Vulnerable children in Ukraine : impact of institutional care and HIV on the development of preschoolers

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Contents

Chapter 1

General Introduction

Introduction

Institutional care for orphaned children has a long history and is widely spread; it has been used in countries with different ethnic, cultural, economic, and political backgrounds. Throughout its existence institutional care served various purposes. On the one hand, it provided shelter, food and education to children who otherwise would often be doomed to extreme poverty, homelessness, and even death (Boswell, 1988). Some poor parents and single mothers considered institutional care as a temporary shelter or boarding school that gave their children a chance for education and better prospects. The state used institutional care to prevent infanticide and impose order, discipline and control over the poorest parts of the population, and, in some instances, it was even used to breed desirable citizens (Carp, 1999; Hacsi, 1998; Ransel, 1988). Socialist and feminist movements favored collective institutional care as a means to facilitate economic and social involvement of women and a solution to gender inequality (Engles, 1902/1972; Firestone, 1970; Taylor, 1983).

On the other hand, the criticism of childcare institutions may very well have been as deeply rooted and widely spread as its pragmatism and use. The high costs, the presumable encouragement of child abandonment, and frequent rearing failures have been mentioned as the major drawbacks. Especially since the early 1940s a number of studies presented a wealth of empirical evidence of the adverse impact of early institutional rearing on the development of children (e.g., Freud & Burlingham, 1944; Goldfarb, 1944; Goldfarb, 1945; Levy, 1947; Spitz, 1945). The decline in the use of institutional care in western countries is to a certain extent associated with the influence of Bowlby's (1969/1997) attachment theory (e.g., Colton & Hellinckx, 1994; Johnson, Browne, & Hamilton-Giachritsis, 2006). The attachment theory originated from a report on the mental health of homeless children in postwar Europe and the effect of institutional care on children's development. It was delivered to the World Health Organization in 1951. The main conclusion of the report titled *Maternal Care and Mental Health* was that the deprivation of a maternal figure for whatever reason in the early years of life is detrimental to the development of the child. Later Bowlby formulated his attachment theory which "regards the propensity to make intimate emotional bonds as a basic component of human nature, already present in germinal form in the neonate and continuing through adult life into old age" (Bowlby, 1988, p.120). Subsequent research demonstrated that this innate propensity in infants to become attached to a specific caregiver(s) is universal and emerges in any cultural or rearing niche (Van IJzendoorn, Bakermans-Kranenburg & Sagi-Schwartz, 2006; Van IJzendoorn & Sagi-Schwartz, 2008).

Despite long existing and recently growing awareness of its negative impact on the development of children, institutional care still remains prevalent in many

parts of the world. In some countries the number of institutionalized children even continues to rise. Thus, in Ukraine the rate of children per 100,000 under the age of 17 years who are reared in residential institutions has increased from 225 children in 1989 to 509 in 2004. At the same time, alternatives to institutional care of children in the region have developed slowly (UNICEF, 2006). In Ukraine, apart from economic and social reasons, the high numbers of institution-reared children appear to be related to a lingering conviction that institutional care can be beneficial for children and the state. This conviction seems to have deep historical roots in the entire region (Carter, 2005) and deserves special attention.

Institutional care in Ukraine: a brief historical overview

The history of institutional care in Ukraine is closely related to developments in Russia because of the geographical and cultural connections between these countries. In the region child care institutions are mentioned for the first time in the beginning of the 17th century (Gorshkova, 1995). In the late 17th and early 18th centuries tsar Peter the Great not only addressed the problem of child abandonment by issuing a series of decrees, but even envisioned a special future for institutionalized children. Considering them as "raw material for his expanding military forces and construction projects" (Ransel 1988, p.28) he reserved a special function for them in the development of the state.

Subsequent development of institutional care in Russia in the 18th century, in general, coincided in many aspects with the history of foundling care in Western Europe (Gouroff, 1829; Gorshkova, 1995; Pullan, 1989; Ransel, 1988). However, the Russian project, inspired by the ideas of the Enlightenment, was more far-reaching: the foundling homes were envisioned as incubators of an entirely new type of individual, and as the breeding ground for people who would be especially useful to their nation. Children were to be made completely different from their parents, filled with enlightened morality, work ethic, civicmindedness, patriotism and respect for constituted authority (Gorshkova, 1995; Ransel, 1988). Therefore, even legitimate not orphaned children were welcome in the growing net of the institutions.

However mortality rates in the children's homes went up to 98% (Langmeier & Matejeek, 1984), and, according to contemporary observers, children who survived early institutional upbringing looked reticent and disobedient, and later became involved in crime (Ransel, 1988). Despite the poor results, the conviction that in a carefully controlled institutional environment, by applying progressive pedagogical techniques, the outcasts of society could be transformed into loyal and conscious citizens was broadly accepted by the educated elite. This became a basis for the educational politics well into the twentieth century.

By the end of the 19th century and the beginning of the 20th century there was a short lived shift in the policy of the government, aiming to support families in their parenting role (Ransel, 1988). Subsequent historical changes, the Bolshevist Revolution, and the emergence of the new Soviet State, however, revived the utopian ideals of institutional rearing. After the October Revolution in 1917, when the Bolsheviks came to power, all children were declared to be State children and their rearing was to be unified (Oslon & Holmogorova, 2001). Adoption was outlawed, and it was not until 1926 that it was restored (Stolee, 1988). The new Soviet policy makers "expressed a wish that all families would be destroyed as soon as possible, so that there would be as many abandoned children as possible and the state would raise them in much greater numbers" (Lunacharsky, 1927/1991, p.10). At the time Children's Homes for orphans and homeless children were viewed as a "wonderful rearing laboratory".

The twentieth century was marked by several waves of homeless children and orphans, flooding the country as a consequence of war, famine, poverty and disease. Despite the poor state resources, the overwhelming majority of these children were to be raised in institutions with the conception that the upbringing of the Soviet children could be best done by the state. In this process the family was only given a secondary role. New concepts of child rearing in the institutions based on Makarenko's theory of personality development "in the collective, by the collective and for the collective" (Bronfenbrenner, 1970, p.51) emerged in the 1930s and became a cornerstone of Soviet education.

This vision was once more reinforced in 1956, when the Communist Party leader N. Khrushchev expressed a necessity to establish new boarding schools for all children, in order to bring up "the constructors of the new society, people with a good heart and lofty ideals of utter devotional service to their nation" (Khrushchev, 1956, p.2). Plans were made to increase the number of the institutionalized children up to at least 2.5 million by the year 1965 (Khrushchev, 1959).

The new settings, often referred to as "schools of the future", were again expected to raise model citizens, trained for specific occupations; to perform a welfare function by providing educational opportunities for children from underprivileged families or groups; and to enhance the social and economic freedom for women. The voluntary cession of children by their parents was encouraged again (Dunstan, 1980). To fulfill the Party's ambitions to institutionalize the highest possible number of children, schools and Children's Homes were reorganized into boarding schools (*internats*), and new facilities were built. *Internats* were to house about 400 children and often had to be equipped with small factories or farms where children could work and develop their skills (Bronfenbrenner, 1970; Dunstan, 1980).

It was not until the 1960s, when it became clear that the Soviet state was unable to cope with the challenges of institutional child-rearing. The state had

to reconsider the role and the responsibility of the family in child upbringing, returning that responsibility to the families. By the 1970s the development of residential education slowed down and practically stopped, the standards in these schools deteriorated, and boarding schools were turned into schools for "difficult" children, children deprived of parental care or lacking the conditions for family upbringing (Dunstan, 1980). The public care system for orphans and children deprived of parental care established in the 1960s is still prevalent. This system is differentiated according to the age and physical condition of children and structured in such a way as to maintain children deprived of parental care from birth to young adulthood (Figure 1).

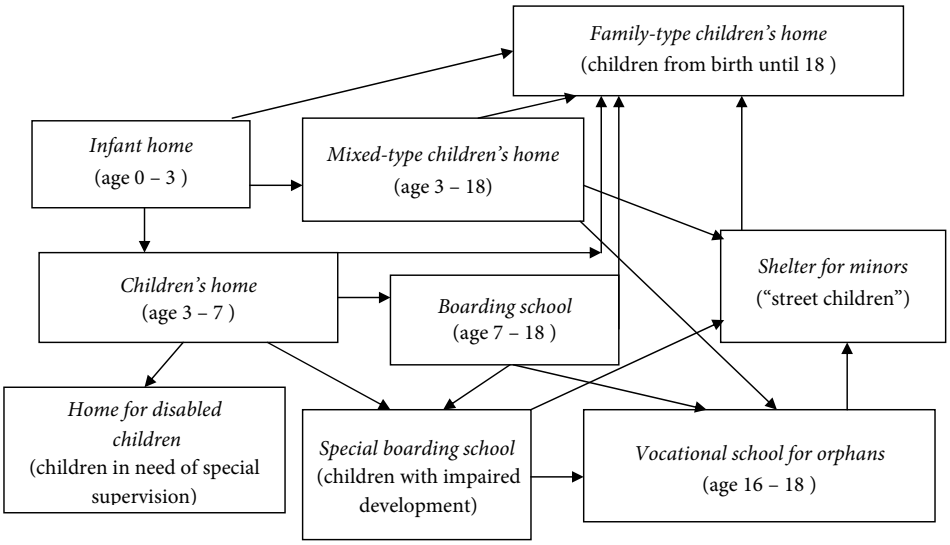


Figure 1. Public care system for orphans and children deprived of parental care (Source: Ukrainian Institute of Social Studies, 2001, p.8)

Ideologically driven developments in the care for orphaned children were not unique to Russia, Ukraine and the former Soviet Block. The parallels can be found at different times in different parts of the world as well. For instance, in America in the nineteenth century some Protestant and state managed orphan asylums also "wanted to break children away from the culture, and often the religion, of their impoverished parents", and Catholic or Jewish asylums, "intended to protect children's religious and/or cultural heritage from a world that asylum managers saw as hostile to it" (Hacsi, 1999, p. 54).

There are also more recent examples of the attempts to create an alternative collective form of child rearing and to nourish a "new type" of citizens loyal to the state. Thus, Israeli Kibbutz movements strived to create collective rearing

alternatives to family care in order to discourage individualism, to liberate women from child care in order to involve them more in the socioeconomic life of the community, and to bring up persons who were better prepared to communal life (Aviezer, Van IJzendoorn, Sagi, & Schuengel, 1994).

Also in China, after the 1948 revolution, most of the functions, including child rearing, that traditionally belonged to the family, were transferred to the people's communes. By the end of 1958, millions of nurseries and kindergartens had been established in the rural communes. Families were encouraged to send their children to the institutions for similar reasons as in the Soviet Union and Israeli Kibbutz movements, i.e. to free adults and especially women from the child-rearing responsibilities and facilitate their greater involvement in the production, and to ensure the proper "socialist" upbringing of the children (e.g., Dixon, 1982; Shao Chuan, 1989).

Even though the role of the ideological principles in the promotion of institutional upbringing may not be unique and limited only to Ukraine, Russia, and the region, its persistence and scale of the influence on child welfare has nevertheless gone far beyond similar developments in other parts of the world. Ironically, nowadays when in Ukraine the state's utopian aspirations to substitute families in the process of child rearing belong to the past, the state has to deal with numerous cases of evasion of parental responsibilities. In Ukraine, only about 20% of children in institutional care are biological orphans (UNICEF, 2006), the rest are so-called social orphans whose parents are unwilling or unable to fulfill their parental responsibilities due to poverty, social marginalization, single parenthood or poor health condition of either child or parent. Such children are entrusted to state institutions that in various reports are criticized for failing to provide an optimal environment for the development of children (e.g., Carter, 2005; UNICEF, 2006).

Average expectable environment vs. structural institutional neglect

Recent empirical and theoretical studies have been consistent in demonstrating that the rearing failures of institutional care are associated with its radical departure from the conditions of the so called average expectable environment (Cicchetti & Valentino, 2006; Hartmann, 1958). Depending on the child's age, the average expectable environment encompasses a range of elements, such as consistent protective and sensitive caregiving, a supportive family, as well as socialization and open opportunities for exploration and mastery of the world. The presence of the average expectable environment appears to be an important prerequisite for the normal development of the child (Bowlby, 1997; Nelson, Zeanah, Fox, Marshall, Smyke & Guthrie, 2007).

Apparently, institutional rearing falls outside the scope of the expected range of the average environment due to the risk of structural neglect that is embedded in the organization and functioning of childcare institutions (Van IJzendoorn, 2008): its regimented nature, high child-to-caregiver ratio, multiple shifts and frequent change of caregivers almost inevitably deprive children of continuous and reciprocal interactions with stable caregivers, necessary to respond to their developmental needs. It appears that the greater the deviation from the conditions of the average-expectable environment, the greater the impact on the development of children and vice versa, the better developmental outcomes institutional care secures the closer it appears in its structure and functioning to the more regular family environment (e.g., Gunnar, 2001; Van IJzendoorn et al., 2009).

Of course, the notion of the average expectable environment is as much applicable to families. Families may also deviate from the average expectable norm for various reasons (e.g., family instability, economic hardships, child abuse and neglect). This raises the question as to what may be more beneficial for the development of the child - a well functioning institution or his or her own dysfunctional family. Bowlby (1951) after reviewing several studies that compared the development of children in institutions with their family-reared counterparts from a socially disadvantaged environment concluded that "children thrive better in bad homes than in good institutions" (p. 68). However, he emphasized that this conclusion is "far from definitive and in any case all depends on how bad is the home and how good the institution" (p. 69).

Some modern advocates of institutional care maintain that institutions of good quality can provide a sense of permanence, security, structure and camaraderie, absent in dysfunctional and abusive families, and that institutional care may be the best option for some children who are left homeless by such plagues of modern times as parental drug and alcohol abuse and AIDS (e.g., Carp, 2006; McKenzie, 1996; Seelye, 1997). A recent empirical study by Miller and colleagues (2007) suggests that in case of extreme rearing circumstances institutions can provide beneficial and for some children even life-saving interventions. Ferris and colleagues (2008) found a trend for survival advantage for Romanian HIV-infected children in institutional care as compared to children who resided with their biological families. While the debate continues, high-resource countries in the vast majority of cases tend to choose for family-based care, in the low-resource countries institutional care is still prevailing (Groza et al., 2009).

The topic of the study: Institutional care and HIV

The persistence of institutional care has been shifting the focus of researchers from the impact of institutional care towards possible risk and protective factors in the development of children in institutions. In fact, empirical studies demonstrate that even when children are reared in the same institutions, and therefore presumably subject to the same caregiving circumstances, they do not show the same developmental outcomes (Smyke et al., 2007; Vorria et al., 2003; Zeanah et al., 2005). Besides, as evident from the comparisons with native family-reared children, not all developmental domains of a child are equally affected by institutional care (e.g., Smyke et al., 2007; Van IJzendoorn & Juffer, 2006). Such heterogeneity in developmental outcomes suggests the presence of certain protective and/or risk factors, which may be related to individual caregiving experiences as well as child characteristics. Identification of these factors may be highly valuable for the development of future intervention programs in child-care institutions. Therefore careful examination of the rearing environment as well as child characteristics against adequate native comparison groups is required. However, such studies are still scarce.

The current thesis focuses on individual characteristics of institutionalized children and various features of the institutional environment in order to explore how they interact with each other and to what developmental outcomes in different domains they lead. The ultimate aim of this thesis is to contribute to the development of intervention programs in institutional care for those children who are not able to experience the fruits of a transition to family-based care.

HIV-infected children are one of such groups. The rapid global spread of the pediatric HIV-infection brings more than 450 new cases every day (UNAIDS, 2007) and in many countries HIV infection becomes a growing reason for child institutionalization due to parental death or abandonment. In Ukraine, that according to UNAIDS has the third fastest spreading HIV/AIDS epidemic in Europe, about 20 percent of children born to HIV-infected women are abandoned and end up in institutional care (UNAIDS, 2007). In general, abandoned or orphaned HIV-infected children are shunned by potential adoptive or foster parents and are therefore likely to remain in institutional care, especially in resource limited countries, yet knowledge about the development of this particular group is very limited. Therefore this thesis explores the development of HIV-infected children in institutions and in their own often disadvantaged biological families in Ukraine.

Aims of the study

The general aim of this study is to explore the correlates and sequelae of institutional rearing to get more insights into the potential intervention targets in child care institutions. More specifically, the study was designed to address the following research questions regarding children reared in Ukrainian child care institutions and in their biological families:

(1) What impact do institutional care and HIV-infection have on different developmental domains of children, i.e. physical growth, stress regulation, cognitive and social-cognitive development, and organization of attachment?
(2) How do HIV-infected children reared in disadvantaged families compare to children reared in institutions in various developmental domains?
(3) Which individual characteristics and which aspects of the rearing environment buffer or exacerbate the impact of institutional rearing?

The main focus of chapter 2 is on the impact of institutional rearing on the physical development and stress regulation of institution-reared children in the absence of HIV infection. It also focuses on the possible role of individual perinatal characteristics and health condition of children in their development.

Chapter 3 extends the focus of the first chapter regarding the physical development and stress regulation of children in institutional care to the presence of HIV infection. Chapter 3 deals with the separate and combined effects of perinatal HIV infection and early institutional rearing on physical development, stress regulation, and cognitive and social-cognitive development of children. The role of different aspects of the rearing environment in cognitive development of children is explored.

In chapter 4 we examine the attachment relationships and indiscriminate friendliness of uninfected and HIV-infected children in biological families and institutions. We also explore the role of caregiving in the formation of attachment relationships of children in the face of institution-related and HIV-related adversities.

The last chapter summarizes the findings presented in the previous three chapters and discusses the limitations and implications of our findings for practice and future research.

Chapter 2

Physical Growth Delays and Stress Dysregulation in Stunted and Non-Stunted Ukrainian Institution-Reared Children

Dobrova-Krol, N.A., Van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., Cyr, C., & Juffer, F. (2008).
Infant Behavior and Development, 31, 539-553.

Abstract

To study the effect of institutional rearing on physical growth and stress regulation we examined 16 institution-reared children (3 to 6 years old) in Ukraine and compared them with 18 native family-reared children pair-matched on age and gender. Physical growth trajectories were examined on the basis of archival medical records and current measurements of height, weight, and head circumference. Stress regulation was studied on the basis of diurnal salivary cortisol sampled 6 times during one day. 31% of institution-reared children were stunted at 48 months whereas none of the family-reared children were. Substantial delays in physical growth were observed in institution-reared children especially during the first year of life. From 24 months onwards a tendency for improvement in physical growth was evident among the temporarily stunted institution-reared children, with complete catch-up in weight and partial catch-up in height by the time of assessment. Chronically stunted institution-reared children demonstrated persistent severe growth delays. Institution-reared and family-reared children showed similar patterns of diurnal cortisol production with decreases over the day. However, temporarily stunted institution-reared children had a significantly higher total daily cortisol production than both chronically stunted institution-reared children and family-reared children. These data confirm previous findings regarding physical growth delays and stress dysregulation associated with institutional care, but also point to differences in cortisol production between stunted and non-stunted institution-reared children.

Introduction

During the second half of the 20th century empirical research produced overwhelming evidence that institutional care has adverse influence on the development of children. Johnson and colleagues analyzed more than 40 studies, covering the period from 1940 until recently. They addressed the development of children who experienced institutional care varying in quality from a number of countries. The authors concluded that, regardless of differences in quality, institutional care not only failed to support optimal development but was fundamentally damaging to children (Johnson, Browne, & Hamilton-Giachritsis, 2006).

In the meantime, brought to the attention of the public, the conclusions as to the adverse effect of institutional care on the development of children have already contributed to a decline in its use throughout the so called developed countries; elsewhere, institutions have remained as a main alternative for children deprived of parental care (Browne, 2005). Thus, Ukraine, previously a republic of the Soviet Union, impelled by economic needs and former ideological convictions to maintain a collective form of child rearing, until now relies mainly on institutional care rather than family-based care for abandoned and orphaned children (Ball, 1994; Bronfenbrenner, 1970; Dunstan, 1980; Ransel, 1988). As a consequence, out of the 52 countries in the WHO European region, Ukraine at this moment takes the third place as to the absolute number and the sixth place as to the relative number of institution-reared children under 3 years of age (Browne, Hamilton-Giachritsis, Johnson, & Ostergren, 2006). Currently the total number of orphans in Ukraine is 112,000 or 1.11% of the total number of children (State Institute for Family and Youth Development, 2007). Also, since 1999 Ukraine has been in the list of the top 10 source countries for international adoption to the United States (Data from U.S. Department of State; Miller, 2005). However, little is known yet about the quality of institutional care in Ukraine, its comparability to institutional care in other countries, and its impact on its young residents.

The Context of the Study: Institutional Care in Ukraine

The majority of the child-care institutions in Ukraine are state-run, with a standardized structure and functioning across the country. They are organized in such a way as to maintain children who are deprived of parental care from birth to young adulthood. Institutions are differentiated according to children's age (for the age groups from 0 to 3 years; 3 to 7 years, and 7 to 18 years); they are also specialized depending on children's physical condition (there are special boarding schools for children with various developmental and physical impairments).

While in institutional care, children are frequently transferred within and between institutions (Ukrainian Institute of Social Studies, 2001).

Child-care institutions for young children in Ukraine may house up to 200 young residents and are usually characterized by high child-to-caregiver ratios, multiple shifts and frequent change of caregivers, which, as research reveals, are common to institutional care across different countries (see Table 1).

Table 1
Composition of residential institutional care in Ukraine, Russia, Romania and Greece

Country	Study	Children in one institution *n*	Children in one group *n*	Caregivers in one group[a] *n*	Child-to-caregiver ratio[b]
Ukraine	Present study	60 - 200	10 - 17	6 - 9	3 - 7 : 1
Russia	The St. Petersburg – USA Orphanage research Team, 2005; Sloutsky, 1997	60 - 200	9 - 20	8.7	4.5 - 7 : 1
Romania	Smyke, Dumitrescu, & Zeanah, 2002; Zeanah et al., 2003; Kaler & Freeman, 1994	120 - 200	30 - 35	9	10 - 12 : 1
Greece	Vorria et al., 2003	100	12	12	4 - 6 : 1

Note: [a]Specialists and pediatricians who are assigned to several groups are not included. [b]Child-to-caregiver ratios during a day shift are reported here, there are usually fewer caregivers during a night shift.

The daily schedule across Ukrainian institutions is strictly regimented. Apart from routines around sleeping, meals, and hygiene it usually includes group learning activities adjusted to age, and indoor and outdoor play activities. All children are expected to participate in the daily routine and may be exempt from it only if they are ill or as a form of punishment. Most institutions provide fairly clean environments, good medical care and adequate nutrition, with limited cognitive and social stimulation, especially during the first year of life.

Despite the established standards of functioning, during the last decade a growing tendency for divergence in the standards of care, living conditions and rearing beliefs can be observed among Ukrainian child-care institutions.

Heterogeneity of Institutional Care

A common feature of child-care institutions, evident from studies conducted in different countries, is the lack of stable, long-term relationships with consistent caregivers (Bowlby, 1951; Frank, Klass, Earls, & Eisenberg, 1996; Sloutsky, 1997; The St. Petersburg - USA Orphanage research Team, 2005; Zeanah, Smyke, & Settles, 2006). Indeed, the regimented nature of institutional care and a high child-to-caregiver ratio almost inevitably deprive institution-reared children of continuous and reciprocal interactions with stable caregivers, necessary to respond to their developmental needs. However, Gunnar (2001) emphasized that institutional settings can not be encompassed only by reference to the lack of stable child-caregiver relationships. Child-care institutions are widely used in countries with different ethnic, cultural and economic backgrounds and may vary not only between but also within countries. In response to the heterogeneity of institutional settings, Gunnar (2001) identified three levels of privation of the child's needs that should be considered in the examination of developmental outcomes: (1) institutions with global privation of health, nutrition, stimulation, and relationship needs; (2) institutions with adequate health and nutrition support, but privation of stimulation and relationship needs; and (3) institutions that meet all needs except for stable, long-term relationships with consistent caregivers. In the light of this classification most Ukrainian child-care institutions are best described by the second category. In addition to existing differences between child-care institutions, empirical studies also demonstrate that children reared in the same institutions, and therefore presumably subject to the same caregiving circumstances, do not show the same developmental outcomes (Smyke et al., 2007; Vorria et al., 2003; Zeanah et al., 2005). Besides, as evident from the comparisons with native family-reared children, not all developmental domains of a child are equally affected by institutional care (e.g., Smyke et al., 2007; Van IJzendoorn & Juffer, 2006). Such heterogeneity suggests the presence of certain protective and/or risk factors, which may be related to individual caregiving experiences as well as child characteristics. Identification of these factors may be highly valuable for the development of future intervention programs in child-care institutions. Therefore careful examination of the rearing environment as well as child characteristics against adequate native comparison groups is required. However, such studies are still scarce (e.g., Smyke et al., 2007; Zeanah et al., 2005; Kaler & Freeman, 1994; Vorria et al., 2003; Vorria, Rutter, Pickles, Wolkind, & Hobsbaum, 1998).

