puede estar quieto/a, es inquieto/a o hiperactivo/a | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Apegado/a a los adultos o demasiado dependiente..... | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Se queja de que se siente solo/a..... | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Se siente confuso/a, o en un mar de dudas | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Llora mucho | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Es cruel con los animales | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Es abusón/a, cruel o desconsiderado/a con los demás | ... | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. A menudo, sueña despierto/a, se queda distraído en | | | |

- ... sus pensamientos
45. Se hace daño deliberadamente o ha intentado suicidarse
46. Exige mucha atención
47. Destroza sus propias cosas
48. Destroza cosas de sus familiares o de otras personas
49. Es desobediente en casa
50. Es desobediente en el colegio
51. No come bien
52. No se lleva bien con otros niños/as
53. No parece sentirse culpable después de portarse mal
54. Tiene celos con facilidad
55. Come o bebe cosas que no son comida – **no** incluya dulces
o golosinas (describa)
-
56. Tiene miedo a ciertos animales, situaciones o lugares – **no**
incluya el colegio- (describa)
-
57. Tiene miedo de ir al colegio
58. Tiene miedo de pensar o hacer algo malo
59. Cree que tiene que ser perfecto/a
60. Se queja o piensa que nadie le quiere
61. Piensa que los demás le quieren fastidiar o hacer daño
62. Cree que no vale para nada o se siente inferior
63. Se hace daño a menudo, es propenso/a tener accidentes
64. Se mete en muchas peleas
65. Se burlan mucho de él/ella
66. Anda con chicos/as que se meten en problemas
67. Oye ruidos o voces que no existen (describa)
-
68. Es impulsivo/a o hace las cosas sin pensar
69. Prefiere estar solo/a a estar con otros
43. Dice mentiras o hace trampas
44. Se muerde las uñas
45. Es nervioso/a, sensible, tenso/a
46. Tiene tics o movimientos nerviosos (describa)

-
47. Tiene pesadillas
48. No cae bien a otros niños/as
49. Tiene estreñimiento
50. Es demasiado miedoso/a, ansioso/a
51. Le dan mareos (vértigos)
52. Se siente demasiado culpable
53. Come demasiado
54. Se siente muy cansado/a
57. Tiene exceso de peso
58. Tiene problemas físicos a los que no se he encontrado una causa médica
- a) Dolores o molestias (**no** dolores de cabeza)
- b) Dolores de cabeza
- c) Náuseas, ganas de vomitar
- d) Problemas en los ojos (describa)
-
- e) Erupciones u otros problemas de la piel
- f) Dolores de barriga o retortijones
- g) Vómitos
- i) Otros (describa)
-
57. Agrede, ataca físicamente a otras perso
58. Se mete el dedo en la nariz, se arranca padrastrros o se rasca diversas partes del cuerpo (describa)
-
59. Se toca los genitales en público
60. Se toca demasiado los genitales

61. Su trabajo escolar es deficiente
62. Es patoso, torpe, desgarbado
63. Prefiere estar con niños/as mayores a estar con los de
su edad.....
64. Prefiere estar con niños/as menores a estar con los de
su edad.....
65. Se niega a hablar.....
66. Repite ciertos actos una y otra vez, compulsiones (describa)
.....
67. Se escapa de casa.....
68. Grita mucho.....
69. Es reservado/a, se guarda las cosas para sí mismo/a
70. Ve cosas que no existen (describa).....
.....
71. Se siente inseguro/a cohibido/a con facilidad.....
72. Prende fuegos
73. Tiene problemas sexuales (describa).....
.....
74. Le gusta llamar la atención o hacer el payaso
75. Es tímido/a o vergonzoso/a
76. Duerme menos que la mayoría de los niños/as
77. Duerme más que la mayoría de niños/as, de día
o de noche (describa)
.....
78. Ensucia o juega con sus excrementos

