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## Risk and Developmental Heterogeneity in Previously-Institutionalized Children

Nim Tottenham<sup>1,2</sup>

<sup>1</sup>University of California Los Angeles

<sup>2</sup>Weill Cornell Medical College, Sackler Institute for Developmental Psychobiology, New York, NY

### Abstract

This manuscript presents an overview of the developmental outcomes of children adopted from institutional care. I describe how institutional care is a risk factor for typical human development and describe the areas of development, both behavioral and neurobiological, that are most vulnerable to this risk. Also described is variation in outcome and resilience, where some children thrive despite exposure to adverse rearing conditions. I conclude with an emphasis on heterogeneity in outcome, describing how the risk associated with institutional care is not a deterministic factor, but rather an influential one.

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At its peak within the past decade, approximately 20,000 children were being adopted from other countries into the United States each year (U.S. Department of State). Despite the large number of previously-institutionalized (PI) children living in the U.S., knowledge about the developmental outcomes of children often remain elusive to parents, educators, and clinicians alike. U.S.-trained clinicians may be faced the unique and complex medical needs of internationally adopted children, who may have unreliable pre-adoption medical histories (Miller, et al., 2007; Saiman, et al., 2001; Schulte, et al., 2002). School systems and teachers may be underprepared for internationally adopted children who may have special needs, yet do not “fit” into traditional diagnostic categories. While many parents are highly informed about international adoption, many others may lack appropriate information about developmental outcome for their children. Devastating media accounts of children with extreme behavioral difficulties, may either under- or over-inform parents, producing unrealistic expectations. While it is true that there are some children who struggle greatly, there are many more stories of children who are thriving. The goal of this paper is to provide a review of the literature on PI children and discuss the significant risk factors as well as discuss the large individual differences between children and the factors that might lead to these differences.

Humans are an altricial species, which means that caregiver presence is necessary early in life for optimal development. The parent-child dyad is a very special and close relationship that is an expected one on the part of the developing infant. Attachment theory emphasizes the role of caregivers in providing stability, security, and safety, which greatly influences the emotional health of the offspring (Bowlby, 1963). That caregiving is an evolutionarily

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Corresponding Author: Nim Tottenham, PhD, University of California Los Angeles, Box 951563, Los Angeles, CA 90095, nimtottenham@ucla.edu, 310-794-7779.

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expected environment means that the absence of this environment could have grave consequences for developmental health (Tottenham, in press). Children raised in institutional care, for example orphanages, are deprived of this species-expected caregiving, and instead are raised under suboptimal conditions. In the absence of this expected environmental influence, the developing system must adapt to the unexpected environment to independently promote survival. These adaptations may promote survival in the short term, but severely impair the individual's ability to optimally cope with changing environmental demands that accompany changes in age. Thus, institutional care presents a major risk factor for atypical psychological development.

As summarized by Gunnar and colleagues (Gunnar, Bruce, & Grotevant, 2000), institutional care, even in the best of circumstances, is suboptimal in that the caregivers are staff members, rather than parents, who rotate shifts and, due to the devastatingly low caregiver-to-child ratio, are under great pressures to cater to the physical needs of a large number of children (Taneja, et al., 2002; Tirella, et al., 2008). Thus, despite the best intentions of the institution, the care children receive in an orphanage cannot possibly mimic the care provided in a family environment. Moreover, in many communities there may be few alternatives to institutional care. Therefore, the scientific goal is to understand the potential developmental outcomes following this type of early experience.