In the present study we focus on the development of Ukrainian institution-reared children who all experienced about the same level of institutional privation. To examine how institutional rearing in interplay with child characteristics affects physical growth and stress regulation of institution-reared children we compared them to native family-reared peers.

Physical Growth

The majority of studies addressing the influence of institutional care on physical growth were based on the population of formerly institutionalized international adoptees. Johnson and colleagues (1992) examined 65 Romanian adoptees and found that these children lost approximately 1 months of linear growth for every 3 months they spent in institutional care. Albers and colleagues (1997) analyzed preadoptive medical records of 56 adoptees from the Former Soviet Union and Eastern Europe and established that children had 1 month of linear growth delay for every 5 months spent in an orphanage. A meta-analysis of studies addressing the physical growth of adopted children with early institutional experience confirmed that institutional care has a dramatic negative effect on growth, especially evident in the development of height and head circumference. It was also confirmed that the longer children spent in institutional care the more they lagged behind in physical growth (Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 2007).

Whereas body weight and subcutaneous fat reflect more recent nutritional condition, faltering of the linear growth reflects long term chronic adversities (Espo et al., 2002; Grantham-McGregor, Walker & Chang, 2000; Miller, 2005). Head circumference growth indicating brain growth appears to be most vulnerable for the combined negative effects of the rearing environment and the least subject to catch-up after adoption, which may be explained by experience-expectant maturational process of the brain, meaning that the absence of specific experiences during critical periods facilitated in the early stage of life by a caregiver prevent the brain from normal growth (Glaser, 2000; Greenough, & Black, 1992; Rutter, O´Connor, & the English and Romanian Adoptees Study Team, 2004; Van IJzendoorn et al., 2007).

Although the etiology of physical growth delay is multifactorial, it could be brought down to three major causes: malnutrition, child morbidity, and maltreatment or neglect, with the latter two often being the cause of the failure of absorption or utilization of nutrients, leading to secondary malnutrition (Blizzard & Bulatovic, 1992; Grantham-McGregor, Fernald, & Sethuraman, 1999, Miller, 2005; Skuse, Reilly, & Wolke, 1994). Even in the presence of adequate nutritional provision, institution-reared children may suffer from poor absorption of nutrients due to ill-health, apathy, and lack of response-contingent stimulation (Frank et al., 1996; Gunnar, 2001; Spitz, 1945). Besides, psychosocial deprivation may cause inhibition of the growth hormone production and cell resistance to growth factors, usually reversible upon removing from the depriving environment (Blizzard & Bulatovic, 1992; Khadilkar, Frazer, Skuse, & Stanhope, 1998).

The individual contribution and interplay of these etiological factors in the physical growth delay of institution-reared children remains underresearched. Johnson (2000) suggests that psychosocial deprivation may be a predominant cause

of the growth delay in institution-reared children. In the absence of longitudinal prospective research, one way to test this hypothesis is to study physical growth dynamics in institutions that provide adequate health and nutrition support. Besides, to exclude possible influence of ethnic differences comparisons with native family-reared children are necessary. The present study describes the course of physical development of institution-reared children in institutions with adequate health and nutrition support in comparison to native family-reared peers from their birth onwards, basing on archival data and current assessments of physical growth.

Regulation of Stress

Recent advances in the field of developmental neuroscience have opened up new avenues for examination of the impact of early unfavorable experiences on the development of the child. A growing body of research points to neurophysiological sequelae of early adversity that are related to the changes in the limbic-hypothalamic-pituitary-adrenocortical axis (LHPA) functioning (Gunnar, 2000).

LHPA is one of the stress regulation systems, with cortisol as its end product. LHPA is engaged in a range of basal metabolic as well as stress-sensitive responses in the body. Under non-stress or basal conditions production of cortisol follows a circadian rhythm and promotes the sleep-awake cycle of the body: It rises near the end of the night sleep, reaches its highest peak about 30 min after awakening, afterwards it drops throughout the day with some surges related to eating and nap, and reaches its nadir 30-60 min after the night sleep has began (Kirschbaum & Hellhammer, 1989; Watamura, Donzella, Kertes, & Gunnar, 2004).

In human infants the LHPA system is highly labile and responsive; it continues to mature throughout infancy and childhood (De Weerth, Zijl, & Buitelaar, 2003; Watamura et al., 2004). In this maturational process the caregiver plays an essential role. By helping an infant to regulate his or her affective state, the caregiver is regulating the release of neurohormones in the infant's brain. If an infant is distressed, the caregiver's tactile and emotional soothing reduces the levels of cortisol and related stress hormones, at the same time, the frontal cortex develops a greater concentration of glucocorticoid receptors that can modulate stress responses (Gunnar, 1998). When comforting interaction with a caregiver is absent or when the caregiver is abusive, neglectful or continually mis-attuned, infants may remain in chronically negative states. Such chronic negative states or chronic stress may lead to dysregulation of circadian cortisol production resulting in some individuals in an elevated pattern and in others in a flat pattern of cortisol production, which in turn may have deleterious consequences for emotional and physical development (Gunnar, 2000; Gunnar & Vazquez, 2006).

Because the institutional environment confronts a child with multiple stressors on the one hand and with highly limited or absent comforting interactions with a caregiver on the other, we may expect that such rearing circumstances will lead to a LHPA functioning dysregulation with respect to the diurnal pattern of cortisol production in children subjected to institutional care. However, the number of studies testing this hypothesis is highly limited. Carlson and Earls (1997) measured the diurnal pattern of salivary cortisol production in institutionalized Romanian children compared with that of home-reared children at 2 years of age. While home-reared children demonstrated a normal decline of cortisol production during the day with its peak in the morning, institutionalized children had relatively low wake-up levels, a slight peak at noon and an overall blunted pattern of diurnal cortisol production. Another study conducted in a Russian Baby Home with 11 children at 3 to 5 months of age produced similar results of blunted rhythms of diurnal cortisol production (Kroupina, Gunnar, & Johnson, 1997, cited in Gunnar, 2000).

Gunnar and Vazquez (2001), commenting on these studies, suggested that the altered dynamics of the normal circadian rhythm may be caused by the neglectful institutional environment and repeated daily intermittent stress. However, it is also possible that this alteration is related to the child's characteristics, such as prenatal substance exposure, perinatal complications, or untoward health condition which are often observed in institution-reared children (e.g., Johnson et al., 1992, 1996; Judge, 2003; Miller, 2005), and were also found to be related to LHPA functioning (e.g., Cianfarani, Geremia, Scott, & Germani, 2002; Hng, Cheung, & McLean, 2005; Zhang, Sliwowska, & Weinberg, 2005). Besides, stunted growth caused by perinatal complications, undernourishment or psychosocial adversities appears to be related to altered LHPA functioning (Fernald & Grantham-McGregor, 1998; Fernald & Grantham-McGregor, 2002; Fernald, Grantham-McGregor, Costello, & Manadhar, 2003; Vazquez, Watson, & Lopez, 2000, cited in Gunnar &Vazquez, 2001).

Thus, in order to examine the influence of institutional rearing on the LHPA functioning of the child it is not sufficient to have a comparison group of native family-reared children, but we also have to take into consideration the background characteristics of the children that might influence cortisol production.

Hypotheses

In the present study we examined whether children reared in institutional care that provides adequate nutrition and health support, showed delays in their physical development and dysregulation of their LHPA functioning as compared to native family-reared peers. We hypothesize that even in the presence of adequate nutrition and health provision institution-reared children show physical growth delays especially evident in height and head circumference (cf. Van IJzendoorn et

al., 2007). We also hypothesize that institutional rearing leads to dysregulation of LHPA functioning with respect to the diurnal pattern of cortisol production and the overall daily production of cortisol (e.g., Carlson & Earls, 1997). Finally, we expect that stunted children are different from non-stunted children in that they show an altered pattern of diurnal cortisol production (e.g., Fernald et al., 2003).

Method

Participants
Participants were 16 institution-reared children and 19 family-reared children living with their biological parents, matched for gender and age.

Institution-reared children. Institution-reared children were recruited from four Children's Homes located in Odessa and Belgorod-Dnestrovsky, Ukraine. The following selection criteria were applied: a) age between 3 and 6 years old; b) admission to institutional care within the first 6 months of age; c) no genetic syndromes (e.g., Down syndrome); d) no evidence of fetal alcohol syndrome in the medical records; e) no HIV infection; f) permanent residence in residential care institutions since admission. Eighteen children were selected, but examination of the case records of these children revealed that 16 of them were admitted to institutional care within the first three months of life. Two other children, although left without parental care within the first six months after the birth, were initially cared for by relatives and admitted to institutional care at 37 and 55 months respectively. These two children were not included in our sample.

The data on the history of institutionalization show that only one child in the institution-reared group was an orphan, whereas the rest were admitted to institutional care because of poverty (n = 9), family disruption (n = 2), or because one or both parents were in prison (n = 4). All mothers of the institution-reared children were abusing alcohol or drugs. Although almost all institution-reared children had parents and/or relatives, only one child remained in contact with his birth family on a regular basis, 6 had sporadic contacts, and 9 children had no contacts with their parents or family members. Two children were living in the same institution with their siblings who did not participate in this study. Since admission to institutional care 8 children remained in the same institution, whereas 7 children had been transferred to another institution once and 1 child had been transferred twice. Three children were born in prison and immediately upon their birth admitted to a prison orphanage where they spent on average 38.01 months (SD = 3.35; range: 35.44 – 41.80); afterwards they were transferred to a regular orphanage. We tested whether this sub-group of children of incarcerated mothers differed from the other institution-reared children on all outcome measures, but

no significant differences emerged (.08 < p < 1.00). Since admission to their current institution, all children had experienced a change of primary caregivers, with 56% having experienced more than three changes. On average, children had been living in institutional care for 47.14 months (*SD* = 9.50; *range* 35.11 – 64.73).

Family-reared children. For the comparison group, family-reared children were recruited in the same geographical area as the Children's Homes from kindergartens, schools and clinics where routine health checks take place. Children were selected according to the following criteria: a) age between 3 and 6 years old; b) living in two-parent biological families; c) no genetic syndromes (e.g., Down syndrome); d) no fetal alcohol syndrome; e) no HIV infection; f) no previous history of institutionalization, hospitalization or prolonged separation (more than 2 weeks) from a primary caregiver.

Background characteristics inspection. Each child from the comparison group was pair-matched on age and gender with a child from institutional care. Mean age of institution-reared children was 48.14 months (*SD* = 9.72; *range* 35.11 - 66.73), and mean age of family-reared children was 51.44 months (*SD* = 9.80; *range* 37.48 - 67.06). There were 8 boys in the institutional care group and 9 in the comparison group.

At the time of assessment there were 5 chronically stunted children in the institution-reared group (four of latest assessment at 48 months, one at 36 months), i.e., from their first birthday onwards they had height-for-age z-scores below -2 SD of the reference population (World Health Organization (WHO), 1995) on all time points. There were no chronically stunted children in the family-reared group. Temporarily stunted children at some point achieved height scores below -2 SD of the reference population, but not persistently so.

Further sample inspection revealed that all chronically stunted children had perinatal hypoxic neurological conditions (PHNC), whereas only one child in the temporarily stunted institution-reared group had PHNC. There were no cases of PHNC in the family-reared group (see Table 2). Although by the time of the assessment all institution-reared children had been declared recovered and healthy by the institutional paediatricians, we decided to set apart the group of chronically stunted children in our further analysis because of their perinatal conditions and unfavorable growth development.

Results of univariate ANOVAs and chi-square test on available demographical data, presented in Table 2, showed no significant differences between the family-reared group and temporarily or chronically stunted institution-reared groups on age of biological mother, child gender, or child age. However, the biological mothers of all institution-reared children were current substance users, while none of the comparison group mothers were.

Table 2
Descriptive statistics for family-reared vs. institution-reared children

	Family-reared children		Institution-reared children					
			Temporarily stunted		Chronically stunted		Total[1]	
	n	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*
Parental characteristics								
Age of mother in years	17	32.12 (5.93)	8	28.00 (8.14)	3	36.00 (8.89)	11	30.18 (8.73)
Mothers' substance use	18	0[a]	10	10[b]	3	3[b]	13	13
Child characteristics								
Gender (male)	19	9	11	5	5	3	16	8
Age in months	19	51.44 (9.80)	11	45.12 (7.80)	5	54.78 (11.05)	16	48.14 (9.72)
Prenatal substance exposure								
Drugs	19	0[a]	3	2[b]	2	1[b]	5	3
Alcohol	19	0[a]	5	4[b]	3	3[b]	8	7
Tobacco	19	1[a]	5	5[b]	2	2[b]	7	7
Child condition at birth								
Perinatal hypoxic conditions	19	0[a]	11	1[a]	5	5[b]	16	6
Low birth weight (< 2.5 kg)	17	3	11	0	4	2	15	2
Child medical condition in infancy and early childhood								
Total morbidity score	18	0.02[a] (0.02)	11	0.08[b] (0.05)	5	0.05[b] (0.03)	16	0.07 (0.04)
Medication intake on the day of saliva sampling	19	5	11	1	5	0	16	1
Cortisol								
Diurnal cortisol production[2]	16	0.45[a] (0.17)	11	0.63[b] (0.15)	5	0.40[a] (0.03)	16	--

Note: Means in the same row that do not share superscripts differ at $p < .05$.
[1] No statistical comparisons were made with the total institution-reared group.
[2] Diurnal production of cortisol computed with AUCg formula.

To examine possible differences in the medical background between temporarily and chronically stunted institution-reared children and family-reared children we conducted a series of chi-square tests and univariate ANOVAs with respect to child condition at birth and medical condition in infancy and early childhood. Results presented in Table 2 show that a higher number of both temporarily and chronically stunted institution-reared children suffered from prenatal substance exposure.

No significant difference was found between both institution-reared groups and the family-reared group on the number of children with low birth weight (less than 2.5 kg), (temporarily stunted versus family-reared: $\chi^2 = 2.17$, $p = .26$, chronically stunted versus family-reared: $\chi^2 = 0.64$, $p = .56$). In infancy and early childhood both groups of institution-reared children suffered more often from various diseases compared to family-reared children which was reflected by their higher total morbidity score, $F(2, 31) = 12.79$, $p < .01$ (see Table 2).

Procedure

For all children enrolled in the study, informed consent was obtained: for the children in the Children's Homes from the local department of the Ministry of Health, and for the children in the family-reared group from their biological parents. All children were invited for a laboratory assessment procedure. Institution-reared children were accompanied by their "favorite" caregiver, as determined through preliminary informal interviews with children and caregivers. If a favorite caregiver was difficult to identify, the person who spent most of the time with a child and knew him or her best was invited. Family-reared children were accompanied by their primary caregiver who was also the biological parent.

Laboratory assessment. During the laboratory assessment procedure the children underwent a physical examination (height, weight, and head circumference) and were administered some other tests that will be reported on elsewhere.

Measures

Medical background. A Medical Background Checklist composed for this study was used to collect information about the health of the children. The checklist concerned the children's prenatal risks (prenatal exposure to substances), as well as health condition and medical history at birth, during infancy and during early childhood. Institutional pediatricians were asked to fill out the Medical Background Checklist, basing their answers on the children's medical records. In

case of family-reared children, parents were asked to obtain the medical records from the pediatric clinics and fill out the Medical Background Checklist in consultation with their pediatricians, when possible.

On the basis of these reports a total morbidity score was calculated. Total morbidity score (TMS) was defined as the total number of diseases requiring medical intervention that the child had experienced during infancy and early childhood until the day of assessment. In the total morbidity score we did not include conditions such as light forms of upper respiratory tract infections or common childhood diseases, like chickenpox, measles and mumps.

To control for age differences among the children, TMS was obtained by dividing the number of reported diseases by the current age of a child in months.

Physical growth. Data on physical growth through the course of the child's development were collected on the basis of the children's medical records. Data on weight, height, and head circumference were obtained for the following ages: birth, 3, 6, 9, 12, 24, 36, and 48 months, depending on the child's current age. Not all medical records were complete and different children had missing data at different time points (see Table 3). Current height, weight and head circumference of all children was measured during the laboratory visit. Anthropometric indices (weight-for-age = WAZ, height-for-age = HAZ, and head circumference-for-age = CAZ) were calculated with the software program, Epi Info™, Version 3.3.2 using the sex specific 2000 CDC reference database (Dean et al., 2002). Epi Info™ calculates HAZ scores for children up to 36 months, however we did not have sufficient data on HAZ between 12 and 36 months for the family-reared children to make group comparisons. Two other growth indices were calculated from birth until the day of assessment.

Diurnal salivary cortisol sampling. To study diurnal cortisol on a typical day a six-sample protocol was followed: 1) awakening, 2) 45 minutes after awakening, 3) 2.5 hours after awakening, 4) 8 hours after awakening, 5) 12 hours after awakening, and 6) bedtime. Saliva samples were collected from the institution-reared children by an institutional nurse and from the family-reared children by their parent. The saliva collection procedure was explained and demonstrated to the parents and institutional nurses and they received the saliva-sampling kits with written instructions for the sampling. Parents and nurses were asked to select a day when children did not attend day-care or school and when nothing unusual, exciting or particularly stressful was scheduled. They were informed that children were not allowed to eat, brush their teeth, or drink liquids (juice or milk) before taking a sample. No stimulation of saliva flow was employed in the sampling procedure. After rinsing the mouth with plain water participants took a roll of cotton into the mouth, chewed on it for approximately 30 seconds or until it became saturated,

and placed it in a salivette with a corresponding label including the time of the sampling. Saliva samples were frozen immediately upon the sampling until they were collected by the research assistant. Nurses and parents registered the exact time of sampling and provided data on activities and experiences that might influence the child's cortisol production during the day of sampling, including time of awakening, stressful daily events, food and medications intake, the child's mood and health condition. The records were screened for intake of psychotropic or corticosteroid medications and for being in a poor health condition at the day of saliva sampling, as both circumstances can potential alter the salivary cortisol production. There were no children who took psychotropic or corticosteroid medications. However, one comparison group child had become ill at the day of saliva sampling and was excluded from the analyses involving diurnal cortisol.

Assay procedure for cortisol. In order to determine the cortisol concentration in the saliva sample we used a time-resolved fluorescence immunoassay. The saliva samples were stored at -20 °C until analysis. After thawing, saliva samples were centrifuged at 2000 g for 10 minutes, which resulted in a clear supernatant of low viscosity. 100 ul of saliva were used for duplicate analysis. Cortisol levels were determined employing a competitive solid phase time-resolved fluorescence immunoassay with fluorometric end point detection (DELFIA). 96-well-Maxisorb microtiterplates (Nunc) were coated with rabbit-anti-ovine immunoglobulin. After an incubation period of 48 h at 4° C, plates were washed three times with washbuffer (pH = 7,4; containing sodium phosphate and the Tween-40). In the next step the plates were coated with an ovine anti-cortisol antibody and incubated for 48 h at 4° C. Synthetic saliva mixed with cortisol in a range from 0 - 100 nmol/l served standards. Standards, controls (saliva pools) and samples were given in duplicate wells. 50 µl of biotin-conjugated cortisol was added and after 30 minutes of incubation the non-binding cortisol/biotin-conjugated cortisol was removed by washing (3x). 200 µl europium-streptavidin (Wallac, Turku, Finland) was added to each well and after 30 minutes and 6 times of washing 200 µl enhancement solution was added (Pharmacia, Freiburg, Germany). Within 15 minutes on a shaker the enhancement solution induced the fluorescence which can be detected with a DELFIA-Fluorometer (Wallac, Turku, Finland). With a computer-controlled program a standard curve was generated and the cortisol concentration of the samples was calculated. The intra-assay coefficient of variation was between 4.0% and 6.7%, and the corresponding inter-assay coefficients of variation were between 7.1% - 9.0%.

A preliminary examination of the obtained cortisol values demonstrated that the distribution of the diurnal cortisol scores was positively skewed. Therefore, diurnal cortisol scores were log 10 transformed prior to analyses (Azar et al., 2004; Oosterlaan et al., 2005). Due to the low concentration of saliva within the cotton

swabs, 6 out of the 19 family-reared children had missing data: 1 child at all six time points; 1 child at awakening and 45 minutes after awakening; and 4 children either at awakening, 12 hours after awakening or before going to bed. Log curve estimation analyses, using individual sampling times as the independent variable, were undertaken to generate missing cortisol values for all except the one child who had missing data at all six time points.

In order to assess the overall production of cortisol from awakening until bed time the computation of the 'Area under the curve with respect to ground' (AUCg) derived from the trapezoid formula was employed (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). Since the AUCg was related to the total time that the children were awake (from awakening till bed time) and the institution-reared children were awake somewhat longer we corrected the AUCg for children's total time of being awake.

Results

Preliminary Analyses

Preliminary analyses were performed to examine whether child characteristics, such as gender, age, and low birth weight (less than 2500 g), as well as morbidity during infancy and early childhood should be included as control variables in the analyses of physical growth and diurnal cortisol production. Gender, age, and low birth weight were not associated with any of the outcome variables. Univariate ANOVA on the total morbidity score with group membership (family-reared children, temporarily stunted institution-reared children, and chronically stunted institution-reared children) as an independent variable revealed that both temporarily and chronically stunted institution-reared children suffered more often from various diseases and had higher total morbidity score compared to the family-reared children, $F(2, 31) = 12.79$, $p < .01$ (see Table 1). No significant difference was found between the temporarily and chronically stunted institution-reared children. Correlation analyses of the total morbidity score with the outcome variables revealed that morbidity during infancy and early childhood was not related to physical growth, however, higher morbidity score was associated with higher diurnal cortisol production, $r = .35$, $p = .05$.

We examined whether mood, not feeling well (excluding one more seriously ill case) or medication intake on the day of saliva sampling were related to the child's overall diurnal production of cortisol. No significant relation was found between the mood of the child or not feeling well on the day of saliva sampling and overall diurnal production of cortisol; but medication intake on the day of saliva sampling was related to decreased overall diurnal production of cortisol, $t(31) = 2.22$, $p = .03$.

Table 3

Means and standard deviations for physical growth variables as a function of rearing environment and stunting

	Family-reared children				Institution-reared children								
					Temporarily stunted				Chronically stunted				
	n	*M*	*SD*	%< -2SD[1]	*n*	*M*	*SD*	%< -2SD[1]	*n*	*M*	*SD*	%< -2SD[1]	F
Height-for-age z score													
Birth	17	0.63	1.10	6	10	0.70	0.75	0	4	-0.23	0.27	0	1.57
3 months	12	0.33	0.78	0	7	-1.30	1.15	43	2	-2.13	2.52	50	7.73*
6 months	12	0.55	0.76	0	8	-1.79	0.80	25	2	-2.21	0.78	50	26.78*
9 months	12	0.66	0.73	0	7	-1.49	0.70	43	2	-1.92	1.24	50	22.94*
12 months	11	0.74	0.65	0	9	-1.71	0.95	33	3	-3.04	0.67	100	39.16*
24 months	4	0.59	1.08	0	7	-2.09	1.16	71	3	-3.01	0.25	100	12.61*
36 months	8	0.87	1.20	0	10	-1.50	1.50	30	3	-3.45	0.60	100	13.97*
48 months	9	0.61	0.88	0	7	-0.75	0.68	0	4	-2.29	0.65	100	20.27*
Weight-for-age z-score													
Birth	17	-0.33	0.96	0	11	-0.58	0.48	0	4	-1.42	0.50	0	3.15
3 months	11	0.22	1.11	0	7	-1.44	0.54	14	2	-2.71	0.62	100	12.43*
6 months	11	0.38	0.88	0	8	-1.55	0.61	25	2	-2.52	0.62	100	21.12*
9 months	11	0.42	0.60	0	7	-2.18	0.84	57	2	-3.16	0.43	100	43.52*
12 months	12	0.61	1.04	0	9	-1.88	0.84	44	3	-3.48	0.60	100	32.13*
24 months	6	0.64	0.56	0	7	-2.15	1.68	57	3	-3.60	1.34	100	12.71*
36 months	8	0.62	0.94	0	10	-0.56	1.00	10	3	-1.98	1.53	33	7.17*
48 months	9	0.24	0.88	0	7	0.07	0.89	0	4	-1.79	1.51	25	5.79*
Head circumference-for-age z -score													
Birth	8	-0.07	1.53	14	6	-0.55	0.60	0	2	-1.58	0.36	0	1.33
3 months	9	-0.68	1.20	25	7	-2.10	1.36	71	2	-3.68	2.36	100	4.83
6 months	9	-0.05	1.34	13	8	-1.91	1.43	38	2	-4.61	2.66	100	8.71*
9 months	8	0.14	1.37	13	7	-1.51	1.16	29	2	-4.52	1.02	100	11.54*
12 months	8	0.70	0.55		7	-0.76	0.91	14	3	-3.12	1.39	100	22.32*

Note. [1]Percentage of children with anthropometric values of less than 2 SD from the reference population. *p-level remaining significant after adjusting for multiple comparisons (for weight and height: $p \leq .0063$; for head circumference: $p \leq .01$).