79. Tiene problemas de habla (describa)

80. Se queda absorto/a mirando al vacío
81. Roba cosas en casa
82. Roba cosas fuera de casa
83. Almacena cosas que no necesita (describa)

84. Se comporta de forma extraña o rara (describa)

85. Tiene ideas extrañas o raras (describa)

86. Es tozudo/a, malhumorado/a o irritable
87. Cambia repentinamente de humor o de sentimientos
88. Se enfurruña o se molesta con facilidad
89. Es desconfiado/a
90. Dice palabrotas
91. Dice que se quiere matar
92. Habla o camina dormido (describa)

93. Habla demasiado
94. Se burla mucho de los demás
95. Tiene rabietas o mal genio
96. Piensa demasiado en el sexo
97. Amenaza a otras personas
98. Se chupa el dedo

99. Se preocupa demasiado por el orden y la limpieza..... ...
100. Tiene problemas de sueño (describa)
.....
101. Hace novillos o falta al colegio
102. Es poco activo/a, se mueve con lentitud o le falta energía
103. Se siente desgraciado/a, triste o deprimido/a..... ...
104. Es muy ruidoso/a, escandalosa/a
105. Consume alcohol o toma drogas no prescritas por el médico
(describa)..... ...
.....
106. Hace actos de vandalismo
107. Se orina encima durante el día..... ...
108. Se orina en la cama..... ...
109. Es un/a quejica, se queja por todo
110. Le gustaría pertenecer al otro sexo
111. Es retraído/a, evita relacionarse con los demás
112. Se preocupa mucho..... ...
113. Por favor, escriba a continuación cualquier otro problema que tenga el chico/a y que no haya aparecido en la lista anterior:

Por favor, asegúrese de haber respondido todas las preguntas.

Subraye las preguntas que más le preocupen.

5.10. Appendix 10. Experimental paradigms

5.10.1. Emotional processing: Dual Valence Task (DVT).

The DVT is an adaptation of the Implicit Association Task designed specifically for ERP measurements. The DVT assesses the emotional valence (positive or negative) of faces and words. Participants are asked to categorize words as either pleasant or unpleasant and faces as either happy or angry, and to make these judgments as fast and as accurate as possible. The DVT allows for behavioral measures through reaction time of responses and electrophysiological measures through activation of early ERP components. In our study, participants were presented with a series of four blocks on a computer screen: 3 practice blocks and one test block. Practice blocks used different face and word stimuli than test blocks. Trials began with a fixation cross presented for 1000 ms followed by the stimulus, which was shown for 100 ms. Immediately after, a fixation cross appeared on the screen and disappeared either after 2000 ms or the participant's response, whichever came first. After a response, there was an interstimulus interval (ISI) of 1000 ms. Each stimulus was centered horizontally and vertically on the screen subtending a visual angle of $4.5^{\circ} \times 3.15^{\circ}$ at a viewing distance of approximately 80 cm. Eighty happy and angry facial expressions and 142 pleasant and unpleasant word stimuli were included. The happy and angry sets of pictures depicted the same people. Faces were previously controlled for arousal, valence, emotion (angry vs. happy), and physical properties, and words were controlled for arousal, valence, predictability, content, length, and frequency.