Thus, in the analysis on diurnal cortisol production we controlled for morbidity and medication intake on the day of saliva sampling.

Physical Growth

To examine children's physical growth across infancy and early childhood as a function of rearing environment and stunting, we conducted a series of ANOVAs comparing family-reared children, temporarily and chronically stunted institution-reared children at different time points from birth to 48 months of age for weight and height measures, and from birth to 12 months of age for head circumference measures. Because of the varying numbers of missing data on growth at the various times of assessments, we were not able to conduct a repeated measures analysis of variance. As multiple comparisons were performed, probability values were Bonferroni adjusted (within each growth parameter) to prevent Type I errors. Figures 1, 2, and 3 illustrate changes in weight, height and head circumference (with standard errors) of the three groups across infancy and early childhood. In Table 3 the means and standard deviations of the growth assessments, the ANOVA results, and a priori contrasts between the family-reared children and temporarily and chronically stunted institution-reared children are presented.

Height. There was no significant group difference in children's supine length at birth (see Table 3). As Figure 1 shows, the family-reared children demonstrated a normal pattern of growth in comparison to the reference population from birth through 48 months of age, whereas the growth of both temporarily and chronically stunted institution-reared children deviated markedly from the family-reared children and the reference population.

Most temporarily stunted children demonstrated stunted growth at some point in their life (see Table 3). At 3 months of age the supine lengths of the temporarily and chronically stunted institution-reared children were significantly lower than the supine length of the family-reared children (see Table 3). The height faltering in the temporarily stunted institution-reared children persisted and reached its peak at 24 months of age, when they were over 3 SD behind the family-reared group and over 2 SD behind the reference population. From 24 months through 48 months of age a relative improvement of growth could be observed and by 48 months temporarily stunted institution-reared children lagged 1.63 SD behind the family-reared group and 0.75 SD behind the reference population.

The height faltering in chronically stunted institution-reared children continued throughout infancy and early childhood and became most pronounced between 12 and 36 months, when they lagged more than 3 SD behind the family-reared group and the reference population. From 36 months to 48 months the gap between the family-reared and the chronically stunted institution-reared children had decreased by a little more than 1 SD and by 48 months the chronically stunted

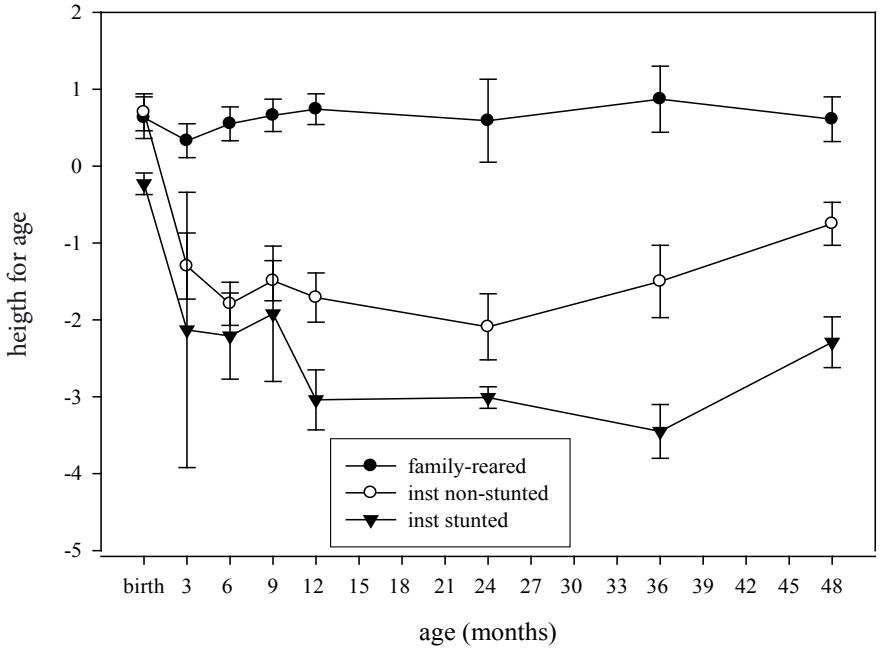


Figure 1. Height-for-age of institution- and family-reared children from 0 to 48 months

institution-reared children were lagging over 3 SD behind the family-reared group and over 2 SD behind the reference population (see Table 3).

Weight. There were no significant group differences in children's weight at birth. However, as Figure 2 shows, chronically stunted institution-reared children were slightly lighter than temporarily stunted institution-reared and family-reared children.

While family-reared children showed a normal weight gain pattern in comparison to the reference population from birth through 48 months of age, the faltering of weight gain in institution-reared children became apparent already at 3 months of age, when both groups of institution-reared children weighed significantly less than the family-reared children (see Table 3 and Figure 2), and became most pronounced between 9 and 24 months, when the temporarily stunted institution-reared group lagged more than 2 SD behind the reference population and more than 2.5 SD behind the family-reared group (see Table 3).

The chronically stunted institution-reared group lagged near 4 SD behind the family-reared group and more than 3 SD behind the reference population, and over 1 SD behind the temporarily stunted institution-reared group. From 24 months of age the difference between the temporarily stunted institution-reared

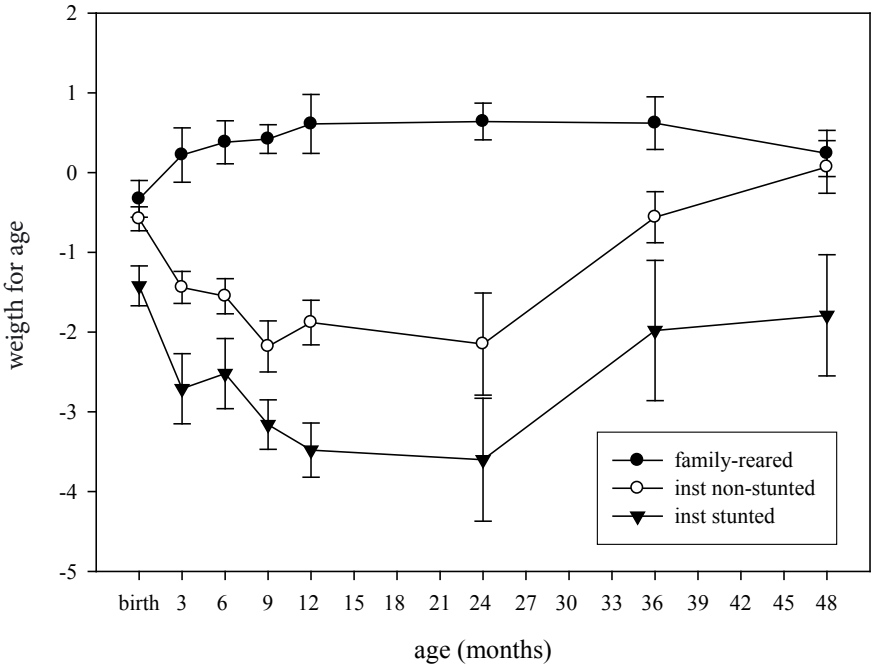


Figure 2. Weight-for-age of institution- and family-reared children from 0-48 months

group and the family-reared group began to level off and by 48 months of age catch-up in weight could be observed in the temporarily stunted institution-reared group, when they reached the normal weight range. The WAZ scores of the chronically stunted institution-reared children at 48 months as compared to both family-reared and temporarily stunted institution-reared children remained significantly lower (see Table 3 and Figure 2).

Head circumference. There was no significant group difference in children's head circumference at birth; however, as Figure 3 demonstrates, the chronically stunted institution-reared children had the lowest CAZ scores among the three groups at birth. From birth until 12 months of age the head circumference growth of the family-reared children remained within the normal range as compared to the reference population. In contrast, as Figure 3 shows, both the currently temporarily and the chronically stunted institution-reared children showed marked retardation in their head circumference growth from birth to 3 months, lagging over 2 SD and over 3 SD, respectively, behind the family-reared group and the reference population at 3 months of age (see Table 3). Whereas in the temporarily stunted institution-reared children there was a tendency for improvement of the head circumference growth from - 2.10 SD at 3 months to -0.76 SD at 12

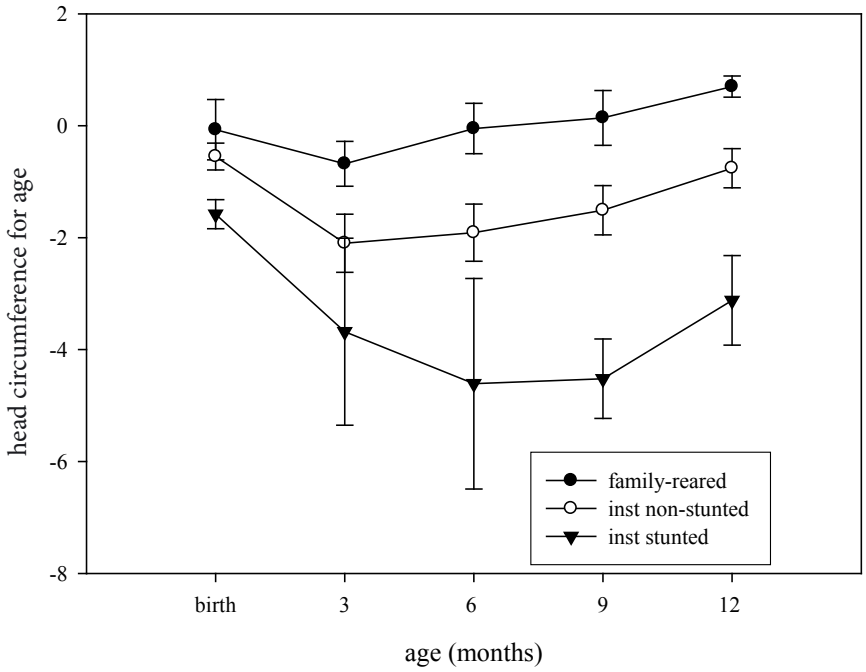


Figure 3. Head circumference-for-age of institution- and family-reared children from 0-12 months

months, the chronically stunted institution-reared group demonstrated sustained severe retardation of head circumference growth up till 9 months of age, when they lagged more than 4 SD behind the family-reared group and the reference population. There was improvement in head circumference growth at 12 months when the chronically stunted institution-reared children decreased the gap with the family reared-children and the reference population with more than 1 SD (see Table 3). Epi Info™ calculates HAZ scores for children up to 36 months; however we did not have sufficient data on HAZ between 12 and 36 months for the family-reared children to make group comparisons.

Diurnal Cortisol Production

To examine diurnal cortisol production (AUCg) as a function of rearing environment and stunting, we conducted a 3 Group X 6 Times repeated measures ANCOVA with groups of children (family-reared, temporarily stunted institution-reared, chronically stunted institution-reared) as the between-subjects factor and the time of sampling (awakening, 45 minutes after awakening, 2.5, 8, and 12 hours after awakening, and bed time) as the within-subjects factor. Child total morbidity score and medication intake on the day of saliva sampling were included as covariates. Results revealed a significant main effect of time, F (5, 135) = 36.48,

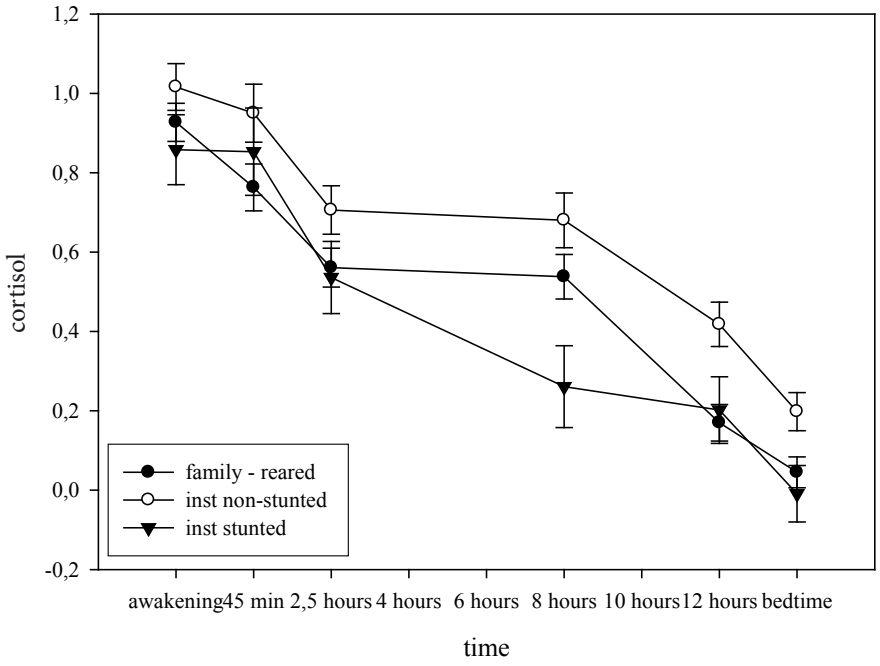


Figure 4. Diurnal cortisol values of institution- and family-reared children

$p < .01$, partial $\eta^2 = .58$, indicating a decrease in diurnal cortisol over the day for the sample as a whole. Results also revealed a significant main effect of group, F (2, 27) = 5.28, $p < .01$, partial $\eta^2 = .28$, indicating that daily average cortisol was higher for temporarily stunted institution-reared children than that of chronically stunted institution-reared children and family-reared children. No significant Group X Time effect was found, F (10, 135) = 1.21, $p = .31$, partial $\eta^2 = .08$, indicating similar decreases over the day for the three groups. Diurnal cortisol values for the three groups are graphically presented in Figure 4.

In order to assess whether the overall diurnal production of cortisol (from awakening until bed time) was related to rearing environment and stunting we conducted a one-way ANCOVA on the overall diurnal production of cortisol with group membership (family-reared children, temporarily stunted institution-reared children and chronically stunted institution-reared children) as an independent variable and total morbidity score and medication intake on the day of saliva sampling as covariates. A significant effect of the group membership was found, F (2, 27) = 5.15, $p = .01$, partial $\eta^2 = .28$. The overall diurnal cortisol production of institution-reared children was higher than in the family-reared group but only for the temporarily stunted institution-reared group ($p = .03$, see Table 2). No significant difference was found in the overall diurnal cortisol production between the family-reared group and chronically stunted institution-reared group.

Discussion

The current study provided a unique opportunity to examine physical growth and stress regulation of children in institutional care. Because the institutions in our study were characterized by the second level of institutional privation according to Gunnar's (2001) classification, providing adequate nutrition and health care, we were able to examine the influence of stimulation and relationship privation on institution-reared children's physical development and stress regulation. The contribution of various child characteristics to physical development and stress regulation were also examined. Finally, comparison with native family-reared peers allowed controlling for possible ethnic differences in developmental outcomes. We found severe delays among institution-reared children in physical growth, especially during the first two years of life. Afterwards, a tendency for improvement in physical growth was evident among most institution-reared children with complete catch-up in weight and partial catch-up in height by 48 months of age. Chronically stunted institution-reared children demonstrated persistent severe growth delays from the first months of their life onwards. Institution-reared and family-reared children showed similar patterns of diurnal cortisol production. However, temporarily stunted institution-reared children had a significantly higher total daily cortisol production than both chronically stunted institution-reared children and family-reared children.

Physical Growth

Archival data showed that there was no significant difference between institution-reared and family-reared children at birth with respect to height, weight and head circumference, but substantial delays in these growth domains were already evident at three months of age. Even in the presence of adequate nutrition and health provision and controlling for the child's morbidity, institution-reared children showed substantial delays in physical growth. Examination of current measurements of physical growth revealed that in our sample about one third of the institution-reared children were stunted. These findings support the hypothesis that stimulation and relationship privation is a predominant cause of physical growth delay in institution-reared children.

After the second birthday a tendency for improvement in physical growth emerged among the institution-reared children, resulting in the group of temporarily stunted children in complete catch-up in weight and partial catch-up in height by 48 months of age. Chronically stunted institution-reared children suffered from more severe delays which persisted from the first months of their life onwards. These findings raise two additional questions: What triggers growth improvement in children who remain in a presumably unchanged caregiving environment? Why do many institution-reared children show temporary (severe)

delays in growth but improve after their second birthday, whereas chronically stunted children show persistent severe delays in physical growth?

Catch-up or improvement in physical growth is usually associated with the removal of growth-inhibiting conditions (Boersma & Witt, 1997; Gafni & Baron, 2000). However, institution-reared children in our sample were born at different times and reared from the first months of their life onwards in the institutions; still all of them showed a tendency for improvement at about the same age. This may point to the emergence of certain protective factors allowing a child to cope with the growth inhibiting condition. The fact that a similar tendency is also observed in stunted malnourished family-reared children who after pronounced faltering of linear growth in the first two years of life seem to experience some catch-up around 40 months (Grantham-McGregor et al., 2007) points to the child rather than its environment in the search for such protective mechanisms.

Observed improvement in physical growth may be related to increasing capacity for adaptation of the somewhat older child. In fact, the younger the child is, the greater the risks for growth retardation are. The growth velocities during the first year of life are the highest. At the same time, this is the period when children are totally dependent on others for their care and, therefore, most vulnerable to poor caregiving. The older the child is, the broader the nutritional and behavioral repertoires are, the easier it may be to make its needs known, and procure more food in case of malnourished children and attention and stimulation in case of institution-reared children. Older children may more actively shape their environment (and this environment may be somewhat more stimulating when they are moved to more "educational" institutions in Ukraine at 36 months) and take care of their own needs for food or stimulation. Complete catch-up in weight in temporarily stunted institution-reared children supports this explanation; it also confirms that weight gain is more easily subject to improvement. The incomplete catch-up in height, on the other hand, may be explained by the presence of a critical period of bone growth in the first years of life which, unlike weight gain, when compromised may result in permanent alteration of the growth trajectory (Cooper et al., 1997), and/or influence of ongoing adversities of institutional rearing for which height appears to be more susceptible than weight.

But why did chronically stunted institution-reared children not improve in the same fashion? Figures 1, 2, and 3 show that chronically and temporarily stunted institution-reared children's growth trajectories are remarkably parallel for all three physical growth parameters. This may indicate that the same mechanisms govern growth in both groups, however, the somewhat less favorable start of the chronically stunted institution-reared children at birth reflected by all three growth measures suggests the presence of a certain risk factor emerging before or at birth, which may exacerbate the influence of institutional rearing on physical growth. All the mothers of institution-reared children were abusing alcohol. Although we

did not include children with fetal alcohol syndrome in our sample, we can not rule out that chronically stunted children may have suffered from this condition, which, as research reveals, is often associated with physical growth failure (e.g., Miller et al., 2006). The fact that all chronically stunted institution-reared children had perinatal hypoxic conditions seems to be an alternative explanation. This assumption is supported by other studies, pointing to the negative effect of perinatal hypoxic conditions on the subsequent development of the child (e.g., Ellis et al., 2001; Hankins & Speer, 2003; Maslova et al., 2003). In our sample, 5 out of 6 institution-reared children with perinatal hypoxic conditions showed severe delays in physical growth, suggesting that either the condition itself, the way it was treated, or a combination of both may be a serious risk factor. Importantly, perinatal hypoxic conditions are not unique to our sample. Other authors also report that neurological diagnoses including perinatal hypoxic conditions are widely spread among international adoptees formerly reared in institutions (Albers et al., 1997, Landgren et al., 2006, Pomerleau et al., 2005). Miller (2005) reports that nearly 50% of medical records of children adopted from Eastern Europe contain the diagnosis of perinatal encephalopathy. Therefore, further examination of this group is important.

Stress Regulation

Temporarily stunted institution-reared children had significantly higher total daily cortisol production compared to family-reared children, which, as we hypothesized, may reflect the dysregulation of the LHPA functioning caused by a stressful institutional environment and limited or absent comforting interactions with a caregiver. Surprisingly, no difference in total daily cortisol production was found between chronically stunted institution-reared children and family-reared children coming from hardly comparable rearing environments. On the other hand, chronically stunted and temporarily stunted institution-reared children differed significantly on the total daily cortisol production, whereas they lived in the same institutional environment. These findings point to certain factors related to the child rather than the rearing environment. From the medical records of institution-reared children we know that all chronically stunted children who also suffered from perinatal hypoxic conditions underwent a treatment to stabilize the functioning of the nervous system. Depending on the condition, such treatment among other medications and procedures may also involve the use of diazepam as well as corticosteroids, such as hydrocortisone and prednisone (Edelstein, Bondarenko, & Bykova, n.d.), which could have lasting effect on the LHPA functioning of these children.

Other than we expected, no differences in the diurnal pattern of cortisol production between chronically stunted and temporarily stunted institution-reared children and family-reared children were found: All groups demonstrated

a normal pattern with elevated morning cortisol values and subsequent decline during the day. We did not confirm the findings of Carlson and Earls (1997) and Kroupina and colleagues (1997), who reported a marked difference in the diurnal pattern of cortisol production between institution-reared and family-reared children. The discrepancy may be explained by the fact that Carlson and Earls (1997) did not differentiate between potential chronically and temporarily stunted children in their study. Besides, the children in their sample were two years younger than the children in the present study. Because diurnal pattern of cortisol production in early childhood is related to age (e.g., Watamura et al., 2004), it is possible that the difference in diurnal cortisol patterns can be explained by the age difference between the children in the two studies. Moreover, the children in their sample were at the peak of the period (24 mos) when significant growth delays were found in the present sample, which may have resulted in divergent patterns of cortisol production.

Limitations

The current study is limited in several aspects. Due to scarce information on perinatal experiences of institution-reared children we cannot disentangle the influence of prematurity and physical condition at birth from the influence of institutional care on physical development and stress regulation in this sample. However, there were no significant differences between the institution-reared and family-reared children on their anthropometric parameters at birth; besides the children with perinatal hypoxic conditions were set apart in the analysis. Therefore we may assume that the physical condition of the temporarily stunted institution-reared children and family-reared children was not much different at birth. In our sample of institution-reared children prenatal substance exposure was reported in all cases when information was available, whereas, as far as we know, none of the family reared-children was exposed to substances during prenatal development. Unfortunately, we did not have sufficient information to examine the influence of prenatal substance exposure on physical development and stress regulation of institution-reared children. However, exclusion of children with fetal alcohol syndrome from our sample allowed ruling out the more severe cases. As there were no cases of perinatal hypoxic conditions among family-reared children, we could not disentangle the role of this set of conditions from the role of institutional care in the persistent growth delays of the chronically stunted institution-reared group. Furthermore, the institutions where we conducted our study were evaluated as adequate in terms of nutrition provision; however, we may not exclude that nutritional needs of the children were still compromised if not in quantity, then in quality, and did not provide children with the necessary range of nutrients required for normal development, especially in the first year of life, when children are dependent primarily on breast-milk substitutes. As to the cortisol measurement,

obviously, single day assessment that was employed in our study may be affected by day-to-day variations. However, we controlled for possible activities and experiences that could influence the child's cortisol production during the day of sampling, including time of awakening, stressful daily events, medications intake, and the child's mood and health condition. Besides, we used a six sample protocol to obtain a more accurate picture of the area under the curve. Concerning the diurnal pattern, the lack of an awakening response observed in the family-reared children may be explained by a poor adherence to the protocol. Although parents were explicitly asked to register any deviations from the protocol and only in three cases delays around the awakening time ranging from 5 to 20 minutes were reported, more deviations from protocol might have occurred. Finally, our small sample size reduced the power of the statistical analysis. At the same time it should be noted that data had to be collected in rather difficult circumstances.

Further research is needed to test our findings related to the growth trajectory of institution-reared children and the relation between LHPA functioning and stunted growth. As children are not admitted to institutional care at random and often suffer from various disadvantageous conditions including poor physical health, we need to extend our understanding of the contribution of the individual child characteristics to the developmental outcomes and their interplay with different aspects of the rearing environment. Children appear to be differentially susceptible to adverse rearing experiences (Belsky, 2005; Belsky, Hsieh, & Crnic, 1998), and genetic differences may play a part in this respect (e.g., Bakermans-Kranenburg & Van IJzendoorn, 2006; 2007; Caspi et al., 2002), therefore, further research examining the influence of gene by environment interactions may shed light on how inheritance contributes to both the dynamics and the outcome of development of institution-reared children (Rutter, 2006). This will contribute to the exploration of possible risk and protective factors, the identification of which is indispensable in the development of targeted and effective intervention programs.

Chapter 3

Effects of Perinatal HIV Infection and Early Institutional Rearing on Physical and Cognitive Development of Children in Ukraine

Dobrova-Krol, N.A., Van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., & Juffer, F. (in press).
Child Development.

Abstract

To study the effects of perinatal HIV-1 infection and early institutional rearing on the physical and cognitive development of children 64 Ukrainian uninfected and HIV infected institutionalized and family-reared children were examined (mean age 50.9 months). Both HIV infection and institutional care were related to delays in physical and cognitive development with a larger effect of the rearing environment. Family care, even of compromised quality, was found to be more favorable for children's physical and cognitive development than institutional care. The impact of the quality of childcare on physical and cognitive development is discussed in light of future interventions.

Introduction

Early exposure to cumulative adversity may cause enduring neurobiological changes responsible for a range of developmental deficits in different domains (Nelson, 2007). The major sources of childhood adversity are poor health, economic hardship, and compromised rearing environment. The presence of perinatal HIV infection is associated with all three of them: HIV, as a medical condition, has a direct impact on physical and cognitive development of the child; as a psychosocial phenomenon, pediatric HIV infection is usually accompanied by perinatal adversities, poverty, parental substance abuse and illness, and increased risk of child neglect, maltreatment and abandonment (Klunklin & Harrigan, 2002; Steele, Nelson, & Cole, 2007).

Currently, thanks to the advances in treatment, HIV infection has turned into a chronic, sub-acute condition rather than an acute lethal disease (e.g., De Martino et al., 2000). At the same time, due to parental death or child abandonment, HIV infection has also become a growing reason for child institutionalization (UNAIDS, 2007). As has been repeatedly demonstrated in previous research, institutional care jeopardizes children's optimal development (e.g., Johnson, Browne, & Hamilton-Giachritsis, 2006). Nevertheless, several studies suggest that in some cases of extremely adverse rearing circumstances well-functioning child-care institutions may offer children a better rearing environment than their own dysfunctional families (e.g., Miller et al., 2007). Therefore, the purpose of this study was to examine the separate and combined influences of HIV status and the type of the rearing environment, i.e. biological families and child-care institutions, on children's stress regulation, physical and cognitive development, as reflected by their diurnal cortisol production, linear growth, general intelligence, and social-cognitive intelligence as indicated by theory of mind.

Previous research demonstrates that HIV infection is usually accompanied by lower birth weight and physical growth delays, and may cause inhibition of cortisol production. The growth failure of HIV-infected children is usually caused by HIV replication, with the resulting immune response affecting the metabolism and consequently physical growth. Growth delays can also occur as a result of perinatal and postnatal insults, unrelated to HIV infection, such as prenatal substance exposure, prematurity, and malnutrition prevalent among children born to HIV-infected mothers, and due to the impact of other HIV clinical symptoms, concurrent diseases, and/or treatment toxicity (Bailey, Kamenga, Nsuami, Nieburg, & St Louis, 1999; The European Collaborative Study, 2003). Furthermore, HIV may cause inhibition of the HPA system functioning due to the direct effect of the virus on adrenal gland, or as a result of concurrent diseases and/or medical treatment (e.g., Marik, Kiminyo, Zaloga, 2002).

Cognitive deficits in HIV-infected children can be attributed to structural central nervous system abnormalities and progressive encephalopathy caused by HIV, health condition and stage of the disease progress (see Wachsler-Felder & Golden, 2002 for a review). Developmental delays in HIV infected children can, however, also be caused by adverse rearing environment (Brown, Lourie, & Pao, 2000). In fact, several studies suggest that adverse rearing environment may have equal or even larger effects on the development of children than the infection itself (Coscia, Christensen, Henry, Wallston, & Radcliffe, 2001; Smith et al., 2006).

An average family provides children with what is referred to as the average expectable environment. Depending on the child's age, it encompasses a range of species-specific elements, such as protective, stable caregiving, socialization, and opens opportunities for exploration of the world (Bowlby, 1998; Cicchetti & Valentino, 2006; Hartmann, 1958). The provision of the average expectable environment is an important prerequisite for children's normal development. For children reared in HIV-impacted families, poverty, parental substance abuse and serious illness are compromising factors falling outside the range of the average rearing environment and leading to adverse developmental outcomes (e.g., Blanchette, Smith, King, Fernandes-Penney, & Read, 2002; De Bellis, 2005; Fishkin et al., 2000; Gottlieb & Blair, 2004).

As to institutional rearing, it clearly falls outside the range of the average expectable environment due to structural neglect that is embedded in the organization and functioning of childcare institutions (Van IJzendoorn, 2008): its regimented nature, high child-to-caregiver ratio, multiple shifts and frequent change of caregivers almost inevitably deprive children of continuous and reciprocal interactions with stable caregivers, necessary to respond to their developmental needs. Compromised family rearing environment as well as institutional care can lead to physical growth delays (Skuse, Reilly, & Wolke, 1994; Van IJzendoorn, Bakermans-Kranenburg, & Juffer, 2007), stress dysregulation (Gunnar & Vazquez, 2006), lower IQ (Nobel, McCandliss, Farah, 2007; Van IJzendoorn, Luijk, & Juffer, 2008), and delayed false belief understanding (Cicchetti, Rogosch, Maughan, Toth & Bruce, 2003; Tarullo, Bruce, & Gunnar, 2007; Pears & Fisher, 2005; Yagmurlu, Berument, & Celimli, 2005).

The link between compromised rearing environment and developmental deficits may operate through child–caregiver interactions. Studies suggest that even in the condition of structural institutional neglect the quality of caregiving plays a leading role in the children's development. Thus, Smyke and colleagues (2007) found that for institution-reared children the caregiving quality was related to three out of six developmental outcomes, including cognitive development. Based on adoptive parents' retrospective reports on the standards of institutional care, Castle and colleagues (1999) established that individualized care in institutions had the strongest positive effect on adoptees' IQ. Intervention studies

also support the importance of child-caregiver relationships, demonstrating that even a modest increase of visual, tactile and auditory interaction between a child and a caregiver (Hakimi-Manesh, Mojdchi, & Tashakkori, 1984), or some extra untutored human care (Hunt, Mohandessi, Ghodssi, & Akiyama, 1976) results in improved physical and mental development of institution-reared children (for a review and meta-analysis of interventions with institutionalized children, see Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2008).

Physical surroundings represent another aspect of the rearing environment influencing child development (directly and via caregivers, see Evans, 2006 for a review). Morison and colleagues (1995) showed that developmental delays in children with early institutional experience were less severe in the presence of toys and worse when children were dirty or soiled while in institutional care. Studies of family-reared children consistently demonstrated that a stimulating and well-organized physical environment allowing free exploration of developmentally adequate objects, toys and books, and language stimulation by caregivers have a positive effect on children's development (e.g., Bradley, 1985). In the current study we explored how these factors were related to the development of HIV-infected children.

According to Gunnar's (2001) classification, the institutions involved in our study were characterized by the second level of institutional privation, providing adequate nutrition and health care, however, lacking stimulation and stability in child-caregiver relationships (Dobrova-Krol, Van IJzendoorn, Bakermans-Kranenburg, Cyr, & Juffer, 2008). This being the case, the question arose whether family care even of compromised quality, as in the case of HIV-impacted families, facilitates the development of HIV-infected children better than institutional care. Or will, perhaps, institutions that provide fairly clean environments, good medical care and nutrition, such as those where the present study was conducted, be good-enough to facilitate the development of children more than the troubled family environment that HIV-impacted parents provide? And to what extent does the presence of HIV undermine the development of the institution-reared children as compared to their non-infected institution-reared peers? To address these questions we compared stress regulation, physical and cognitive development of HIV-infected children with about the same level of immune control over the infection, as reflected by their CD4 T-lymphocyte count (McMichael & Rowland-Jones, 2001), in different rearing environments: families versus institutions. To examine the effect of HIV infection on physical and cognitive development with respect to the type of the rearing environment we also included family- and institution-reared children without the HIV condition.

Hypotheses

We predicted the following: (a) both HIV infection and institution-rearing would

lead to stress dysregulation and delayed physical and cognitive development; with an expected larger effect of the rearing environment than of HIV infection; (b) even compromised family care was expected to be more favorable for the child's development than institutional care, but quality of care within the institution was predicted to be associated with level of cognitive development.

Method

Participants

Participants were 64 children: 13 HIV-infected institution-reared children, mean age 52.28 months (*SD* = 12.99; range 34.78 – 74.16); 16 uninfected institution-reared children, mean age 48.14 months (*SD* = 9.72; range 35.11 – 66.73); 16 HIV-infected family-reared children, mean age 52.01 months (*SD* = 14.78; range 30.18 – 71.56); and 19 uninfected family-reared children, mean age 51.44 months (*SD* = 9.77; range 37.48 – 67.06). The groups did not differ with respect to age and gender. Data on the background characteristics of children is presented in Table 1. All HIV-infected children were born to seropositive mothers and acquired the infection perinatally. Diagnosis of HIV-1 infection was based on positive viral culture of polymerase chain reaction assay performed after the neonatal period on at least two occasions over two months. In the group of uninfected institution-reared children five had perinatal hypoxic neurological conditions (PHNC), whereas there were no cases of PHNC in the three remaining groups. Because previous studies have demonstrated that PHNC are related to altered physical and cognitive development and stress regulation (Ellis et al., 2001; Van Handel, Swaab, De Vries, & Jongmans, 2007) we decided to exclude these children from further analysis. Moreover, one of the HIV-infected family-reared children was excluded because of clear signs of fetal alcohol syndrome not reported in the medical records, resulting in an effective sample of 58 children. The power of the current design with two factors (HIV and rearing environment), $N = 58$ children and an expected large effect size ($f = .40$) was .82; for the multivariate analyses including one covariate (birth weight, see below) the power was .85.

Institution-reared children. Institution-reared children were recruited from four Children's Homes in Ukraine. The following selection criteria were applied: a) age between 3 and 6 years old; b) admission to institutional care within the first year of life; c) no genetic syndromes (e.g., Down syndrome); d) no evidence of fetal alcohol syndrome in the medical records; e) permanent residence in child care institutions since admission. These selection criteria substantially limited the number of children who could participate in the study. On average, the mean age at admission to institutional care of the uninfected children was 1 month

(*SD* = 1; range: 0 – 3), and they had been living in institutions for 47 months (*SD* = 9; range: 35 – 65). The mean age at admission to institutional care of the HIV-infected children was also 1 month (*SD* = 2; range: 0 – 7). One child who was admitted at 7 months of age previously had lived in a hospital and was cared for by the hospital staff. HIV-infected children had been living in institutional care for 51 months on average (*SD* = 14; range: 35 – 74).

The data on the history of institutionalization showed that in the group of uninfected institution-reared children nine were admitted to institutional care because of poverty, two due to family disruption; and four because one or both parents were in prison; one child was an orphan. Since admission to institutional care seven of the uninfected children were transferred from one institution to another. For one child information about the number of transfers between institutions was missing. Seven uninfected children remained in occasional contacts with their parents or family members. Among the uninfected institution-reared children two had siblings living in the same institution; the siblings did not participate in our study.

In the group of HIV-infected institution-reared children one child was admitted to institutional care due to poverty, one child due to family disruption, and five children because one or both parents were in prison; six of the HIV-infected institution-reared children were orphans. Five HIV-infected children were once transferred from one child-care institution to another. Three of the HIV-infected children remained in occasional contacts with their biological family members. HIV-infected children had no siblings residing in the same institution.

Family-reared children. Family-reared children were recruited from local Ukrainian kindergartens, schools, and clinics where routine health checks take place. Caregivers of HIV-infected family-reared children were contacted through a non-governmental organization providing psychosocial support to HIV-infected people in the region. Some of the contacted caregivers refused to participate in the study mainly because several measures (see below) involved the video-recording of activities at home; some parents refused to participate because of the seemingly complicated procedure of diurnal salivary cortisol sampling, which along with the strict selection criteria limited our sample size. Children were selected according to the following criteria: a) age between 3 and 6 years old; b) living in biological families; c) no genetic syndromes (e.g., Down syndrome); d) no evidence of fetal alcohol syndrome in the medical records; and e) no previous history of institutionalization.

All uninfected children were reared in two-parent biological families with at least one employed parent. In two cases, the excessive use of alcohol by fathers was reported. There were no reported cases of criminal records among the parents of uninfected family-reared children. Among HIV-infected family-reared children

eight were living in two-parent biological families; four were reared by single mothers; and three by their single biological grandmothers as their parents were unable to take care of the children due to drug abuse. In eight families at least one parent was using alcohol and/or drugs and in one family both parents were abusing alcohol. In three families both parents were unemployed. In four families at least one parent had a criminal record and in one case both parents had criminal records. In two cases data on criminal records of the fathers were missing. Both uninfected and HIV-infected family-reared children were raised in families with low-to-middle income, but the monthly income of the HIV-impacted families was significantly lower than of families without HIV, $t(23) = 2.54$, $p < .05$. We tested whether income of the families as a proxy for family SES impacted the outcome measures of the family-reared children, but no significant difference emerged ($.15 < p < .46$).

Procedure

For all children enrolled in the study informed consent was obtained; for the children in the Children's Homes from the local department of the Ministry of Health, and for the children in the family-reared group from their parents or primary caregivers. All children were invited for a laboratory assessment procedure. Institution-reared children were accompanied by their "favorite" caregiver, as determined through preliminary informal interviews with children and caregivers. If a favorite caregiver was difficult to identify, the person who spent most of the time with a child and knew him or her best was invited. Family-reared children were accompanied by their primary caregiver. During the laboratory assessment procedure the children underwent a physical examination (height, weight, and head circumference) and were administered an abbreviated, non-verbal cognitive performance test (SON-R) and a Theory of Mind task. Because of limited time and resources assessment of the rearing environment was possible only for the HIV-infected children and was conducted during home visits in the case of family-reared children and during visits to child-care institutions for institution-reared children.

Measures

Child HIV-1 health status. Following the assessment procedure the children's medical records from the regional AIDS Center were reviewed in order to obtain the following data: immunological status according to the Centers for Disease Control and Prevention (CDC) classification, cluster of differentiation 4 (CD4)

T-lymphocyte counts that reflect the level of immune control over the infection (McMichael & Rowland-Jones, 2001), and duration and type of antiretroviral treatment. CD4 cell counts most proximal to the time of assessment were used (range 1 to 3 months). Preliminary analysis revealed no significant difference between the HIV-infected family-reared and institution-reared children on CD4 cell counts, $t(27) = -1.48$, $p = .15$ (see Table 1). Out of 20 children subjected to the treatment, 18 received the same anti-retroviral medications. Table 1 shows that 37.5 % of family-reared children and 92.3% of institution-reared children were receiving antiretroviral therapy at the time of the assessment; no significant difference between family-reared and institution-reared children was found on duration of antiretroviral treatment $t(15) = -0.57$, $p = .58$. We tested whether the children receiving antiretroviral therapy differed from the non-treated HIV-infected children on all outcome measures, but no significant difference emerged ($.15 < p < .94$).

Physical growth. Data on physical growth was collected from the children's medical records. Measurements of current height, weight and head circumference of all children were conducted by a trained research assistant during the laboratory visit. For the purposes of the present study we used birth weight as a marker for prenatal adversities (e.g., Nordstrom-Klee, Delaney-Black, Covington, Ager, & Sokol, 2002; Shankaran et al., 2004). Current height, weight, and head circumference were highly correlated ($rs > .50$), and because faltering of height serves as a good indicator of long term chronic adversities (e.g., Miller, 2005), current height-for-age scores were used as index for physical growth. Height-for-age (HAZ) was calculated with the software program Epi Info™, Version 3.3.2 using the sex specific 2000 CDC reference database (Dean et al., 2002).

Diurnal salivary cortisol sampling. A six-sample protocol was followed. Saliva samples were collected on a typical day from the institution-reared children by an institutional nurse and from the family-reared children by their parent. The standard saliva collection protocol and assay procedure for determining cortisol concentration in the saliva samples was applied (see for details, Bakermans-Kranenburg, Van IJzendoorn, Mesman, Alink, & Juffer, 2008; Dobrova-Krol et al., 2008). Due to the low concentration of saliva within the cotton swabs, five HIV-infected and five uninfected family-reared children had missing data at one or two out of the six sampling points. In these cases missing cortisol values were generated with log curve estimation analyses using individual sampling times as the independent variable, resulting in 52 children with complete cortisol data. Three HIV-infected children and one uninfected family-reared child who had missing data at more than two sampling points as well as one HIV-infected family-reared child who refused to cooperate were not included in the analysis

involving diurnal cortisol. Another uninfected family-reared child was excluded from the analyses involving diurnal cortisol because he was ill at the day of saliva sampling. Diurnal cortisol scores were log 10 transformed prior to analyses (Azar et al., 2004).

In order to assess the overall secretion of cortisol from awakening until bedtime the 'Area under the curve with respect to ground' (AUCg) was computed (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). Since the AUCg was related to the total time that the children were awake (from awakening till bed time) we corrected the AUCg for children's total time of being awake. In the group of HIV-infected institution-reared children two outliers on the AUCg were assigned a raw score on the offending variable that differed one unit from the next most extreme score in the distribution (Tabachnick & Fidell, 2007).

Cognitive performance. The Snijders-Oomen Nonverbal Intelligence Test (SON-R) was used to assess the children's cognitive performance (Tellegen, Winkel, Wijnberg-Williams, & Laros, 1998). The SON-R is a non-verbal intelligence test for children between 2.5 and 7 years of age that does not require the use of spoken or written language. The test consists of six non-verbal subtests that focus on two different types of abilities: visual-spatial abilities (meaningful pictures) and abstract reasoning (non meaningful pictures). Previous research showed that the non-verbal SON-R test is well suited for use with children of ethnic minorities in the Netherlands (Tellegen & Laros, 1993) and in other countries (e.g., Australia, Jenkinson, Roberts, Dennehy, & Tellegen, 1996; China, Zhang, Gong, Sun, & Tian, 1997). In our study, we selected two of the most reliable subtests of the SON-R to assess the children's cognitive performance (Tellegen & Laros, 1993): a visual-spatial performance subtest *Patterns* and an abstract reasoning subtest *Analogies*; average internal consistency of the subtests was .76. Convergent validity of the SON-R IQ with the WISC-R FSIQ and PIQ was .80, and with the Raven's matrices .74 (Tellegen & Laros, 1993). In our sample the internal consistency of the used subtests as estimated by Cronbach's alpha was .81. Total cognitive performance score was calculated with the SON-R computer program on the basis of the two subtests.

Theory of Mind. To assess the children's ability to comprehend false belief, we used one of the False Belief tasks: the classic Unexpected-Transfer Task (Baron-Cohen, Leslie, & Frith, 1985). The Unexpected-Transfer Task has a number of advantages when testing children without or with very little productive language skills due to its easily understood storyline supplemented by the use of props, simple vocabulary and its non-verbal response mode (Baron-Cohen, 1992; Garfield, Peterson, & Perry, 2001). The Unexpected-Transfer Task demonstrated good test-retest reliability, with the kappa value of .62 (Hughes et al., 2000). The task was

acted out with two dolls, Sally and Anne, each with a different colored basket and a ball, and involved unseen displacement of the object, in which Sally puts a ball in her basket and then leaves the scene. While Sally is away and cannot watch, Anne takes the ball out of Sally's basket and puts it into her box. Sally then returns and the children are asked where they think she will look for her ball. To pass the task children were to answer that Sally will look inside her basket before realizing that her ball isn't there, and thus predict an action based on an attributed false belief. The names of the dolls were changed into the culturally appropriate ones.

Rearing environment. The HOME inventory was employed to assess the rearing environments of HIV-infected family- and institution-reared children. The Early Childhood HOME Inventory is designed to measure the quality and quantity of stimulation and support available to a child in the rearing environment (Bradley et al., 1993). The information needed to score the HOME was obtained during a 45- to 90-min visit to the place where the child lived, during a time when the child and the child's primary caregiver were present and awake. The semi-structured interview and observation were conducted with minimal obtrusiveness and allowed observed participants to act normally (Caldwell & Bradley, 2003). The Child Care Early Childhood version of the HOME (CC-EC-HOME) designed for use between 3 and 6 years of age was employed in the study. It contains 58 items clustered into eight subscales: Learning Materials, Language Stimulation, Physical Environment, Caregiver Responsivity, Academic Stimulation, Modeling, Variety of Experience, and Acceptance. The Inventory was translated into Russian and the interviewers were trained by the first author. In order to calculate inter-rater reliabilities, a second observer coded 93% of the CC-EC-HOME observations: intra-class correlation coefficients for all the sub-scales scores and the total HOME scores ranged from .73 to .94.

Background characteristics. Univariate ANOVAs and chi-square tests showed no significant differences between the four groups on age of the biological mother, child gender, or child age. Differences on the variables related to child background characteristics are presented in Table 1.

Results

Preliminary Analysis

Preliminary analyses did not reveal an association between gender and any of the outcome variables, i.e., height at the assessment, diurnal cortisol production, and cognitive performance. Birth weight was significantly related to current height (p <.01), marginally related to cognitive performance on SON-R (p = .06), and

Table 1

Descriptive statistics for family-reared vs. institution-reared children

	Family-reared children						Institution-reared children					
	HIV -			HIV +			HIV -			HIV +		
	n^1	*M*	*(SD)*	n^1	*M*	*(SD)*	n^1	*M*	*(SD)*	n^1	*M*	*(SD)*
Age of mother (yrs)	17	32.12	(5.93)	14	32.47	(5.68)	11	30.18	(8.73)	8	30.38	(5.21)
Family income	12	234.75[a]	(112.29)	13	149.54.[b]	(43.10)						
Age of child (mos)	19	51.44	(9.77)	16	52.01	(14.78)	16	48.14	(9.72)	13	52.28	(12.99)
Weight-for-age at birth	16	-0.32[a]	(0.99)	15	-1.15[ab]	(1.21)	15	-0.81[ab]	(0.61)	13	-1.36[b]	(0.56)
CD4 T-lymphocyte count				14	913.21	(459.91)				13	1147.69	(375.01)
		n	*(%)*		*n*	*(%)*		*n*	*(%)*		*n*	*(%)*
Perinatal complications	19			16			16	5	(37.5)	13		
Antiretroviral therapy				16	6[a]	(37.5)				13	12[b]	(92.3)

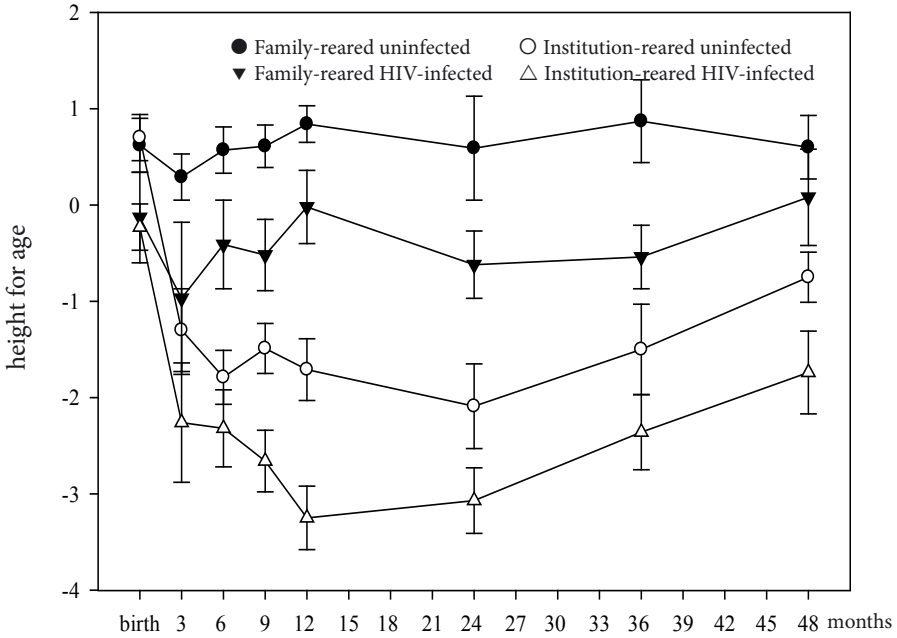
Note: Means in the same row that do not share superscripts differ at $p < .05$. [1]Number of cases with available data.

not related to ToM (p = .11). We used birth weight as a covariate in our analyses involving height and SON-R. Current age of the child was significantly related only to ToM (p < .01), and was taken into account in analyses involving this variable. Means and standard deviations of height, diurnal cortisol production, cognitive performance on SON-R, and percentages of children who passed the ToM task are presented in Table 2.

Differences Between Uninfected and HIV-Infected Family- and Institution-Reared Children on Height, Stress Regulation, and Cognitive Performance

Height. Figure 1, based on the height-for-age means with standard errors from birth to 48 months of age, shows the height trajectories of the four groups across infancy and early childhood. Although both groups of HIV-infected children had lower supine length at birth than their uninfected counterparts, this difference was significant only between uninfected family-reared children and HIV-infected

Figure 1. Height-for-age (*Z-scores, Mean, SE*) of uninfected and HIV-infected family-and institution-reared children



Note: at 36 months N = 47 (family-reared uninfected = 8, family-reared infected = 16, institution-reared uninfected = 10, institution-reared infected = 13); at 48 months N = 35 (family-reared uninfected = 8, family-reared infected = 11, institution-reared uninfected = 7, institution-reared infected = 9).