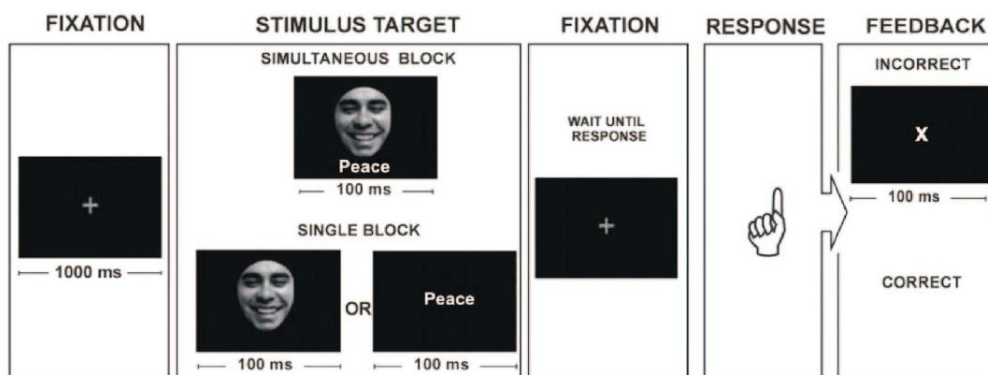


Figure 1. Experimental design. The trial started with a fixation cross, followed by a target stimulus (face or word) or two simultaneous stimuli (face and word), depending on which of the two main blocks was being performed. After the target stimulus, a fixation cross appeared until the response. If the response was incorrect, a red cross appeared and the trial ended. Otherwise, the trial ended without feedback. After responses or feedback, an ISI of 1000 ms was added (not shown).

5.10.2. Emotional Morphing

The emotional morphing task, is a dynamic test of recognition of emotional expressions (Blair et al., 2001), consists of a series of images showing the gradual transformation of a neutral facial image to a full emotional expression (see Figure 4). For the design of the task the software is used Morpher 3.0. The program lets you create, from the neutral image and emotional expression end, 20 states intermediate interpolated between the original images. For our experiment, Ekman models were used (1993), which represent 7 basic emotional expressions. This test provides the behavioral measure of how much intensity of emotion required for survey subject right and if you choose the right or not.



Figure 2. Example of fear

5.10.3. Moral sensitivity: *Intention Inference Task (IIT)*.

EEG signals were recorded during participants completed a modified version of a standard Intention Inference Task (IIT), developed by Decety *et al.*, 2012 in studies on empathy and morality. The IIT assesses rapid moral decisions regarding actions involving intention to harm (intentional vs. accidental) on different target type (object vs. person). Participants are asked to judge whether the action was performed intentionally or accidentally (Decety & Cacioppo, 2012). In our study, participants were presented with a series of three-frame video on a computer screen: the first frame (T1) was 100 ms long and displayed an establishing scene; the second frame (T2) was a 100 ms frame displaying either an intentional harm or an accidental harm, followed by a third 100 ms frame (T3) confirming the intentional or accidental harm. The trials began with a fixation cross that was presented for 800 ms. A 500 ms inter-trial interval was added. During the experiment, accuracy and reaction times were recorded.



Figure 2. Stimuli examples. Visual stimuli used in the study depicting people (top row) or objects (bottom row) being harmed intentionally (left) or by accident (right). The stimuli were short dynamic visual scenarios.

5.11. *Appendix 11. Attachment Adoption Adolescence Research Network (AAARN)*

Abstract Project core

More than 32.000 children are adopted internationally every year; about one hundred countries around the world are involved (Selman, 2000). The literature provides strong evidence that the exposure to early stress influences later emotional regulation. Regarding adopted children, early stress, poor life conditions and separation may constitute potential risk factors regarding the social-emotional development; the period of adolescence, which involves separations and new relationships may be especially sensitive in this regard. While most studies on attachment and behavior problems in adopted children provide relatively optimistic results, only few studies addressed these issues about adolescents who had been adopted in infancy or in childhood. The present project will envisage adopted and non adopted adolescents' socio-emotional development and behavior problems and the adoptive parents' representations about their children. It is hypothesized that adolescents adopted in infancy or in childhood present more often behavior problems, and that the emergence of these problems is mediated by the adolescent's and the parents' representations of attachment, which in turn are influenced by the characteristics of the adoption (i.e. age at adoption, country of origin). Adopted adolescents are over-represented in the psychiatric consultations. Better understanding of the mechanisms which are involved in the adoptees' well being may help preventive efforts.