Table 2

Means and standard deviations for height, diurnal cortisol production, and cognitive performance on SON-R, as a function of rearing environment and HIV status, controlling for birth weight, and percent of children who passed the ToM task

	Family-reared children						Institution-reared children							
	HIV-			HIV+			HIV-			HIV+				
	n	*M*	*(SD)*	*n*	*M*	*(SD)*	*n*	*M*	*(SD)*	*n*	*M*	*(SD)*	*F*	χ^2
Height-for-age at the assessment	16	0.12^{a}	(0.78)	15	$-0.61^{a,b}$	(1.06)	11	$-0.89^{b,c}$	(0.72)	13	-1.86^{c}	(1.30)	7.02**	
Diurnal cortisol production[1]	15	0.45^{a}	(0.18)	12	$0.47^{a,b}$	(0.27)	11	0.63^{b}	(0.15)	13	0.40^{a}	(0.17)	2.80*	
SON-R	16	98.94^{a}	(19.59)	15	79.07^{b}	(16.90)	11	$69.73^{b,c}$	(21.28)	13	64.00^{c}	(14.32)	8.59**	
ToM[2]	18	61.1^{a}		16	25.0^{b}		11	18.2^{b}		13	23.1^{b}			8.33*

Note: Means in the same row that do not share superscripts differ at $p < .05$. [1]Diurnal production of cortisol computed with AUCg formula. [2]Unexpected-Transfer Task.

*p ≤ .05. **p < .01. ***p < .001.

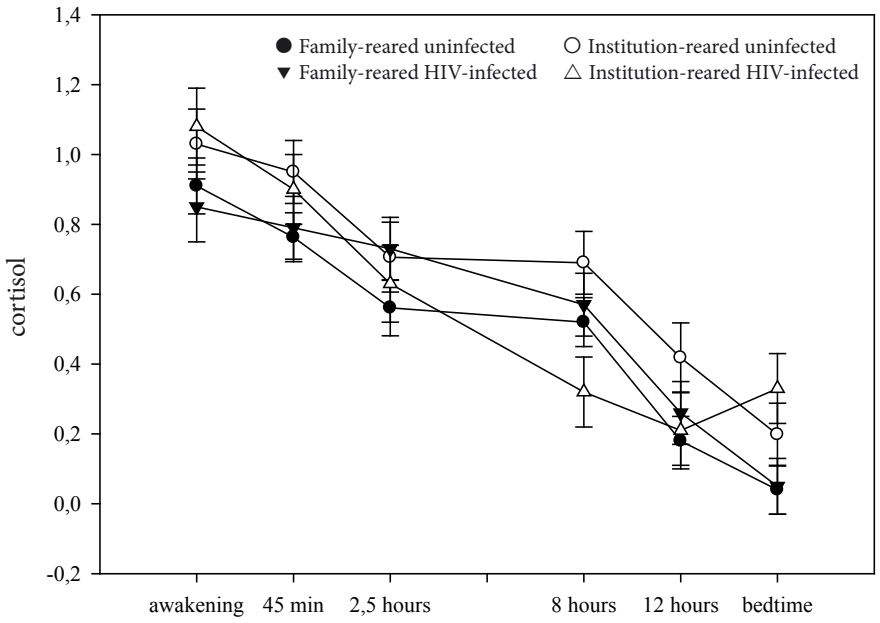


Figure 2. Diurnal cortisol values (nmol/l, log transformed) of uninfected and HIV-infected family-and institution-reared children

institution-reared children ($p < .01$). Figure 1 shows a normal pattern of linear growth of the uninfected family-reared children remaining within 1 SD (range = 0.29 to 0.87) of the reference population. For the other three groups a faltering of linear growth after birth was observed at different periods of their development: the height of the HIV-infected family-reared children remained within 1 SD (range = -0.97 to 0.08) of the reference population; the height of the uninfected institution-reared children ranged from -2.09 to -0.75; and the height of the HIV-infected institution-reared children ranged from -3.25 to -1.74. At the time of the assessment all four groups had mean height-for-age scores within 2 SD from the reference population (see also Table 2).

Stress regulation: diurnal cortisol production. Figure 2 illustrates diurnal cortisol curves of uninfected and HIV-infected family-and institution-reared children. Table 2 shows the mean values of the total diurnal cortisol production for the four groups of children.

Cognitive performance: SON-R and ToM. As Table 2 shows, cognitive performance on SON-R of the uninfected family-reared children was in the average range (M = 98.94, SD = 19.59), performance of HIV-infected family-reared children was

Table 3
Intercorrelations for the outcome variables across and within uninfected vs. HIV-infected, family- vs. institution-reared groups

	Total						Uninfected group / HIV-infected group						Family-reared group / Institution-reared group					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1.WAZ[1]	--						--	-.16	.23	-.04	.25	.25	--	-.03	.28	.04	.29	.23
2. Age	.03	--					.06	--	-.25	.03	-.11	.31	.09	--	-.19	.05	.01	.35*
3. HAZ[2]	.38**	.02	--				.29	-.17	--	-.47*	.27	.49**	.60**	.15	--	-.03	.22	.40*
4. Cortisol	.12	-.15	-.08	--			.08	.06	.01	--	-.28	-.36	.38	-.37	.01	--	-.03	.16
5. SON-R	.25	.12	.41**	.00	--		-.01	.12	.39*	.12	--	.26	.01	.17	.20	.27	--	.08
6 ToM	.22	.36**	.44**	-.09	.24	--	.43*	.45	.34	.06	.03	--	.09	.32	.37	-.41*	.24	--

Note: [1]Weight-for-age z-score at birth. [2]Height-for-age z-score at the assessment day.
*p < .05. **p < .01

in the borderline deficiency range (M = 79.07, SD = 16.90); and performance of uninfected institution-reared children (M = 69.73, SD = 21.28) and HIV-infected children (M = 64.00, SD = 8.59) fell in the range of mental deficiency according to the SON-R norms (Tellegen et al., 1998). Table 2 presents the percentages of children who passed the ToM task.

Multivariate Analyses

In Table 3, bivariate correlations between the control and outcome variables in the whole sample and as a function of the rearing environment and HIV infection are presented.

To assess the difference between the groups as a function of the rearing environment and HIV status we conducted a MANCOVA on current height, diurnal cortisol production, and cognitive performance, controlling for birth weight. Significant overall effects were found for rearing environment, F (3, 44) = 10.23, $p < .01$, partial $\eta^2 = .41$, and for HIV status, F (3, 44) = 3.01, $p = .04$, partial $\eta^2 = .17$. Subsequent ANCOVAs showed main effects for rearing environment and HIV status for both height and cognitive performance and a significant interaction effect for diurnal cortisol production (see Table 2). A priori contrasts revealed that uninfected family-reared children had significantly better scores on current height than both institution-reared groups, and performed significantly better on the SON-R test than all other groups. No significant difference on current height and SON-R between the HIV-infected family-reared children and uninfected institution-reared children was found. HIV-infected institution-reared children had significantly lower current height and SON-R scores than both family-reared groups, but they did not differ significantly from the uninfected institution-reared group (see Table 2). Diurnal production of cortisol was significantly higher in the group of uninfected institution-reared children as compared to uninfected family-reared children and HIV-infected institution-reared children, but uninfected institution-reared children did not differ significantly from HIV-infected family-reared children.

For ToM, chi-square analysis based on the extension of the Fisher's exact test for larger contingency tables and for small sample sizes (Verbeek & Kroonenberg, 1985) demonstrated significant differences between the groups, χ^2 (3, N = 58) = 8.33, $p = .04$, with family-reared uninfected children outperforming the other three groups of children. To control for age, we used a median split of the sample on age and compared the children's ToM performance among younger (< 47.86 months) and older (> 47.86 months) children. We found that in the group of younger children the success rate was 43% for uninfected family-reared children, and 17% for HIV-infected institution-reared children, none of the HIV-infected family-reared and uninfected institution-reared children passed the task. Among older children the success rate was 73% for uninfected family-reared children,

Table 4

Means, standard deviations, and correlations with cognitive performance on SON-R scores for HOME scales of HIV-infected children as a function of rearing environment

Scale	Total *n*=29			Family-reared children *n*=16			Institution-reared children *n*=13				
	M	*(SD)*	*r*	*M*	*(SD)*	*r*	*M*	*(SD)*	*r*	*F*	*d*
Learning materials	6.41	(2.57)	.29	6.13	(2.96)	.31	6.77	(2.05)	.54	0.44	-0.25
Language stimulation	5.69	(1.39)	.54**	6.00	(1.67)	.50**	5.31	(0.86)	.52	1.83	0.52
Physical environment	4.79	(1.61)	-.18	3.81	(1.60)	.20	6.00	(0.00)	.25	24.11**	-1.94
Responsivity	5.93	(1.71)	.12	6.00	(1.75)	.02	5.85	(1.73)	.24	0.06	0.07
Academic stimulation	4.10	(1.18)	.13	4.19	(1.38)	.08	4.00	(0.91)	.19	0.18	0.16
Modeling	5.14	(1.27)	.23	5.44	(1.46)	.10	4.77	(0.93)	.25	2.05	0.55
Variety	6.41	(1.84)	-.02	5.63	(2.09)	.24	7.38	(0.77)	.23	8.23**	-1.11
Acceptance	3.17	(0.89)	.42*	3.63	(0.89)	.15	2.62	(0.51)	.48	13.31**	2.84
Total	41.66	(8.02)	.28	40.81	(10.21)	.30	42.69	(4.21)	.66**	0.39	-0.24

Note: *$p < .05$. **$p < .01$.

67% for uninfected institution-reared children, 50% for HIV-infected family-reared children, and 29% for HIV-infected institution-reared children. Separate chi-square analysis conducted to compare the performance of uninfected and HIV-infected family- and institution-reared children in the younger and older groups on ToM demonstrated a significant effect for the younger children, χ^2 (3, N = 29) = 7.58, Fisher exact p = .04, again with family-reared uninfected children outperforming the other three groups of children, and no effect for the older children, χ^2 (3, N = 29) = 3.62, Fisher exact p = .35.

Cognitive Development and Environmental Characteristics

To compare the rearing environments of HIV-infected family- and institution-reared children, one-way ANOVA's on HOME subscales and HOME total scores were conducted (see Table 4; HOME scores were not available for the non-HIV infected participants, see Method).

To obtain an accurate picture of the magnitude of the differences between the two groups on the various HOME scales, independent of sample size, we also present effect sizes, as reflected by Cohen's *d*. According to Cohen (1988), d = 0.20 can be interpreted as a small effect size, d = 0.50 as medium, and d = 0.80 as large. The rearing environment of the HIV-infected institution-reared children was scored significantly higher than the environment of HIV-infected family-reared children on the Physical Environment subscale, F (1, 27) = 24.11, p < .01 (d = -1.94), and the Variety subscale, F (1, 27) = 8.23, p < .01 (d = -1.11), and significantly lower on the Acceptance subscale, F (1, 27) = 13.31, p < .01 (d = 2.84). No difference was found on the HOME total score, F (1, 27) = 0.39, p = .54 (d = -0.24).

To examine how various aspects of the rearing environment as reflected by the HOME subscales were associated with the cognitive performance of HIV-infected children, we computed the correlations between the HOME subscales and SON-R scores (see Table 4). For the whole group of HIV-infected children higher SON-R scores were related to more Language Stimulation, (r = .54), and more Acceptance, (r = .42). For HIV-infected family-reared children higher SON-R scores were related to more Language Stimulation (r = .50). For HIV-infected institution-reared children higher SON-R scores were related to higher total HOME scores (r = .66). We did not find any significant relations between the HOME subscales and current height, diurnal cortisol production, and ToM performance.

Discussion

Both HIV infection and institutional care are related to delayed physical growth and poor cognitive performance. The impact of the rearing environment on physical growth and cognitive performance on SON-R was, however, greater than the impact of HIV infection. Family care, even of compromised quality, was found to be more favorable for children's physical growth and cognitive development than institutional care. HIV-infected children reared in disadvantaged families showed better physical and cognitive development not only in comparison to HIV-infected children, but also compared to non-infected relatively healthy children reared in institutions providing good quality physical environments. In families as well as in institutions better quality of the rearing environment was associated with higher levels of cognitive performance of HIV-infected children. We found elevated diurnal cortisol production in uninfected institution-reared children, and lower levels of diurnal cortisol production in their HIV-infected counterparts. Finally, uninfected children reared in families performed significantly better on the Theory of Mind task than all other groups.

The design of the current study provides a unique opportunity to examine how perinatal HIV infection and early rearing environment affect stress regulation, physical growth and cognitive development of children in an ethnically homogeneous group. Moreover, to control for major differences in the duration and type of institutional care, we assessed children who were admitted to institutional care at one month after birth on average and who permanently resided in childcare institutions with about the same level of institutional privation.

Physical growth. The association between HIV status and lower birth weight and physical growth delays has been well documented in previous studies (e.g., Bailey et al., 1999; The European Collaborative Study, 2003), and was replicated in our sample. Archival data showed that delays in physical development of HIV-infected children were evident already at birth and persisted through the course of the child's development as compared to non-infected children raised in similar rearing environments. However, physical growth delays of HIV-infected children reared in families were less substantial not only in comparison to HIV-infected but also uninfected institution-reared children, who received adequate nutritional provision and health care, and whose physical environment was not significantly different from the environment of their family-reared counterparts as revealed by the HOME Total Score.

Stress regulation. Our finding of an interaction effect between HIV status and type of care on total diurnal cortisol production indicates that the institutional environment, as a source of repeated daily intermittent stress, may cause an

elevation of cortisol production for uninfected children, as also documented in other studies addressing stress regulation of children with institutional experience (e.g., Gunnar, Morison, Chisholm, & Schuder, 2001). In the case of HIV-infected children, it may contribute to a weakened immune system functioning that allows HIV to have a greater inhibiting impact on cortisol production as compared to HIV-infected family-reared children. However, since family- and institution-reared children had similar CD4 T-lymphocyte counts (reflecting the level of immune control over the infection), an alternative and perhaps more plausible explanation is related to antiretroviral treatment that the majority of the HIV-infected institution-reared children and less than half of the family-reared children were receiving, which may also inhibit production of cortisol (e.g., Marik et al., 2002).

Cognitive performance on SON-R. The cognitive performance of the uninfected family-reared children was in the average range, whereas in the HIV-infected family-reared children it was in the borderline deficiency range, and in both uninfected and HIV-infected institution-reared children it fell in the range of mental deficiency (Tellegen et al., 1998). For institutionalized children the impact of the infection on cognitive functioning appeared to be not very substantial. In fact, not all aspects of cognitive functioning may be equally affected by the presence of HIV. For example, along with normal performance of HIV-infected children on various measures of IQ, lower levels of performance have been found for executive functioning and processing speed (Koekkoek, De Sonneville, Wolfs, Licht, & Geelen, 2008), visual-spatial and time orientation tests (Tardieu et al., 1995), and motor development (Blanchette, Smith, King, Fernandes-Penney, & Read, 2002). The SON-R test used in our study was not meant to detect impairments in executive functioning.

At the same time, a substantial discrepancy in cognitive performance between family-reared children with and without HIV was observed: it was more than three times larger than between institution-reared children with and without HIV. This discrepancy may be attributed to the difference in the rearing circumstances in the HIV-infected and uninfected families; whereas uninfected children were from relatively normally functioning low-to-middle class families, HIV-infected children were growing up in more problematic family environments. The relatively small difference in cognitive performance of institution-reared children may be explained by the fact that both uninfected and HIV-infected children were raised in mixed groups in the same institutions, and their rearing circumstances were nearly identical. Alternatively, it may reflect a general floor effect in non-neurologically impaired groups.

On average, the institution-reared children were more than 22 IQ points behind the family-reared children, and the gap between HIV-infected institution-

reared children and their family-reared counterparts was more than 15 IQ points. Examination of the rearing environments of HIV-infected children living in families and institutions with the HOME inventory revealed no significant differences on the HOME Total Score between those groups. Interestingly, scores on the individual HOME scales indicate that in comparison to the rearing environment of HIV-impacted families, childcare institutions were providing more toys, books, and games that facilitate learning; the physical environment of the institutions was safer, offered more space, and was perceptually more appealing; finally, the care arrangements in the institutions provided more variety for the children. However, despite these benefits, HIV-infected institution-reared children showed greater cognitive delay than their family-reared counterparts. Further examination of the individual scales of the HOME inventory revealed that caregivers of the HIV-infected family-reared children were more accepting. Basically, institutional care was offering a better physical environment, whereas families secured more supportive child-caregiver interaction. Our findings suggest that the presence of a primary caregiver, and family care, even of compromised quality, promotes cognitive development of HIV-infected children above institutional care. Importantly, we found that correlations between cognitive performance and different aspects of the rearing environment reflected by the HOME scales were of considerable strength - even if they were not always statistically significant due to small subsample sizes. Also, the overall quality of care within institutions was associated with the cognitive performance of HIV-infected children; however, fairly adequate physical aspects of the rearing environment appeared to be insufficient to facilitate normative cognitive development.

Theory of Mind. More than half of the uninfected family-reared children passed the ToM Task assessing the acquisition of false belief understanding, which was more than two times more than in the remaining three groups of children. This difference was especially evident among the younger children. This finding confirms that the average expectable environment facilitates earlier acquisition of ToM. However, although HIV-impacted families secured better child-caregiver interaction than in institutions, it was not sufficiently better to facilitate early ToM development, which requires from caregivers a certain level of sensitivity, fine tuning and mind-mindedness as well as the ability to focus on the child's thoughts and feelings (Fonagy, Gergely, & Target, 2007). In the same vein, another study addressing the development of ToM in family- and institution-reared children demonstrated significantly better results for family-reared children from middle SES families and failed to demonstrate statistically significant differences between children reared in low SES families and in institutions (Yagmurlu et al., 2005).

Limitations and Future Directions

The major limitation of the current study is its modest sample size that calls for replication of our findings in other countries and institutional settings. However, the power of the study was adequate (> .80) and sufficient to find significant differences of the expected magnitude. The design of the study did not allow for random assignment of children to different conditions. Because of the scarce information on perinatal development, we were only able to account for possible effects of birth weight as a proxy for perinatal insults. Besides, children in the four settings may have been systematically different in their genetic makeup, and further studies are needed to extend our understanding of how such genetic differences might contribute to the development of institution-reared children, making them less or more vulnerable to the negative effects of structural neglect (Rutter, 2006). Finally, the group of uninfected family-reared children was different from the other three groups in that these families most likely provided the average expectable environment. On the one hand, conclusions regarding the effects of HIV status on developmental outcomes should remain preliminary until direct comparison with a group of high risk families without HIV infected children is made. On the other hand, it does allow assessing differences in the effects of the average expectable environment and institutional care among uninfected children. It should also be noted that income differences between the two types of families were not associated with children's growth parameters, cortisol production, and cognitive development.

Practical Implications

Our study has important practical implications, especially concerning the development and implementation of intervention efforts in childcare institutions, which is the important strength and impact of this study. Our results indicate that it seems to be the quality of child-caregiver relationships and not so much the presence of HIV infection or the quality of the physical environment that contributed to the (delays in) growth and cognitive development of the children in our study. This finding points to the importance of comprehensive but focused intervention efforts in childcare institutions. Renovation of premises and equipping them with toys and learning materials, which has become a popular form of intervention in Eastern Europe, is certainly valuable, but our findings suggest that they may not be sufficient to decrease the gap between the institutional environment and the environment necessary for normative child development.

Of course, family-type of care is the best alternative for institution-reared children. Recent findings of The Bucharest Early Intervention Project (BEIP) in which children were randomly assigned to foster families or institutional care demonstrated that by the age of four, children in foster care were scoring almost 10 points higher on IQ tests than the children left in the orphanages, and those

children who left the orphanages before two years of age saw an almost 15-point increase (Nelson et al., 2007). However, much time may pass before in Ukraine, with about 112,000 children under the age of 17 years reared in institutions (State Institute for Family and Youth Development, 2007), emerging alternative care and especially foster care for children with special needs and HIV will substitute institutionalized childcare. Unfortunately, HIV related stigma and fears are still dominating among the general population. Some of the caregivers who participated in our study admitted that they had to conceal their involvement with HIV-infected children from their families. Not surprisingly, children with HIV remain the least preferred candidates for adoption or foster care. Therefore intervention programs ameliorating the impact of institutionalization are of high importance for those children who are lacking the alternatives of growing up in family care. We believe that in such cases institutions offering good nutritional support and health care, especially important when adherence to the treatment regime is required, may serve at least as a temporary resort for the children. However, changing the structural neglect by enhancing the stability and the quality of the child-caregiver relationship should be a precondition and the major target of the intervention efforts (The St. Petersburg – USA Orphanage Research Team, 2008).

Thus, our study fulfils an important pilot function, increasing our knowledge about the physical and cognitive development of an emerging special-needs group of HIV-infected children reared in childcare institutions. Especially now, when the number of HIV-infected children in Ukraine and elsewhere in the world is growing, we hope that the examination of possible risk and protective factors affecting their development will contribute to a better understanding of their developmental processes, and to practical recommendations that ultimately lead to an improvement of their quality of life.

Chapter 4

The Importance of Quality of Care: Effects of Perinatal HIV Infection and Early Institutional Rearing on Preschoolers' Attachment and Indiscriminate Friendliness

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Abstract

The rearing environment of HIV-infected children is often compromised putting these children at additional risks. Positive caregiving may ameliorate the impact of adverse circumstances and promote attachment security. The goal of the present study was to examine the attachment relationships of HIV-infected children in biological families and institutions, and to assess the role of caregiving in the face of HIV-related adversities. We studied 64 Ukrainian uninfected and HIV-infected children reared in families and institutions (mean age 50.9 months). Physical and cognitive development of children as well as attachment-related domains and indiscriminate friendliness were assessed. Institutional care but not the presence of HIV was associated with less attachment security and higher levels of indiscriminate friendliness. HIV-infected family-reared children were less often secure and more often disorganized compared to uninfected family-reared children. HIV-infected and uninfected children in institutions showed the highest rates of insecure and disorganized attachments. On average, the level of indiscriminate friendliness among institution-reared children was more than twice as high as among family-reared children. Only 24% of institution-reared children had clearly developed attachment patterns, as opposed to 97% among family-reared children. Controlling for physical and cognitive development, type of care (institution or family), and HIV status, positive caregiving was associated with more attachment security. Indiscriminate friendliness was associated with lower attachment security among family-reared children, but with more positive caregiving among institution-reared children. Etiology and function of indiscriminate friendliness may differ for family-reared *versus* institution-reared children. Our findings point to the necessity of early interventions improving the quality of care for HIV-infected children.

Introduction

The rapid global spread of pediatric HIV infection has led to the emergence of a special need group of children whose development is hampered by this serious disease and environmental adversities. Whereas the advances in medical treatment have improved their survival rates and health condition, multiple psychosocial challenges accompanying HIV to a large extent remained unresolved, which tempers the medical successes and places children at risk for maladaptive functioning (Steele, Nelson, & Cole, 2007). Research demonstrated that early secure attachment promotes resilience in the face of adversities, however, attachment formation, in turn, is associated with context and quality of caregiving, as well as with child characteristics (Cassidy & Shaver, 2008). The goal of the present study was to examine the attachment relationships of HIV-infected children in different caregiving contexts: biological families and institutions; and to assess the role of caregiving in the face of HIV-related adversities.

The presence of HIV is a serious risk factor that can cause impairments of attachment formation. A study examining attachment quality as related to maternal and child HIV infection in Uganda, where transmission of HIV is not generally associated with family adversities, demonstrated that HIV-infected infants had less secure attachments (as assessed with the Attachment Q-sort) than uninfected infants (Peterson, Drotar, Olness, Guay, & Kiziri-Mayengo, 2001).

Often HIV-infected children either grow up in multiple-problem families or become abandoned or orphaned and end up in institutional care, especially in resource-limited countries. In both cases, rearing environment markedly deviates from the so called average expectable environment required for normal child development. Children in multiple-problem families are at risk for inadequate caregiving, and children in institutions often grow up in an atmosphere of structural neglect (Van IJzendoorn, 2008). In both cases, the formation of a coherent pattern of attachment may be violated resulting in attachment disorganization or attachment disorder that, in turn, may become a mediator between early adversities and subsequent psychopathology (Carlson, 1998). The prevalence of disorganized attachment in high-risk families ranges from 21% to 48%, as opposed to 15% in low-risk families (Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). As to currently institutionalized children, the rates of disorganization reported in different studies exceeded the normative data manifold: 41% in Chili (Herreros, 2009); 65% in Romania (Zeanah et al., 2005), 66% in Greece (Vorria et al., 2003), 74% in China (Steele, Steele, Jin, Archer, & Herreros, 2009), and 86% in Russia (The St. Petersburg-USA Orphanage Research Team, 2008).

Profound deviations of the rearing environment from the average expectable norm may lead to other deviant social behaviors such as indiscriminate friendliness that is also referred to as indiscriminate sociability, disinhibited social behavior,

or disinhibited attachment (e.g., Rutter, Kreppner, & Sonuga-Barke, 2009; Zeanah & Smyke, 2008). Indiscriminate friendliness is manifested in the failure to exhibit expectable reticence around unfamiliar adults, accompanied by seemingly friendly contacts with strangers and lack of checking back with a parent figure in anxiety-provoking situations. The etiology and function of indiscriminate friendliness are unclear, however, improved quality of caregiving seems to lead to a decrease of indiscriminate friendliness among institution-reared children (Smyke et al., 2002; The St. Petersburg-USA Orphanage Research Team, 2008).

Adequate quality of caregiving also appears to buffer illness-related adversities (Van IJzendoorn, Goldberg, Kroonenberg, & Frenkel, 1992), as well as challenges of the rearing environment in disadvantaged families (e.g., Carlson, 1998) and in institutions (Herreros, 2009). Therefore, it is not the mere presence of a certain risk or protective factor but their accumulation and specific combinations that determine the developmental outcomes of children (e.g., Cyr, Euser, Bakermans-Kranenburg, & Van IJzendoorn, in press). In our study we made some first steps to examine the separate and combined impact of potential risk and protective factors on the formation of attachment of children with HIV infection.

Hypotheses

We predicted the following: (a) HIV infection and institution-rearing are associated with insecure attachment, more attachment disorganization, and more indiscriminate friendliness, and the combination of both HIV infection and institution-rearing is the least favorable; (b) compromised family care is more favorable for the development of attachment than institutional care, (c) positive caregiving is related to more attachment security and less attachment disorganization and indiscriminate friendliness.

Method

Participants

Participants were 64 children, mean age 50.9 months: 13 HIV-infected institution-reared; 16 uninfected institution-reared; 16 HIV-infected family-reared; and 19 uninfected family-reared (see Table 1). The selection criteria were: a) age between 3 and 6 years old; b) b) no genetic syndromes (e.g., Down syndrome); c) no evidence of fetal alcohol syndrome in the medical records. The groups did not differ with respect to age and gender. All HIV-infected children were born to seropositive mothers and acquired the infection perinatally.

Institution-reared children. Institution-reared children were recruited from four Children's Homes in Ukraine were they permanently resided since admission; the mean age at admission of the uninfected children was 1 month (*SD* = 1; range: 0 –

3), and they had lived in institutions for 47 months on average (*SD* = 9; range: 35 – 65). The mean age at admission of the HIV-infected children was also 1 month (*SD* = 2; range: 0 – 7). One child admitted at 7 months of age had previously lived in a hospital and was cared for by the hospital staff. HIV-infected children had lived in institutional care for 51 months on average (*SD* = 14; range: 35 – 74). For other details, see Dobrova-Krol, Van IJzendoorn, Bakermans-Kranenburg, Juffer, (in press).

Family-reared children. Family-reared children with no previous history of institutionalization were recruited in the same region. All uninfected children were reared in two-parent families with at least one employed parent. There were no criminal records among the parents, and in two families excessive use of alcohol by fathers was reported. Among HIV-infected family-reared children eight were living in two-parent families; four were reared by single mothers; and three by their single grandmothers because their parents were unable to parent due to drug abuse. In nine families one parent was abusing alcohol or drugs. In three families both parents were unemployed. In five families one parent had criminal records; data on criminal records of two fathers were missing. Families in both groups had low to middle income, but the monthly income of the HIV-impacted families was significantly lower, $t(23) = 2.54$, $p < .05$. Family income was not significantly related to any of the outcome variables ($.09 < p < .72$) (see Table 1).

Procedure

Informed consent was obtained from the local department of the Ministry of Health for institution-reared children, and from the primary caregivers for family-reared children. All children participated in a laboratory assessment procedure. Institution-reared children were accompanied by their favorite caregiver as determined through preliminary interviews with children and caregivers. If a favorite caregiver was difficult to identify, the person who spent most of the time with a child and knew him or her best was invited. Family-reared children were accompanied by their primary caregiver.

Measures

Child HIV-1 health status. The children's medical records were reviewed to obtain the cluster of differentiation 4 (CD4) T-lymphocyte counts most proximal to the time of assessment (range 1 to 3 months) that reflect the level of immune control over the infection, as well as duration and type of antiretroviral treatment. No

Table 1
Descriptive statistics for family-reared vs. institution-reared children

	Family-reared children						Institution-reared children					
	HIV -			HIV +			HIV -			HIV +		
	n^1	*M*	*(SD)*	n^1	*M*	*(SD)*	n^1	*M*	*(SD)*	n^1	*M*	*(SD)*
Age of mother (yrs)	17	32.12	(5.93)	14	32.47	(5.68)	11	30.18	(8.73)	8	30.38	(5.21)
Age of child (mos)	19	51.44	(9.77)	16	52.01	(14.78)	16	48.14	(9.72)	13	52.28	(12.99)
CD4 T-lymphocyte count				14	913	(459.91)				13	1148	(375.01)
Weight-for-age at birth	17	-0.33^{a}	(0.96)	15	-1.15^{ab}	(1.21)	15	-0.81^{ab}	(0.61)	13	-1.36^{b}	(0.56)
Height-for-age at assessment	19	0.20^{a}	(0.98)	16	-0.54^{a,b}	(1.06)	16	-1.58^{b,c}	(1.29)	13	-1.86^{c}	(1.30)
Cognitive performance	19	97.63^{a}	(19.40)	16	78.00^{b}	(16.87)	16	67.31^{b}	(18.97)	13	64.00^{b}	(14.32)
Attachment security	19	5.97^{a}	(1.74)	16	4.63^{a,b}	(1.31)	16	3.75^{b}	(1.94)	13	4.27^{b}	(1.87)
Attachment disorganization	19	2.79	(1.66)	16	4.14	(2.30)	16	4.44	(1.88)	13	4.00	(2.34)
Indiscriminate friendliness	19	0.63^{a}	(0.90)	16	1.13^{a}	(1.20)	16	2.44^{b}	(1.31)	13	1.69^{a,b}	(1.70)
Positive caregiving	19	1.39^{a}	(1.43)	16	-0.19^{b}	(1.34)	16	-0.96^{b}	(1.62)	13	-0.62^{b}	(1.41)

Note: Means in the same row that do not share the same superscripts differ at $p < .05$. [1]Number of cases with available data.

significant difference between the HIV-infected family- and institution-reared children on CD4 cell counts was found, $t(27) = -1.48$, $p = .15$ (see Table 1). Out of 20 children subjected to the treatment, 18 received the same anti-retroviral medications. No significant difference between family- and institution-reared children was found on duration of antiretroviral treatment, $t(15) = -0.57$, $p = .58$. There was no difference between the children receiving antiretroviral therapy and non-treated HIV-infected children on any outcome measure, $.15 < p < .94$.

Physical growth. Height, weight and head circumference were measured during the laboratory visit. Birth weight was retrieved from children's medical records. Current height, weight, and head circumference were highly correlated (rs > .50), as well as birth weight and current height ($r = .79$, $p < .01$). Because faltering of height serves as an adequate indicator of long term chronic adversities (e.g., Miller, 2005), it was used as the index for physical growth. Height-for-age was calculated with the software program Epi Info™, Version 3.3.2 using the 2000 CDC reference database.

Cognitive performance. The Snijders-Oomen Nonverbal Intelligence Test (SON-R) for children between 2.5 and 7 years of age was used (Tellegen, Winkel, Wijnberg-Williams, & Laros, 1998). The SON-R does not require the use of spoken or written language, and consists of six subtests focusing on visual-spatial abilities and abstract reasoning. Previous research showed good psychometric qualities and proved that the SON-R test is suited for use with children in different countries (e.g., in China**,** Zhang, Gong, Sun, & Tian, 1997). We selected two of the most reliable subtests of the SON-R to assess children's cognitive performance: *Patterns* and *Analogies*. The internal consistency of these subtests as estimated by Cronbach's alpha was .81. Total cognitive performance score was calculated with the SON-R computer program.

Positive caregiving. The Emotional Availability Scales (Biringen, Robinson, & Emde, 2000) were used to assess the quality of caregiving provided by the primary or favorite caregiver. Children were videotaped with their caregiver during three minutes of free play without toys. Caregivers' sensitivity and non-intrusiveness were coded by an experienced coder (FJ) who was unaware of the HIV and rearing status of the participants. A second coder rated 55% of the sample; intra-class correlation (single measure, absolute agreement) for sensitivity was 0.72, for non-intrusiveness it was 0.81. A score for positive caregiving was obtained by adding the standardized scores of caregivers' sensitivity and non-intrusiveness.

Attachment. Attachment to the caregiver was observed in the Strange Situation Procedure (SSP; Ainsworth et al., 1978). The procedure involves a series of

episodes in which the infant is exposed to mildly stressful events: the entrance of a stranger and two separations from the caregiver, followed by a reunion.
Insecure-avoidant children keep a comfortable distance from the parent and show minimal responses. Insecure-resistant children are preoccupied with the relationship with the parent, and show immature and/or angry behavior. Secure children have calm and comfortable interaction with the parent and give an update to the parent when he or she returns (Stevenson-Hinde & Verschueren, 2002). Insecure/Controlling-Disorganized children either show contradictory or misdirected and other disorganized behaviors, or show that they have taken control of the interaction and of the relationship to reduce uncertainty when the caregiver cannot be counted upon. The SSP was coded by two experienced observers (MHvIJ and MJBK) according to the Cassidy and Marvin's system (Cassidy & Marvin with the MacArthur working group, 1992). The observers were blind for the HIV and rearing status of the participants. Agreement for the four attachment classifications was 81%, $k = .70$ ($n = 16$).

In addition, continuous ratings for security and disorganized/controlling behavior were assigned. The intercoder reliabilities for security and disorganization were .88 and .73, respectively ($n = 16$; single measure, absolute agreement). To document the degree of attachment formation we used a 5-point rating scale (Zeanah et al., 2005). Ratings of "5" indicated consistence with traditional A, B, C, and D classifications. Ratings of "4" indicated evidence of attachment behavioral organization and the presence of pervasive behavioral anomalies (beyond the scope of traditional disorganization coding). Ratings of "3," "2," and "1" were assigned for behavioral displays ranging from fragmented or incomplete sequences of attachment behavior differentially directed toward the caregiver, to isolated attachment signals and responses, or no evidence of attachment behavior. Intraclass correlation coefficient for interrater reliability was .84 ($n = 16$).

Indiscriminate friendliness. A semistructured interview with the caregiver to evaluate the child's behavior toward the parent and other adults in both novel and familiar situations was used (Chisholm, 1998). Caregivers were asked whether the child (1) wandered without distress; (2) was willing to go home with a stranger; (3) how friendly the child was with new adults; (4) was ever shy; (5) what the child typically did upon meeting new adults. For each question a score of 1 was given if a caregiver gave a response indicating indiscriminate friendliness. Research demonstrated substantial convergence of this measure with other measures of indiscriminate behavior, with intercorrelations ranging from $r = .64$ to $r = .83$ (Zeanah, Smyke, & Dumitrescu, 2002). In our sample the internal consistency as estimated by Cronbach's alpha was .66. Deleting the first item (the child wandered without distress) increased Cronbach's alpha to 0.74, therefore we computed the total score by adding scores on items 2 to 5.

Results

Preliminary Analyses

Univariate ANOVAs and chi-square tests showed no significant differences between the four groups on age of the biological mother, child gender, or child age. There were no associations of gender, current age, total duration of institutionalization, with any of the outcome variables, i.e., attachment security, disorganization of attachment, indiscriminate friendliness, and positive caregiving. Current height was positively related to positive caregiving (r = .43, p < .01); cognitive performance was positively related to attachment security (r = .29, p = .02) and positive caregiving (r = .38, p <.01), and negatively related to disorganization of attachment (r = -.33, p <.01) and indiscriminate friendliness (r = -.36, p < .01); therefore we used current height and cognitive performance as covariates in further analyses.

Rearing Environment, HIV-status, and Attachment

Table 1 presents descriptive information and contrasts among the four groups of HIV-infected and uninfected family- and institution-reared children for the continuous outcome variables. The distribution of attachment classifications in the four study groups is presented in Figure 1.

The distribution of attachment patterns was for uninfected family-reared children: 58% secure, 11% avoidant, 16% resistant, and 16% disorganized;

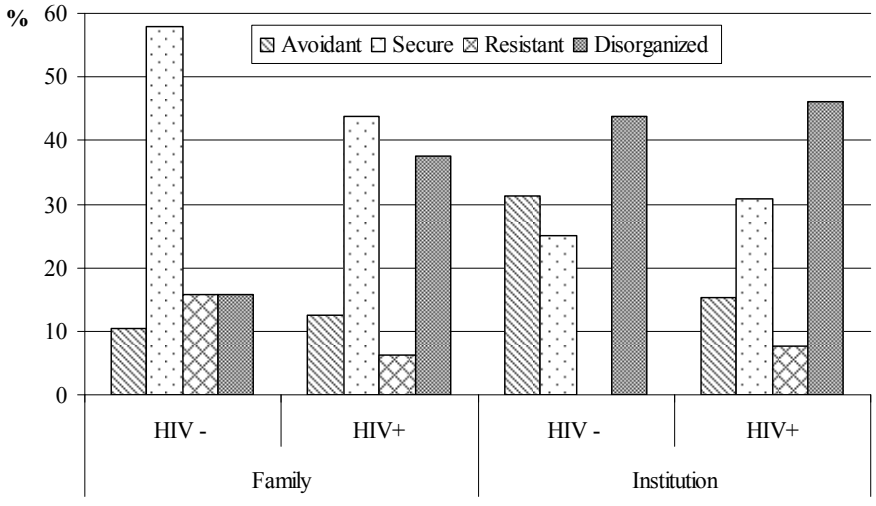

Figure 1. Distribution of attachment patterns

Table 2
Intercorrelations for the outcome variables across and within family- vs. institution-reared groups

	Total (N = 64)					Institution-reared group (n = 29)					Family-reared group (n = 35)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1. Height-for-age at assessment	--					--					--				
2. Cognitive performance	.44**	--				.25	--				.19	--			
3. Security	.14	.29*	--			-.06	-.21	--			-.10	.38*	--		
4. Disorganization	-.18	-.33*	-.48**	--		-.35	-.08	-.35	--		.18	-.40*	-.53**	--	
5. Indiscriminate friendliness	-.13	-.36**	-.32*	.16	--	.28	-.13	-.07	.04	--	-.02	-.21	-.36*	.14	--
6. Positive caregiving	.43**	.38**	.43**	-.32*	.01	.40*	-.13	.31	-.36	.45*	.12	.42*	.33*	-.19	.02

Note: *p < .05. **p < .01

for HIV-infected family-reared children: 44% secure, 13% avoidant, 6% resistant, and 38% disorganized; for uninfected institution-reared children: 25% secure, 31% avoidant, none resistant, 25% disorganized, and 19% unclassifiable; for HIV-infected institution-reared children: 31% secure, 15% avoidant, 8% resistant, 46% disorganized, and 8% unclassifiable. Children with unclassifiable attachments were included in the disorganized group (as in e.g., Zeanah et al., 2005).

On the 5-point ratings of attachment formation (Zeanah et al., 2005), 34 family-reared children received a rating of 5, one child was rated a 4. Of 29 institution-reared children 12 were rated lower than 4, and only 7 children received a 5. All children classified as secure received a score of 5.

Multivariate Regressions Predicting Attachment Security, Attachment Disorganization, and Indiscriminate Friendliness

In Table 2, bivariate correlations between the covariates and outcome variables in the whole sample and as a function of the rearing environment are presented.

To assess the unique contribution of the rearing environment, HIV infection, positive caregiving, and their interactions, we conducted a series of hierarchical regression analyses predicting attachment security, attachment disorganization, and indiscriminate friendliness. We entered children's height and cognitive performance in the first step, followed by rearing environment and HIV status in the second step; the interaction between rearing environment and HIV status in the third step; and positive caregiving in the last step. The regressions explained a significant 29% of the variance in attachment security, 37% of the variance in indiscriminate friendliness and were not significant in the prediction of attachment disorganization (see Table 3).

In the prediction of attachment security, type of care was a significant predictor, with institutional care being associated with lower levels of attachment security ($p = .04$). There was no association between HIV status and attachment security. The interaction between rearing environment and HIV status made a significant contribution, $R^2_{change} = .06$, $F(1, 58) = 4.46$, $p = .04$, with family rearing in the absence of HIV infection being associated with higher levels of attachment security. Positive caregiving accounted for an additional significant 6% of the variance in the level of attachment security, $F_{change}(1, 57) = 4.42$, $p = .04$, with more positive caregiving being associated with more attachment security.

The regression predicting indiscriminate friendliness showed that type of care was a significant predictor with institutional care being associated with more indiscriminate friendliness. There was no association between HIV status and indiscriminate friendliness. The significant interaction of rearing environment and HIV status indicated that for uninfected children the difference in level of indiscriminate friendliness between family-reared and institutionalized children was more pronounced (with institutionalized children showing more

Table 3
Regression analyses predicting attachment security, attachment disorganization, and indiscriminate friendliness from rearing environment, HIV status, and positive caregiving, controlling for current height and IQ

	Attachment security				*Disorganization of attachment*				*Indiscriminate friendliness*			
	ß	*p*	R^2	F_{change}	*ß*	*p*	R^2	F_{change}	*ß*	*p*	R^2	F_{change}
Step 1			.08	2.79			.11	3.79*			.13	4.44*
Height	-.23	.12			.03	.86			.16	.25		
Cognitive performance	.04	.80			-.23	.14			-.20	.15		
Step 2			.17	3.07†			.11	.07			.25	4.73*
Rearing environment	-.33	.04			.00	.98			.55	<.01		
HIV status	-.12	.34			.04	.78			.05	.68		
Step 3			.23	4.46*			.14	1.79			.29	3.13§
Rearing environment x HIV status	.18	.15			-.12	.38			-.30	.01		
Step 4			.29	4.42*			.17	1.83			.37	7.42**
Positive caregiving	.29	.04			-.20	.18			.35	.01		

Note: N = 64. ß, t, and p statistics are based on the final model.
§ p < .10 † p = .05. * p < .05. ** p < .01.

indiscriminate friendliness) than for HIV-infected children (see also Table 1). Positive caregiving made a significant contribution to the prediction of indiscriminate friendliness accounting for an additional 8%, $R^2_{change} = .08$, $F_{change}(1, 57) = 7.42$, $p < .01$, and was associated with more indiscriminate friendliness. Although an additional interaction between positive caregiving and type of care just failed to be significant, type of care seemed to be a moderator: the correlation between positive caregiving and indiscriminate friendliness for institution-reared children was .45, $p = .01$, for family-reared children it was .02, $p = .91$ (Table 2). The difference between the two correlation coefficients was $Z_{diff} = 1.76$, $p = .078$.

Discussion

We found that institutional care but not the presence of HIV infection was associated with less attachment security and higher levels of indiscriminate friendliness. Although HIV-infected family-reared children were less often secure and more often disorganized compared to uninfected family-reared children, HIV-infected and uninfected children in institutions showed the highest rates of insecure and disorganized attachments and poorly developed attachment patterns. Even after controlling for physical and cognitive development, type of care, and HIV status, positive caregiving was associated with more attachment security. Indiscriminate friendliness was associated with lower attachment security among family-reared children, but with more positive caregiving among institution-reared children.

The absence of an association between HIV infection and attachment contrasts with the findings of Peterson and colleagues (2001) on lower attachment security among HIV-infected children in Uganda. However, unlike the Ugandan children who had almost twice as many AIDS-related symptoms as the uninfected comparisons, most children in our study were asymptomatic, therefore, HIV infection may not have interfered with attachment formation, or, as the meta-analysis by Van IJzendoorn and colleagues (1992) points out, caregivers had a greater impact than children's health condition in shaping the child-caregiver attachment relationship.

Indeed, the elevated rate of disorganization (38%) among HIV-infected family-reared children falls within the range of the meta-analytic prevalence of disorganization in high risk families (Van IJzendoorn et al., 1999). The fact that HIV-infected children in disadvantaged families had better outcomes than both healthy and HIV-infected children in institutions suggests that the structural neglect of childcare institutions may be more damaging for attachment formation than the presence of HIV in multiple-risk family environments.

More than 40% of institution-reared children did not exhibit clear attachment patterns that could be rated with 4 or 5 on the attachment formation scale, which

is in line with other studies reporting on the lack or absence of clearly discernable attachment patterns in institution-reared children (e.g., Zeanah et al., 2005). Nevertheless, we also found a number of children who formed secure attachments despite compromised rearing environments, among HIV-infected family-reared children (44%), as well as among HIV-infected (31%) and uninfected (25%) institution-reared children. According to the 5-point attachment formation rating scale (Zeanah et al., 2005), all children in our sample who were rated as secure also had a clear attachment pattern.

So what helps children to form a secure attachment in adverse rearing environments? The child-to-caregiver ratio in our institutions (3-7:1) was similar to the institution in Greece (4-6:1) (Vorria et al., 2003) and more favorable than in Romanian institutions, (10-12:1) (Smyke et al., 2002). The percentage of securely attached children in our study was comparable to the results of the Greek study (28% vs. 24%, respectively), and 10% higher than in the Romanian sample. Apparently, a more favorable child-to-caregiver ratio may have an ameliorating effect on the attachment formation in institutional care.

In addition, attachment security was associated with more positive caregiving, even after controlling for child-related characteristics, type of care, and HIV status. This is in line with research on attachment in institutional settings (e.g., Zeanah et al., 2005), and in multiple-problem and normally developing families (Cyr et al., in press; De Wolf & Van IJzendoorn, 1997). However, the lack of an association between positive caregiving and attachment disorganization may mean that the level of positive caregiving was not sufficient to compensate for the pathogenic experiences of children, and according to the meta-analytic evidence insensitivity is not sufficient to evoke disorganized attachment (Van IJzendoorn et al., 1999).

Finally, we found that institution-reared children had a higher level of indiscriminate friendliness that was related to more positive caregiving. Our results seem to be in line with Chisholm's (1998) finding of a positive association between indiscriminate friendliness and being a favorite in an institution. Indiscriminate friendliness might be interpreted as adaptive behavior aiming to elicit caregiving from any available person in an institution. However, we found no positive association between indiscriminate friendliness and physical and cognitive development or attachment security indicating better adaptation.

Possibly, indiscriminate friendliness in institution-reared children is not adaptive, but results from the lack of expected input in the form of contingent interactions with a stable caregiver needed to facilitate the development of a preference for familiar caregivers. This presumably experience-expectant process is shown in the transformation from a relatively indiscriminate response towards strangers, characteristic for the first months of life, to stranger anxiety occurring around 7 to 8 months (Bowlby, 1997). Provence and Lipton (1962), who observed the development of institution-reared infants report that "in the second six months

one saw no evidence of increasing personal attachment to a particular person" (p. 78), and that the infants "responded with equal enjoyment to everyone who came around" (p. 80).

The lack of the expected experience during a sensitive period may lead to permanent deficits or, as Rutter and colleagues (2007, 2009) suggest biological programming effects. In fact, Wolkind (1974) reported that indiscriminate behaviors were confined to children admitted to an institution before two years of age. Similarly, Rutter and colleagues (2007) found that marked disinhibited attachment was more common among children adopted between 6 and 42 months as opposed to those adopted earlier. Persistence of these behaviors even after adoption as well as their associations with vagal regulation (Oosterman & Schuengel, 2007), and inhibitory control abilities (Bruce, Tarullo, & Gunnar, 2009), also point to possible biological programming during a sensitive period. In our case, the association between indiscriminate friendliness and positive caregiving may simply reflect a natural reaction of caregivers to contact-inducing behaviors. However, due to the shallow nature of such contacts children may not profit from them.

The significant negative association between indiscriminate friendliness and attachment security among family-reared children and its absence among institution-reared children points to possible equifinality of indiscriminate friendliness. In fact, in case of children without institutional background the etiology, course, correlates, and meaning of indiscriminate friendliness may be different (Bruce et al., 2009; Rutter et al., 2007; Zeanah et al., 2004). Among family-reared children indiscriminate friendliness is related to maltreatment and maternal psychiatric problems or substance abuse (Boris et al., 2004; Lyons-Ruth, Bureau, Riley, & Atlas-Corbett, 2009; Zeanah et al., 2004). Thus, it seems to result from a distortion or disruption of early attachment relationships rather than a lack thereof.