Importance of the project

The results of previous studies in this area pointed out the vulnerability of infants and children from international adoption, regarding the frequency of behavior problems. It is then of great importance to understand the mechanisms underlying the risks. This project should provide hints regarding the prevention of later problems and difficulties. In return, such studies may encourage local authorities, through international cooperation, to improve adequate stimulation, stable and individualized care in orphanages. The results may also encourage adoption's agencies to establish programs of information and help adoptive parents in the perspective of improving child and adolescents' development.

In a second hand, results of this study will bring new fundamental knowledge about the effect of early stress and deprivation, and attachment on mental health, later in life. Adolescence may be an especially sensitive period in this regard, however it has not been fully explored. The mediating role

of attachment regarding mental health also represents an important piece of investigation in this project, which is crucial regarding intervention.

Specificity of the project

The present core project represents a global international and transcultural research program on adoption. Specific research protocols derivated from the present project will be developed for every partner team in every participating country. The database including the core instruments will provide transnational and transracial data including countries from origin and of reception. Cross national comparisons will then be possible, for instance in terms of impact of national and international policies regarding adoption.

List of next publication in preparation (entre parentesis liderando el estudio)

- ✓ Cross cultural comparation CBCL (Switzerland, Stephanie Habersaat)
- ✓ Cross cultural comparation PDI (Italia, Marta Casonato)
- ✓ Comparation CBCL padres con adolescentes (Belgium, Isabelle Roskman)
- ✓ Cross cultural intergenerational comparation (Chile, Josefina Escobar & Pía Santelices)
- ✓ FFI and ratios of secure attachment entre países (Romania, Ana Muntean + España, Natalia Barcons + Chile, Josefina Escobar & Pía Santelices)

Listing of teams or persons with an interest in the network

Belgium: Prof. Dominique Charlier-Mikolajczak, Prof. Isabelle Roskam, Marie Stievenart, Service de Psychiatrie Infanto-Juvenil aux. Cliniques Universitaires Saint-Luc. Université Catholique de Louvain (UCL), Bruxelles, Belgium

Prof. Véronique Delvenne; Zoé Rosenfeld, Université Libre de Bruxelles

Canada: Prof. Réjean Tessier; Line Nadeau, PhD, École de psychologie, Centre de recherche du CHUQ. Hôpital St-François d'Assise. Québec, Canada

Chile: Prof. María Pía Santelices Alvarez, María Josefina Escobar. Psychology Department. Pontificia Universidad Católica de Chile, Santiago, Chile

Czech Republic: Prof. Lenka Šulová, Univerzita Karlova Praze, Praha, Czech Republic

France: Prof. Hervé Benony, Université de Bourgogne, Dijon, France; Aubeline Vinay, PhD
Université de Bourgogne, Dijon, France

Italy: Prof. Paola Molina ; Marta Casonato, Dipartimento di Psicologia, Università degli Studi di
Torino, Torino, Italia. Prof. B. Ongari, Alessandro Decarli, Tiziana Mocatti, Università de Trento

Lithuania: Rita Zukauskiene, Tomas Butvilas, Mykolas Romeris University, Vilnius

Romania: Prof. Ana Muntean, Calin Negrea, Andreea Birneanu, Ramona Tutunariu, Violeta Stan,
West University of Timisoara, Romania;

Spain: Neus Abrines Jaume, Natalia Barcons

South Korea: Prof. Keumjoo Kwak, Seoul National University, Seoul, South Korea, Yee Jin Shin,
MD, Yonsei University College of Medicine, Seoul

Switzerland: Blaise Pierrehumbert, PhD, Stéphanie Habersaat, MASc, Carole Müller-Nix, MD,
SUPEA Research Unit, Lausanne, Prof. François Ansermet, MD, Daniel Schechter, Ph.D., SPEA,
Genève and Columbia University, New York

USA: Howard Steele, PhD, Miriam Steele, PhD , Psychology Department. The New School For
Social Research. New York, Etats-Unis

Vietnam: Van Thi Kim Cuc, PhD, Académie des sciences, Hanoi, Vietnam