Our study has several limitations. The modest sample size calls for replication of our findings. However, the power of the study was sufficient (> .80) to find significant differences of moderate effect sizes. Furthermore, we were not able to employ observational measures of indiscriminate friendliness, and it was difficult to disentangle the impact of HIV from other family adversities. Conclusions regarding the effects of HIV should remain preliminary until a direct comparison with a group of uninfected children reared by HIV-infected primary caregivers is made.

Because pediatric HIV infection is a growing challenge worldwide the findings of our study have important practical implications for policymakers, practitioners and caregivers. Our study suggests that even compromised family care appears to be more favorable for the formation of attachment relationships of HIV-infected children than good quality institutions. Therefore, efforts should be made to prevent

child abandonment and to support HIV-impacted families in their parenting role. If a child nevertheless ends up in institutional care the rearing environment should be optimized by reducing the number of children per caregiver and improving the quality of caregiving. The timing of such interventions is of importance. As the phenomenon of indiscriminate friendliness illustrates, structural neglect or traumatic experiences during the first year of life may have long-term or even permanent effects on children. Therefore, preventive measures and interventions should be introduced at the earliest stages of life.

Chapter 5

Discussion and Conclusion

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Discussion

In this study the impact of institutional care and perinatal HIV infection on different developmental domains of preschool children was examined. We examined the contribution of various child characteristics and different aspects of the rearing environment to the developmental outcomes of children in search for possible risk and protective factors. Our ultimate goal was to gain more insight into potential intervention targets in childcare institutions. In this study the following research questions were addressed:

(1) What impact do institutional care and HIV infection have on different developmental domains of children?
(2) How do HIV-infected children reared in disadvantaged families compare to HIV-infected children reared in institutions in various developmental domains?
(3) Which individual characteristics and which aspects of the rearing environment buffer or exacerbate the impact of institutional rearing?

The development of four ethnically homogeneous groups was compared: children with and without perinatal HIV infection reared in their biological families and childcare institutions. We assessed children who were put into care at one month after birth on average. These children permanently resided in institutions with a similar organization and quality of care. Institutions involved in our study provided adequate nutrition and health care, but lacked stimulation and stability in child-caregiver relationships. As far as family-reared children are concerned, both uninfected and HIV-infected children were raised in families with low to middle incomes. HIV-impacted families had lower monthly incomes and were more likely to experience multiple adversities than families without HIV. HIV-infected children in families and institutions had about the same level of immune control over HIV as was reflected by their CD4 T-lymphocyte count.

In this chapter the findings of our study are summarized and discussed and we also discuss the implications of our findings for policy and practice and for future (intervention) research.

The impact of institutional care and HIV on the development of children

The findings of our study contribute to a body of research demonstrating that structural institutional neglect impedes the normal development of children. We found that institutional care was associated with less favorable outcomes in all

developmental domains that we examined. We also found that presence of HIV infection led to less favorable developmental outcomes, however, negative impact of institutional care was greater than presence of HIV in several domains as separately discussed below.

Physical Growth

Our findings around physical growth contribute to the wealth of data demonstrating significant suppression of physical growth among children reared in institutions. The suppression of physical growth among institution-reared children usually results from a complex interplay of different factors, such as nutritional insufficiency, child health condition, and structural neglect (see Johnson, Gunnar & Palacios, 2009, Van IJzendoorn et al., 2007 for reviews). The growth failure of HIV-infected children is usually caused by HIV replication, or HIV-related diseases, and/or treatment toxicity (Bailey et al., 1999; The European Collaborative Study, 2003).

In our study institution-reared children regardless of their HIV status demonstrated substantial delays in physical growth despite relatively adequate nutrition and health provision and even after controlling for possible impact of the child's morbidity. This finding suggests that structural neglect may be the main cause of physical growth delays among institution-reared children in our sample (see chapter 2). Presence of HIV infection was also associated with less favorable growth dynamics both among family- and institution-reared children. We demonstrated that in our sample institutional care had a greater negative impact on children's physical development than HIV infection (see chapter 3).

Regulation of Stress

Our study provided a unique opportunity to contribute to the rather scarce data on stress regulation of currently institutionalized children. Institution- and family-reared children in our sample, on average, showed similar patterns of diurnal cortisol production with decreases in the course of the day. However, we found elevated total diurnal cortisol production in uninfected institution-reared children and no difference among the other three groups (uninfected and HIV-infected family-reared children and HIV-infected institution-reared children). Elevation of the cortisol production among uninfected institution-reared children, as we discussed in chapter 2, may be caused by a stressful institutional environment and limited or absent comforting interactions with a caregiver (Gunnar, 2000; Gunnar & Vazquez, 2001). The lack of difference in total daily cortisol production found among the remaining groups may most likely be caused by the medical treatment that the majority of children with HIV infection underwent. The medical treatment may have inhibited the production of cortisol, thus masking the dysregulation of stress (see chapter 3).

Cognitive Performance

The negative impact of structural institutional neglect on cognitive development of children has been demonstrated in a substantial body of research. A meta-analysis of 75 studies on the cognitive development of children in orphanages throughout the world demonstrated that an absolute difference in IQ between institutionalized and family-reared children amounted to 20 IQ points (Van IJzendoorn, Luijk, & Juffer, 2008). Studies on cognitive sequelae of HIV in infancy and early childhood also report on cognitive deficits observed in HIV-infected children (e.g., Blanchette et al., 2002; Jeremy et al., 2005; Wachsler-Felder & Golden, 2002).

We found that, on average, institution-reared children were more than 22 IQ points behind family-reared children. The difference in cognitive performance between HIV-infected and uninfected children was about 12 IQ points. We demonstrated that rearing adversities, and institutional care in particular, were associated with greater delays in cognitive development than presence of HIV infection (see chapter 3)

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Theory of Mind (ToM)

The average expectable environment and especially its caregiving component, i.e., sensitivity, fine tuning and mind-mindedness facilitates earlier acquisition of ToM which refers to the ability to see self and others in terms of mental states. Compromised rearing circumstances may decrease the quality of caregiving and lead to delayed false belief understanding.

In our study, more than a half of the uninfected family-reared children whose rearing circumstances were most favorable among the four groups passed the ToM task. The remaining three groups of children performed almost twice worse and did not substantially differ from each other. Both structural institutional neglect and multiple family adversities could have delayed development of ToM. The fact that there was no substantial difference between infected and uninfected institution-reared children suggests that presence of HIV did not pose an additional risk to the development of ToM among institution-reared children (see chapter 3).

Attachment

While institutional care has a negative impact on virtually every developmental domain, research demonstrates that the development of attachment relationships is most at risk in institutional care (Zeanah et al., 2006). Presence of a chronic pediatric condition can also be potentially disruptive to the attachment formation process of children due to the associated medication regimens, recurrent hospitalizations, and frequent separations from caregivers and peers (e.g., Barlow & Ellard, 2006; Odegard, 2005).

We found that only a quarter of children reared in institutions developed clear attachment patterns, as opposed to 97% of children reared in families. Institutional care but not the presence of HIV was associated with less attachment security. Because most children in our study were asymptomatic, HIV infection may not have interfered with attachment formation (see chapter 4).

Indiscriminate Friendliness

Deviations of the rearing environment from the average expectable norm may lead to deviant social behaviors such as indiscriminate friendliness. Indiscriminate friendliness is defined as a failure to exhibit reticence around unfamiliar adults, impersonal and superficial contacts with strangers, and lack of checking back with a caregiver in anxiety-provoking situations (e.g., Rutter, Kreppner, & Sonuga-Barke, 2009; Zeanah & Smyke, 2008). It has been described as one of the most persistent behavioral abnormalities associated with institutional background and foster care (e.g., Chisholm, 1998; Zeanah, Smyke, Dumitrescu, 2002). Indiscriminate friendliness has also been observed among maltreated children reared in families (e.g., Zeanah et al., 2004).

In this study we found that, on average, the level of indiscriminate friendliness among institution-reared children was more than twice higher than among family-reared children. As expected, we did not find any association between presence of HIV and indiscriminate friendliness. We found that indiscriminate friendliness was associated with lower attachment security among family-reared children, and with more positive caregiving among institution-reared children. This finding as well as previous research allowed us to suggest that the etiology of indiscriminate friendliness may differ for family- and institution-reared children. In chapter 4 we also argue that indiscriminate friendliness observed among institution-reared children may not be adaptive, as some scholars suggest. We argue that it may result from the lack of expected experience, i.e. consistent interactions with a stable caregiver, during a sensitive period. This sensitive period is likely to be in the first year of life when the transition from indiscriminate response towards strangers to stranger anxiety takes place.

The findings of our study demonstrate that structural institutional neglect impedes the development of children in all examined domains. Presence of HIV infection was also found to be associated with less favorable outcomes in physical growth and cognitive development, however, negative impact of institutional care was greater than presence of HIV.

HIV-infected children in families and children in institutions

One of the questions of our study was whether the presence of a primary caregiver, and family care, even of compromised quality, as was the case for HIV-impacted families involved in this research, continues to facilitate the development of HIV-infected children better than institutional care. Or do institutions that provided fairly clean environment and good medical care, such as those where the present study was conducted, offer a more optimal rearing environment for HIV-infected children?

We found that in three out of six developmental outcomes that we examined, HIV-infected children reared in disadvantaged families demonstrated better results than HIV-infected children reared in institutions. Thus, physical growth delays of HIV-infected children reared in families were less substantial. They showed better cognitive performance than HIV-infected institution-reared children, who lagged with more than 15 IQ points behind. 96% of the HIV-infected children reared in families managed to develop clearly discernable attachment relationships as opposed to only 46% of the HIV-infected children in institutional care. We also found that HIV-infected family-reared children were more often secure and less often disorganized than HIV-infected children in institutions. Moreover, HIV-infected children reared in families tended to show more favorable developmental outcomes even in comparison to uninfected and relatively healthy children reared in institutions.

When we compared the quality of the rearing environment of HIV-infected children in families and institutions with the help of the HOME inventory, we did not find any significant differences on the HOME Total Score between these groups. Examination of the individual HOME scales revealed that institutional care offered better physical environment, whereas families secured better quality of child-caregiver interactions. Finally, families provided a more consistent rearing environment with limited stable caregivers, which was not possible in institutions because of their structure and functioning. We may conclude that due to the consistency, stability and better quality of child-caregiver relationships, even compromised family care promoted more optimal development of HIV-infected children compared to institutions that provided better physical environments.

Compared to the institutions, HIV-impacted families facilitated better outcomes in several domains. However, HIV-impacted families failed to facilitate early ToM development. Besides, the elevated levels of disorganized attachment and indiscriminate friendliness in comparison to uninfected family-reared children, and lack of difference in these domains with HIV-infected institution-reared children indicate that the rearing environment in HIV-impacted families was not optimal for the normal development of children.

On the basis of our findings we may conclude that the structural neglect of childcare institutions appeared to be more damaging for children's physical growth, cognitive development, and attachment formation than the presence of HIV in multiple-problem families.

Risk and protective factors

Although, on average, institutional care was associated with less favorable outcomes in all developmental domains that we have studied, there was a certain individual variation in the responses of institution-reared children to apparently similar adverse experiences. In some cases the outcomes in different domains were even close to normal. For instance, in almost 30% of children height-for-age scores were within one standard deviation from population norms at the time of the assessment; 7% of children in our sample demonstrated cognitive performance within the normal range; 21% of children succeeded in the Theory of Mind task. Finally, 28% of children managed to form secure, clearly developed attachment relationships with their favorite caregiver, and about 37% of children exhibited no or little signs of indiscriminate friendliness. These findings point to the presence of certain factors which may buffer or exacerbate the influence of structural institutional neglect on the development of the child.

Variation in the developmental outcomes may be related to variations in the genetic background, child-related characteristics, variations in the rearing circumstances, as well as complex interrelation between different environmental and child-related factors. We were not able to examine the relation between genetic background and developmental outcomes. Also, because of the modest sample size, limited information on perinatal development and logistical constraints, exploration of the interrelation and mutual influence of child characteristic and environmental factors was limited. Nevertheless, on the basis of our study as well as previous findings we were able to identify several protective factors, risks, and potential intervention targets.

As to the child-related characteristics, we did not find any association between gender, age, or duration of institutionalization. Because there was little variation in the age of admission and the majority of children was admitted to institutional care at the age of one month on average, we did not find any association between the age of admission and subsequent developmental outcomes. Neither did the examination of the impact of individual history of institutionalization, such as transference within and between institutions, presence of siblings in the same institution, and contacts with parents or relatives yield significant results.

We found that perinatal adversities and less optimal physical and health condition of the child at birth were significantly associated with less favorable

physical development. An important, although indirect finding was related to a subgroup of children with the so called perinatal hypoxic conditions. Children who were diagnosed with these conditions demonstrated persistent severe growth delays. Despite some improvement in the course of their development, at the time of the assessment these children remained severely delayed. Their cortisol production also clearly deviated from other uninfected institution-reared children. Obviously, children with perinatal complications may be at increased risk for developmental delays in institutional care and require special attention.

As to the environmental factors, we found that better quality of the rearing environment and especially better quality of caregiving was significantly associated with better physical growth and with better cognitive performance of HIV-infected institution-reared children. As we discussed earlier, the overall quality of rearing environment within the institutions was fairly adequate. Moreover, for a number of its physical characteristics, e.g., safety, quantity and variety of toys, and even structured learning activities it appeared to be better than in HIV-impacted families. Nevertheless, fairly adequate physical aspects of the rearing environment of the childcare institutions appeared to be insufficient to facilitate normative physical and cognitive development of HIV-infected children. Better quality of caregiving was also associated with more attachment security even after controlling for the possible impact of the physical and cognitive domains, type of care (family vs. institution), and HIV status. Thus, we can conclude that good quality of caregiving may facilitate better development of institution-reared children and act as a buffer against environmental and health-related adversities. Therefore, the quality of caregiving represents an important intervention target.

Quality of Caregiving as an Intervention Target

Various intervention studies demonstrate that the quality of the rearing environment in the childcare institutions can be improved in different ways. Thus, for instance, a 15 minutes auditory, tactile and visual stimulation program twice a day, 5 days a week during a month, resulted in significant gains in height, weight and head circumference in the experimental group of newborn children reared in a Korean orphanage (Kim, Shin, & White-Traut, 2003). Indirect findings of The St. Petersburg-USA Orphanage Research Team (2008) pointed to the importance of the nutritional component in the improvement of physical growth of institution-reared children. A meta-analysis of 14 intervention studies enhancing cognitive development of institutionalized children reported that all interventions in this meta-analysis showed positive but varying results (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2008). As to the development of attachment relationships, which we discussed in chapter 4, more favorable child-to-caregiver ratios may better facilitate the attachment formation between caregivers and children in institutional care. Smyke and colleagues (2002) report in their study that even

when the child-to-caregiver ratio remained unchanged but only the number of caregivers attending to a given child was reduced, children appeared to show fewer signs of disordered attachment. These and other studies point to the children's plasticity and the variety of means than can be used to stimulate the development of institution-reared children.

Ideally, to decrease the gap between the institutional care and family rearing comprehensive measures are required. These measures should include optimization of the physical environment, reduction of the child-to-caregiver ratio, facilitation of consistency and continuity of child-caregiver relationships, and enhancement of the quality of caregiving. An excellent example of such a comprehensive program is an intervention study in one of the Russian orphanages that involved training of the caregivers to promote responsive caregiving, and structural alterations aimed to increase the consistency of caregivers. Children involved in this intervention program showed improvements in physical growth, cognition, language, motor development, personal-social adjustment and affect (Groark, Muhamedrahimov, Palmov, Nikiforova, & McCall et al., 2005; Muhamedrahimov, 2007; The St. Petersburg – USA Orphanage Research Team, 2008). However, in Ukraine, in view of the already high costs associated with institutional care that are more than twice higher than in foster care (Carter, 2005), the feasibility and cost-efficiency of such intervention programs are a matter of concern.

The findings of our study indicate that it is primarily the stability and quality of child-caregiver relationships and not so much the presence of HIV-infection and the quality of the physical environment that contribute substantially to the delays in the development of children. Therefore, the effectiveness of less extensive, interaction-focused interventions in childcare institutions should be tested. One of such intervention programs that may be potentially effective in the childcare institutions is a Video-feedback Intervention to promote Positive Parenting (VIPP; Juffer, Bakermans-Kranenburg, & Van IJzendoorn, 2008).

Finally, an important issue in the discussion of possible intervention measures in the context of institutional care is their timing. The first year of life is crucial for different developmental domains. Thus, as far as the physical growth is concerned, the younger the child is, the greater the risk for growth retardation. The growth velocities during the first year of life are the highest. At the same time, this is the period when children are totally dependent on others for their care and, therefore, most vulnerable to poor caregiving (Johnson, 2000; Johnson et al., 2009; Van IJzendoorn et al., 2007). Our study also demonstrates that in the first years of their lives children in institutional care were most severely delayed in their physical growth.

We were not able to examine the development of the stress regulation system and cognitive development during the first year of life. However, a body of research indicates that the first year of life is also crucial for the development of the stress

regulation system. If an infant is distressed, the caregiver's comforting behavior reduces the levels of cortisol and related stress hormones. By helping an infant to regulate his or her affective state during the postnatal period, the caregiver helps to buffer or protect the developing brain from the potential deleterious effects of elevated glucocorticoids which may otherwise hamper subsequent emotional and physical development of the child (Gunnar 2000; Gunnar & Cheatham, 2003; Nelson et al., 2009). As to the cognitive development, the meta-analysis of interventions improving cognitive development of institution-reared children reports that interventions with children younger than 12 months were more effective than interventions starting at a later age (Bakermans-Kranenburg et al. 2008).

For the formation of the attachment relationships, according to Bowlby (1988), a sensitive period appears to start from about six weeks of age, and during the first year of life attachment behavior develops most readily (Bowlby, 1969/1997). Our findings on indiscriminate friendliness among institution-reared children also illustrate how the lack of consistent and sensitive caregiving during the first year of life may impede the formation of stranger anxiety and the development of preference for familiar caregivers. Adoption research as well as intervention studies in childcare institutions demonstrate that the earlier (sometimes as early as 6 months) the adoption or intervention takes place, the more effective it is in fostering security and diminishing indiscriminate friendliness (e.g., Rutter et al., 2007; Smyke et al., in press; Van den Dries, Juffer, Van IJzendoorn, Bakermans-Kranenburg, 2009). Therefore, to provide children with necessary conditions for their normative development, interventions should ideally be introduced at the earliest stages of life.

Limitations and future directions

The major limitations of the current study are a modest sample size and its quasi-experimental design that did not allow for random assignment of children to different rearing conditions. Besides, children are not admitted to institutional care at random and often suffer from various disadvantageous conditions including poor perinatal condition and physical health. In our sample we identified a subgroup of children with a perinatal hypoxic condition that clearly deviated in their development from the rest. Perinatal hypoxic conditions were not unique to our sample and appear to be widely spread among international adoptees and institution-reared children (Albers et al., 1997, Landgren et al., 2006, Pomerleau et al., 2005; Miller, 2005; Miller et al., 2007). Thus, for instance, Miller (2005) reports that nearly 50% of children adopted from Eastern Europe had been diagnosed with perinatal encephalopathy. However, as Miller and colleagues further point

out (2005, 2007), this and other similar diagnoses related to perinatal hypoxic conditions do not correspond to the International Classification of Disease - 10 (World Health Organization, 2004). In childcare institutions perinatal hypoxic conditions are frequently treated with medications including 'nootrops' and 'brain microcirculation enhancers' meant to improve cognitive function (Miller et al., 2007). Because these conditions are widely spread among Eastern-European children with an institutional background and associated treatment involves the use of medicine that may have lasting effect on the developing brain and nervous system, further exploration of their meaning as well as the (long-term) impact of the treatment on the development of children is required.

We also need to extend our understanding of the contribution of the individual child characteristics to their developmental outcomes and their interplay with different aspects of the rearing environment. Furthermore, it was difficult to disentangle the impact of HIV from other family adversities. For that reason, conclusions regarding the effects of HIV should remain preliminary until a direct comparison with a group of uninfected children reared by HIV-infected primary caregivers is made.

In this study we used a traditional dyadic approach in the examination of attachment relationships of institution-reared children and studied attachment relationships with only one, favorite, caregiver. However, in the multiple-caregiver environment multiple attachment relationships may be developed, forming an attachment network that appears to have more predictive power and therefore should be addressed in future research (Tavecchio & Van IJzendoorn, 1987; Van IJzendoorn, 2005; Van IJzendoorn & Sagi-Swartz, 2008).

Finally, children appear to be differentially susceptible to (adverse) rearing experiences and genetic differences may play an important role (e.g., Bakermans-Kranenburg & Van IJzendoorn, 2006, 2007; Belsky, Hsieh, & Crnic, 1998; Caspi et al., 2002). Therefore, further research examining the influence of gene-environment interactions may shed more light on how inheritance influences both the dynamics and the outcome of the development of institution-reared children. This will contribute to the further exploration of possible risk and protective factors, which is indispensable for the development of targeted and effective intervention programs.

Conclusion

Almost sixty years ago Bowlby reported to the World Health Organization that even in troubled homes children thrive better than in good institutions. We may now add that children infected by HIV appear to thrive better in their troubled families than healthy children in relatively good institutions. Bowlby explained that "…the infant and young child should experience a warm, intimate, and continuous relationship with his mother (or permanent mother-substitute)" (p. 11), because "…mother-love in infancy and childhood is as important for mental health as are vitamins and proteins for physical health" (p. 158). We may now also confirm that for vulnerable children deprived of parental care and/or infected by HIV mother's or caregiver's continuous presence and sensitive care is crucial and may ameliorate environmental and child-related adversities.

Therefore, efforts should be made to prevent child abandonment and to support HIV-impacted families in their parenting role. For those children who nevertheless end up in an institution the rearing environment must be optimized. Given that adequate physical and medical care is provided, it can be achieved by ensuring stability and improving the quality of caregiving. The timing of such interventions is of great importance. Because (structural) neglect and traumatic experiences during the first year of life may have long-term or even permanent detrimental impact on children, interventions should be introduced at the earliest possible stages of life.

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Samenvatting

Summary in Dutch

Door de snelle wereldwijde verspreiding van pediatrische besmetting met HIV komen er elke dag meer dan 450 nieuwe gevallen bij (UNAIDS, 2007). De vooruitgang in medische behandelingen van kinderen die met HIV zijn besmet heeft weliswaar geleid tot een verbetering van hun overlevingskansen en gezondheidstoestand, maar voor de talrijke psycho-sociale complicaties waarmee HIV gepaard gaat, is doorgaans geen oplossing. Zo zien we dat in Oekraïne - volgens UNAIDS het derde land in Europa voor wat betreft de verspreiding van HIV - ongeveer 20 % van de kinderen geboren uit een moeder met HIV verstoten wordt en terechtkomt in een kindertehuis (UNAIDS, 2007). En wanneer de kinderen wel in de eigen familiekring kunnen blijven, dan wordt de omgeving waarin ze opgroeien vaak gekenmerkt door tekortkomingen op psycho-sociaal gebied (achterstandsgezinnen).

Zoals in eerder onderzoek bij herhaling is aangetoond, is institutionele zorg schadelijk voor een optimale ontwikkeling van het kind. Anderzijds kan uit sommige studies ook worden opgemaakt dat goed functionerende kindertehuizen een betere omgeving aan kinderen bieden dan het eigen disfunctionerende gezin.

Het doel van dit onderzoek was na te gaan wat de gevolgen zijn van institutionele zorg en perinatale HIV-besmetting op verschillende ontwikkelingsgebieden van jonge kinderen met als uiteindelijk doel om een eerste antwoord te kunnen geven op de vraag waarop een interventie in kindertehuizen gericht zou moeten zijn. In het onderzoek werd nagegaan of bepaalde eigenschappen van de kinderen en aspecten van de omgeving waarin ze opgroeiden invloed hadden op hun ontwikkeling, om zo mogelijke risico- dan wel beschermende factoren op te sporen. De volgende onderzoeksvragen zijn in deze studie aan de orde gesteld:

(1) Welke gevolgen hebben institutionele zorg en HIV-besmetting op de verschillende domeinen van de kinderlijke ontwikkeling?
(2) Wat zijn, voor verschillende ontwikkelingsdomeinen van het kind, de overeenkomsten en verschillen tussen kinderen met HIV-besmetting in probleemgezinnen en kinderen in tehuizen?
(3) Welke eigenschappen van de kinderen en welke aspecten van de omgeving waarin ze opgroeien, verzachten dan wel verergeren de negatieve gevolgen van institutionele zorg?

In het onderzoek waren 64 Oekraïense kinderen betrokken. Zij vormden de volgende vier groepen: kinderen met perinatale HIV-besmetting die bij hun biologische ouders opgroeien; kinderen zonder perinatale HIV-besmetting die bij hun biologische ouders opgroeien; kinderen met HIV-besmetting die in een kindertehuis verblijven; kinderen zonder HIV-besmetting die in een kindertehuis verblijven. De tehuiskinderen die werden onderzocht waren gemiddeld een

maand na hun geboorte aan de zorg van het tehuis toevertrouwd en verbleven sinds die tijd permanent in tehuizen met vergelijkbare structuur en zorgkwaliteit. De tehuizen waar het onderzoek werd uitgevoerd boden wel adequate voeding en gezondheidszorg maar schoten tekort op het gebied van stimulering en stabiele relaties tussen leidsters en kinderen. De gezinskinderen die werden onderzocht, zowel de kinderen met als zonder HIV-besmetting, groeiden op in gezinnen met een laag tot modaal inkomen. De gezinnen met HIV-besmette kinderen hadden een lager inkomen dan de gezinnen waar de kinderen geen HIV hadden en ze waren vaker belast met meerdere problemen; ze kunnen worden geclassificeerd als achterstandsgezinnen. De HIV-besmette kinderen die we onderzochten hadden onderling ongeveer hetzelfde niveau van immuniteit, zoals uitgedrukt in hun CD4 T-lymphocyte score.

We onderzochten de volgende zes ontwikkelingsdomeinen: de fysieke ontwikkeling en gezondheidstoestand; de stress-regulatie op grond van cortisol-productie; de cognitieve ontwikkeling; de sociaal-cognitieve ontwikkeling; de (soort) gehechtheid van kinderen aan hun ouder of favoriete opvoeder; aanwezigheid van zogenaamde vriendelijkheid zonder onderscheid (*indiscriminate friendliness*). Behalve de zes ontwikkelingsdomeinen bepaalden we nog de kwaliteit van de zorgomgeving (bijvoorbeeld hygiëne en interieur, aanwezigheid en kwaliteit van speelgoed, interacties tussen kind en ouder/opvoeder).

Het eerste hoofdstuk van dit proefschrift biedt een korte inleiding in de geschiedenis en de problematiek van institutionele zorg, met de nadruk op Oost Europa. De uitkomsten met betrekking tot lichamelijke groei en stress regulatie worden behandeld in de hoofdstukken 2 en 3. In hoofdstuk 3 worden ook de uitkomsten wat betreft cognitieve en sociaal-cognitieve ontwikkeling besproken. De uitkomsten met betrekking tot gehechtheid en vriendelijkheid zonder onderscheid worden behandeld in hoofdstuk 4. In hoofdstuk 5 volgt een bespreking van al onze bevindingen tegen de achtergrond van de oorspronkelijke onderzoeksvragen, terwijl tevens de beperkingen van ons onderzoek en suggesties voor toekomstig onderzoek aan bod komen.

Gevolgen van institutionele zorg en van HIV voor de ontwikkeling van kinderen

De uitkomsten van ons onderzoek bevestigen de uitkomsten van eerder onderzoek waaruit bleek dat institutionele zorg nadelig is voor de gezonde ontwikkeling van kinderen. Het opgroeien in een kindertehuis bleek samen te hangen met vertraging van de lichamelijke groei en de cognitieve ontwikkeling, met verhoogde productie van cortisol en een groter percentage gevallen van vriendelijkheid zonder onderscheid. Slechts een kwart van de tehuiskinderen had een herkenbare

vorm van gehechtheid, terwijl dat voor 97% van de gezinskinderen het geval was. Veilige gehechtheid kwam aanzienlijk minder vaak voor bij tehuiskinderen dan bij gezinskinderen. De resultaten lieten zien dat HIV-besmetting ook samenhing met minder gunstige scores voor de ontwikkeling. Opmerkelijk is dat voor de ontwikkelingsdomeinen lichamelijke groei, cognitieve ontwikkeling, gehechtheid en vriendelijkheid zonder onderscheid de nadelige invloed van institutionele zorg veel groter bleek dan die van besmetting met HIV.

Gezinskinderen met HIV-besmetting en kinderen in tehuizen

Voor drie van de zes ontwikkelingsdomeinen die we onderzochten, geldt dat kinderen met HIV-besmetting die opgroeiden in het eigen achterstandsgezin betere resultaten boekten dan hun leeftijdgenoten die werden opgevoed in tehuizen, ondanks het feit dat daar goede materiële omstandigheden waren.

De achterstand in lichamelijke groei van kinderen met HIV-besmetting die leefden in het eigen gezin was duidelijk minder groot dan de achterstand van zowel de besmette als de niet-besmette kinderen in de tehuizen. De cognitieve prestaties van gezinskinderen waren eveneens beter dan die van de tehuiskinderen, een verschil van meer dan 15 punten in IQ. De gehechtheid van gezinskinderen met een HIV-besmetting was weliswaar minder vaak een veilige en vaker een desorganiseerde gehechtheid dan bij gezinskinderen zonder HIV-besmetting, maar duidelijk vaker veilig en duidelijk minder vaak gedesorganiseerd dan bij tehuiskinderen, al dan niet besmet met HIV. Bovendien had 96% van de kinderen met HIV-besmetting in een gezin een herkenbare gehechtheid opgebouwd, terwijl dat bij slechts 46% van de kinderen met HIV-besmetting in tehuizen het geval was.

We vergeleken de omgeving waarin de HIV-besmette gezinskinderen opgroeiden met de omgeving van tehuiskinderen. Het bleek dat de onderzochte tehuizen weliswaar een betere materiële omgeving boden, maar gezinnen, zelfs achterstandsgezinnen, een betere verhouding tussen kind en opvoeder. Het feit dat kinderen met HIV-besmetting die opgroeien in probleemgezinnen er wat betreft lichamelijke groei, cognitieve ontwikkeling en gehechtheid duidelijk beter voorstonden dan tehuiskinderen, al dan niet besmet, die in materieel goed voorziene tehuizen leven, moet daarom worden toegeschreven aan de invloed van een stabiele en kwalitatief goede relatie tussen kind en opvoeder.

Bedreigende en beschermende factoren; mogelijke doelstellingen voor interventie in institutionele zorg

Hoewel in zijn algemeenheid institutionele zorg samenhing met minder gunstige uitkomsten voor alle ontwikkelingsdomeinen, was er tegelijkertijd een zekere individuele variatie in de reacties van kinderen op vergelijkbare ongunstige ervaringen. Die variatie in uitkomsten doet vermoeden dat er bepaalde beschermende en/of bedreigende factoren in het spel zijn die de invloed van (wat we noemen) de structurele verwaarlozing van kinderen in tehuizen hetzij verzachten, hetzij verergeren. We onderzochten de mogelijke invloed van bijzonderheden die voor kinderen afzonderlijk gelden, zoals geslacht, leeftijd, de persoonlijke geschiedenis in institutionele zorg, het moment van opname in institutionele zorg, verplaatsingen binnen en tussen tehuizen, de aanwezigheid van biologisch verwante kinderen in hetzelfde tehuis, en de hoeveelheid contact met ouders of verwanten; echter alles zonder resultaat. We konden daarentegen wel vaststellen dat zowel perinatale problemen, een minder goede lichamelijke toestand als de gezondheid op het moment van geboorte significant samenhingen met een minder goede lichamelijke ontwikkeling. Een betere cognitieve prestatie van de kinderen hing samen met meer veilige gehechtheid en minder gedesorganiseerde gehechtheid.

We konden vaststellen dat een betere kwaliteit van de omgeving waarin het kind opgroeit en vooral een betere kwaliteit van de zorg significant samenhangen met een betere lichamelijke groei en een betere cognitieve ontwikkeling van tehuiskinderen met HIV-besmetting. We vonden een samenhang tussen enerzijds sensitieve zorg en anderzijds veilige gehechtheid, zelfs na het uitsluiten van de mogelijke invloed van de lichamelijke en cognitieve ontwikkeling, type opvang (tehuis of gezin) en HIV-besmetting.

We gaan er daarom vanuit dat de kwaliteit van de zorg een beschermende buffer kan zijn tegen ongunstige omstandigheden in de omgeving of bij het kind zelf, en dat de kwaliteit van de zorg een belangrijk en haalbaar doel voor interventie is.

Beperkingen en suggesties voor toekomstig onderzoek

De belangrijkste beperking van het onderhavige onderzoek is de bescheiden omvang van de steekproef en de quasi-experimentele opzet. Bovendien was het moeilijk de inwerking van HIV-besmetting te onderscheiden van die van andere ongunstige omstandigheden in het gezin, zodat conclusies over de uitwerking van HIV-besmetting gezien moeten worden als voorlopig, totdat een rechtstreekse vergelijking gemaakt kan worden met kinderen van wie de primaire opvoeder besmet is met HIV, terwijl zij zelf niet zijn besmet. Daarnaast kunnen kinderen

verschillend reageren op ongunstige opvoedingservaringen; erfelijke verschillen zijn daarbij mogelijk van invloed. Toekomstig onderzoek naar de wisselwerking tussen genen en omgeving kan daarom licht werpen op de bijdrage van erfelijkheid aan de dynamiek en uitkomst van de ontwikkeling van kinderen in tehuizen. Dergelijk onderzoek kan bijdragen aan een nauwkeuriger bepaling van mogelijke bedreigende en beschermende factoren, en dat is noodzakelijk om doelgerichte en werkzame interventieprogramma's op te stellen.

Conclusie

Dit onderzoek is belangrijk voor de toekomst, omdat het onze kennis vergroot over de ontwikkeling van kinderen met HIV-besmetting die opgroeien in tehuizen. Dit is een groeiende groep kinderen, nu HIV niet meer per definitie op korte termijn dodelijk is en kinderen met HIV-besmetting vaak in tehuizen worden ondergebracht – ze worden immers zelden geadopteerd.

Onze onderzoeksresultaten brengen ons terug bij de conclusie die Bowlby reeds trok in zijn rapport voor de Wereldgezondheidsorganisatie bijna zestig jaar geleden, namelijk dat zelfs in achterstandsgezinnen kinderen beter gedijen dan in welvarende tehuizen. We kunnen daaraan nu toevoegen dat kinderen die besmet zijn met HIV en opgroeien in achterstandsgezinnen desondanks een betere ontwikkeling laten zien dan gezonde kinderen in tehuizen. Bowlby stelde dat "de zuigeling en de kleuter behoren te verkeren in een warme, nauwe en bestendige betrekking met hun moeder (of de vervanging daarvan), een betrekking waaraan beiden bevrediging en genoegen ontlenen"(blz. 11), omdat "de moederliefde in de kindertijd even onmisbaar is voor de geestelijke gezondheid als vitaminen en proteïnen voor de lichamelijke" (blz. 158). We kunnen hier bevestigen dat voor kwetsbare kinderen, kinderen in tehuizen en kinderen besmet met HIV, de voortdurende aanwezigheid van en de sensitieve zorg door een ouder dan wel vaste verzorgster van wezenlijk belang is. Deze opvoeder is een belangrijke steun als de omstandigheden, hetzij wat betreft de zorgomgeving hetzij wat betreft de gezondheid van het kind, ongunstig zijn.

Alle inspanningen zouden er daarom op gericht moeten zijn te voorkomen dat kinderen worden verstoten, door ook gezinnen waar HIV voorkomt te ondersteunen bij de vervulling van hun opvoedingstaken. Als een kind onverhoopt toch wordt toevertrouwd aan de zorg van een tehuis, dan zou (aangenomen dat in elk geval de materiële omstandigheden voldoende zijn) gezorgd moeten worden voor stabiele en kwalitatief hoogwaardige, sensitieve zorg.

Краткое содержание диссертации

Summary in Russian

В связи с высокими темпами распространения ВИЧ-инфекции, которая на сегодняшний день охватывает различные возрастные и социальные группы, ВИЧ ежедневно поражает более 450 детей в мире. Хотя успехи в области медицины привели к улучшению состояния здоровья и увеличению продолжительности жизни ВИЧ-инфицированных детей, многочисленные психосоциальные проблемы, зачастую связанные с этим заболеванием, во многом остаются нерешенными. Так в Украине, которая занимает третье место в Европе по темпам распространения ВИЧ, семьи, в которых воспитываются серопозитивные дети, нередко страдают от целого ряда неблагоприятных обстоятельств, связанных с социальными, финансовыми, и эмоциональными проблемами. Кроме того, около 20% детей, рождающихся у ВИЧ-инфицированных матерей, попадает в дома ребенка (UNAIDS, 2007).

Как показывают многочисленные исследования, воспитание вне семейной среды отрицательно сказывается на развитии ребенка. В то же самое время, некоторые данные указывают на то, что хорошо функционирующие дома ребенка могут обеспечить детей более благоприятной средой развития, чем проблемные семьи.

Задача настоящей работы заключается в изучение развития ВИЧ-инфицированных детей дошкольного возраста, воспитывающихся в детских учреждениях и в биологических семьях. Данная работа была призвана найти ответы на следующие исследовательские вопросы:

(1) Как воспитание в домах ребенка и детских домах, а также присутствие ВИЧ-инфекции влияет на различные сферы развития ребенка?
(3) Как ВИЧ-инфицированные дети, воспитывающиеся в проблемных семьях, отличаются в своем развитии от детей, воспитывающихся в домах ребенка?
(2) Какие индивидуальные характеристики ребенка и какие аспекты воспитательной среды смягчают или, наоборот, усугубляют воздействие воспитания в детских учреждениях на развитие ребенка?

Участники исследования

В нашем исследовании приняли участие 64 ребенка (средний возраст 51 месяц) с положительным и отрицательным ВИЧ-статусом, которые воспитывались в домах ребенка и детских домах (далее домах ребенка) и в биологических семьях. Мы сформировали четыре группы детей, сходные по возрасту и распределению полов: здоровые дети в домах ребенка; здоровые дети в семьях; ВИЧ-инфицированные дети в домах ребенка; ВИЧ-

инфицированные дети в семьях. Все дети в домах ребенка лишились семьи и поступили в детские учреждения, в среднем, в возрасте одного месяца и постоянно проживали в домах ребенка. Дома ребенка были сходны в организации и функционировании и обеспечивали своих воспитанников адекватным физическим и медицинским уходом.

Что касается детей в семьях, их родители имели средний или низкий уровень достатка. Уровень достатка в семьях ВИЧ-инфицированных детей был значительно ниже, чем в семьях здоровых детей. Кроме того, семьи ВИЧ-инфицированных детей значительно чаще, чем семьи здоровых детей, были подвержены влиянию целого ряда неблагоприятных обстоятельств. В таких семьях один или оба родителя зачастую были инфицированы ВИЧ, злоупотребляли алкоголем и/или наркотиками, не имели постоянной работы и нередко имели одну или несколько судимостей. Что касается ВИЧ-инфекции, все дети были инфицированы в перинатальный период вертикальным путем, т.е. от матери к ребенку. На момент обследования серопозитивные дети в домах ребенка и в семьях имели сходные показатели числа CD4+ Т-лимфоцитов, демонстрирующие степень влияния вируса на иммунную систему.

Методы исследования

В данном исследовании был использован ряд методик, направленных на изучение физического развития, регуляции стресса, когнитивного развития, развития внутренней модели сознания "другого", развития отношений привязанности и проявлений неразборчивой дружелюбности. Мы также исследовали различные аспекты среды развития ВИЧ-инфицированных детей в семьях и в домах ребенка. Ниже изложены основные методы, которые мы использовали для изучения соответствующих сфер развития ребенка.

Физическое развитие и состояние здоровья детей. Динамика физического развития детей была изучена на основании архивных медицинских данных, а также оценки роста ребенка на момент обследования. Данные о состоянии здоровья детей были получены на основании медицинских карт.

Регуляция стресса. Продукция и уровень саливарного кортизола ребенка в течение одного дня были исследованы на основании шестикратного забора слюны по фиксированному графику с момента пробуждения и до момента отхода ко сну.

Когнитивное развитие. Мы использовали сокращенный вариант невербального теста интеллекта *Snijders-Oomen Nonverbal Intelligence Test (SON-R). SON-R* предназначен для детей в возрасте от 2,5 до 7 лет и широко применяется в различных культурных и клинических группах (Tellegen, Winkel, Wijnberg-Williams, & Laros, 1998). *SON-R* позволяет определить уровень когнитивного развития ребенка и сравнить полученные данные с существующими нормами.

Внутренняя модель сознания "другого" (Theory of Mind). Внутренняя модель сознания "другого" представляет собой способность видеть себя и других в связи с наличием психических моделей (убеждений, желаний, намерений и т.д.) и на основе этого прогнозировать поведение окружающих. Мы исследовали уровень развития внутренней модели сознания другого при помощи так называемой задачи на понимание ложности убеждений (*False Belief Task;* Baron-Cohen, Leslie, & Frith, 1985).

Развитие отношений привязанности. Особенности развития отношений привязанности между ребенком и родителем/любимым воспитателем были изучены на основе классической лабораторной процедуры, известной как «незнакомая ситуация» (*Strange Situation Procedure*; Ainsworth et al., 1978). В зависимости от поведения ребенка, данная процедура позволяет определить один из четырех видов привязанности ребенка к матери/любимому воспитателю: безопасная привязанность (*secure attachment*), небезопасная привязанность избегающего типа (*avoidant attachment*), небезопасная привязанность амбивалентного типа (*ambivalent attachment*), небезопасная привязанность дезорганизованного типа (*disorganized attachment*). Кроме того, были использованы дополнительные шкалы для оценки уровня развития привязанности (*Attachment Formation Rating*; Zeanah et al., 2005), и уровня безопасности и дезорганизации привязанности ребенка (Cassidy & Marvin with the MacArthur working group, 1992).

Неразборчивая дружелюбность (Indiscriminate friendliness). Неразборчивая дружелюбность описывается как одна из наиболее устойчивых поведенческих аномалий, связанных с воспитанием в домах ребенка (Rutter et al., 2007, 2009; Zeanah & Smyke, 2008). Феномен неразборчивой дружелюбности характеризуется отсутствием стеснительности и сдержанности, которую дети обычно проявляют в контакте с незнакомыми взрослыми. В нашем исследовании степень неразборчивой дружелюбности в поведении ребенка была оценена при помощи полуструктурированного интервью с родителями или любимыми воспитателями (Chisholm, 1998). Данное интервью позволяет получить необходимую информацию о поведении ребенка по отношению к незнакомым взрослым в различных ситуациях.

Среда развития ребенка. Среда развития ВИЧ-инфицированных детей в семьях и в домах ребенка была изучена при помощи метода HOME (Bradley et al., 1993), который основывается на наблюдении и структурированном интервью с родителями/воспитателями. Метод HOME позволяет оценить как физические аспекты среды (гигиена, внутренний интерьер, безопасность, наличие учебных и игровых материалов), так и качество воспитательной работы, а также особенности взаимоотношений между родителем/воспитателем и ребенком (академическая стимуляция, дисциплина, чувствительное реагирование на сигналы ребенка). Кроме того, при помощи так называемых шкал эмоциональной доступности (*The Emotional Availability Scales*; Biringen, Robinson, & Emde, 2000) мы исследовали уровень позитивного взаимодействия между родителем/воспитателем и ребенком во время непродолжительной игры без использования игровых материалов.

Краткие результаты исследования

В данном исследовании впервые было изучено влияние присутствия перинатальной ВИЧ-инфекции и воспитания в домах ребенка на различные сферы развития ребенка. Глава 1 данной диссертации представляет собой введение в историю и проблематику воспитания детей вне семьи в детских учреждениях. Наши результаты, касающиеся физического роста и регуляции стресса, обсуждаются в главе 2 и 3; результаты, связанные с когнитивным развитием и формированием внутренней модели сознания "другого", обсуждаются в главе 3; данные изучения организации привязанности и неразборчивой дружелюбности представлены в главе 4. В главе 5 мы обобщаем и обсуждаем полученные результаты и их возможное практическое значение.

Мы обнаружили, что фактор воспитания в домах ребенка был связан с задержкой физического и когнитивного развития, а также с повышенным уровнем продукции кортизола и более высоким уровнем неразборчивой дружелюбности. Только четверть детей-воспитанников домов ребенка смогла сформировать выраженные отношения привязанности, в отличие от 97% детей, развивающихся в семьях. Уровень безопасности привязанности среди воспитанников домов ребенка был значительно ниже, чем среди детей в семьях. Результаты наших исследований показали, что фактор присутствия ВИЧ-инфекции был также связан с менее благоприятными показателями развития. Однако воздействие воспитания в домах ребенка оказалось значительно большим, чем присутствие ВИЧ-инфекции в области физического роста, когнитивного развития, развития отношений

привязанности и было связано с более высоким уровнем неразборчивой дружелюбности среди обследованных нами детей.

Сравнение ВИЧ-инфицированных детей в семьях и домах ребенка выявило, что в трех из шести сфер развития, дети в проблемных семьях имели более благоприятные результаты, не только по сравнению с ВИЧ-инфицированными, но и по сравнению с относительно здоровыми детьми, воспитывающимися в домах ребенка. Это касалось физического и когнитивных развития, а также организации отношений привязанности. По показателям регуляции стресса, формирования внутренней модели сознания "другого", а также неразборчивой дружелюбности ВИЧ-инфицированные дети в семьях не отличались от инфицированных и здоровых детей в домах ребенка.

Сравнение среды развития ВИЧ-инфицированных детей в семьях и в домах ребенка не выявило значимых различий в обобщенной оценке среды. Более того, дома ребенка были оценены несколько выше, чем семьи. Анализ индивидуальных шкал показал, что дома ребенка были оценены выше по тем из них, которые отражали физические аспекты среды, в то время как семьи были более высоко оценены по тем шкалам, которые отражали качество воспитания и позитивные аспекты взаимодействия между родителем/воспитателем и ребенком. Кроме того, в отличие от семей, дома ребенка в силу своей структуры и организации не могли обеспечить стабильного присутствия ограниченного числа воспитателей в жизни ребенка.

Результаты нашего исследования показали, что более высокое качество как физической среды, так и воспитания и позитивного взаимодействия с ребенком было связано с более благоприятными результатами в сфере физического и когнитивного развития ВИЧ-инфицированных детей. При этом степень влияния факторов воспитания и позитивного взаимодействия с ребенком на уровень физического и когнитивного развития оказалась более значительной, чем степень влияние качества физической среды.

Анализ полученных данных также показал, что позитивное взаимодействие между воспитателем и ребенком было связано с более благоприятными результатами в сфере формирования привязанности даже при исключении возможного влияния ВИЧ-статуса и среды воспитания (в семье или в доме ребенка).

Выводы

На основании полученных данных мы можем сделать следующие выводы:

- воспитание в домах ребенка ведет к отставаниям и отклонениями в различных сферах развития ребенка, и оказывает более негативное

влияние, чем присутствие ВИЧ-инфекции;
- даже адекватный физический и медицинский уход в домах ребенка является недостаточным для создания оптимальных условий, необходимых для нормального развития детей;
- ВИЧ-инфицированные дети в проблемных семьях развиваются лучше, чем дети в домах ребенка, благодаря стабильному присутствию родителей и более высокому качеству воспитания, даже несмотря на менее благоприятные, чем в домах ребенка, физические условия развития;
- позитивные аспекты взаимодействия между ребенком и родителем/воспитателем смягчают различные недостатки среды воспитания и отрицательное влияние состояния здоровья ребенка на его развитие.

Заключение

На основании полученных данных мы можем утверждать, что для оптимального развития уязвимых детей, лишенных родительского попечительства и/или страдающих от ВИЧ-инфекции, постоянство и заботливое и чувствительное обращение со стороны родителей и/или воспитателей является крайне важным. Поэтому необходимо вести профилактическую работу по предотвращению отказов от детей и оказывать необходимую поддержку уязвимым семьям и семьям, страдающим от ВИЧ-инфекции, в воспитании ребенка. Для тех детей, которые оказались или окажутся в доме ребенка, необходимо оптимизировать среду их развития не только за счет улучшения физических условий, но, прежде всего, за счет повышения стабильности и качества воспитания.

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Curriculum Vitae

Natasha Dobrova-Krol was born on 14 September 1973 in Odessa, Ukraine. She completed her secondary education in Odessa in 1990. Afterward she began a study of biology at Odessa Mechnikov State University which she completed *(cum laude)* in 1995. From 1995 through 1999 she followed a post-graduate programme in clinical psychology and psychodiagnostics at Kyiv Shevchenko University in Ukraine. During these years she also worked as a visiting scholar at the Department of Social Work and Human Justice at Regina University in Canada, and as a visiting research assistant at the Department of Clinical Psychology of the University of Ghent in Belgium, and with the Child Adoption and Fostering Team at the Maudsley Institute of Psychiatry in London. Subsequently, she was involved in various (international) projects in the field of child development and child welfare as a psychologist, a researcher, and a project manager in Ukraine. In 2005 she received a Spinoza scholarship at the Centre for Child and Family Studies, Institute of Education and Child Studies of Leiden University that also allowed her in 2006 to start a PhD study on the impact of HIV and institutional rearing on the development of children in Ukraine. The results of the study are presented in this dissertation. In 2009 she received the ISED International Article Award for the paper presented in chapter 3.