Research teams that have had the opportunity to characterize caregiving institutions help provide a picture of institutional care. The St. Petersburg-USA Orphanage Research Team has described conditions in Russia that seem to be characteristic of many caregiving institutions around the world (The St. Petersburg-USA Orphanage Research Team, 2008). For example, caregiving institutions tend to be characterized as “acceptable with respect to medical care, nutrition, sanitation, safety, toys, and equipment and lack of physical or sexual abuse”. In contrast to physical health and safety, the team found that the “social and emotional interactions between caregivers and children [were] extremely limited and noticeably deficient”. These observations, that although health care, nutrition, and safety needs are often met, necessary maternal input is lacking, are highly similar to observations of other institutions (Groark & McCall, 2011; Groark, McCall, Fish, et al., 2011; Smyke, et al., 2007; Tirella, et al., 2008; Vorria, et al., 2003; Zych, 2006). While these observations valuably provide a general understanding of institutional characteristics, a large challenge to parents and scientists alike is that often very little information about experiences in the orphanage *for an individual child* is available. Unreliable documentation for the individual child regarding quality of care, nutrition, and potential maltreatment leaves researchers at a loss for describing how these specific factors might influence the outcome of *an individual child*. Nonetheless, it is clear that improvements in orphanage caregiving or complete removal from orphanage care drastically improves outcome. There have been dramatic experiments conducted that significantly alter the early care experienced by children who would otherwise receive standard institutional rearing. The St. Petersburg Orphanage Intervention Project (The St. Petersburg-USA Orphanage Research Team, 2008) includes a quasi-experimental social-emotional-relationship intervention for children living in institutional care. This intervention is aimed at improving the physical environment, employment practices, and daily procedures of the staff who provide care for infants and children. Improvements include emphasizing warm, sensitive, and responsive caregiver-child interactions, as well as implementing structural changes that create an environment to promote caregiver-child relationships. Children who received this intervention showed significant developmental gains not only in social and personal domains, but also in language and communication, motor skills (both fine and gross), physical growth, and caregiver-child interactions. The success of this intervention seems to be in its ability to transform the “institutional” culture into one that is more “family-like”. A second dramatic intervention, the Bucharest Early Intervention Project (BEIP), focuses on the effects of a

high-quality foster care intervention designed for institutionalized children. The BEIP uses random assignment to remove some children from institutional care and place them into stable foster family caregiving arrangements. Studies have shown that relative to children who remain in orphanage care, those randomly assigned to the foster care intervention show rapid improvements in a number of outcome measures, including cognitive development (Nelson, et al., 2007), attachment behaviors, emotional reactivity, psychiatric symptomatology (Bos, et al., 2011), and neural activity as measured by electroencephalogram (EEG)(McLaughlin, Fox, Zeanah, & Nelson, 2011; Moulson, Westerlund, Fox, Zeanah, & Nelson, 2009). This work is important for several reasons. First, it demonstrates the plasticity of the developing brain, showing that improved rearing conditions can change outcome. Secondly, it reduces scientific doubt that institutionalization itself causes poor outcome rather than genetic or prenatal factors. That is, these intervention studies suggest that many of the effects of institutionalization are likely to be related to institutionalization itself rather than preexisting conditions of the child. However, there are outcome measures that may not show *complete* catch-up (e.g., language, externalizing disorders, emotional behaviors) (Bos, et al., 2011; Windsor, et al., 2011) and seem less amenable to intervention. These findings may suggest that there are lingering effects of early institutional care in children receiving the foster care intervention, but still leave open the possibility of contributing effects of genetic or prenatal factors.

Through the process of international adoption, many children are removed from orphanage care. It is true that the adoption process itself can be exceedingly stressful for the child and family. With adoption, the child experiences changes in language (and is often unable to communicate or be communicated to by the adopting family), food, culture, and people. Nonetheless, relative to children who remain in orphanage care, PI children show dramatic improvements across developmental domains (Bos, et al., 2011; van Ijzendoorn, Juffer, & Poelhuis, 2005) as will be discussed in more detail below.

Nonetheless, relative to children without a history of institutional care, PI children are at high risk for exhibiting a number of developmental delays when first adopted. Several of these delays may be physical in nature. As described by Johnson & Dole (1999) it is very common for PI children to be small in size, in terms of stature, weight, and head circumference. Muscle tone may be weak from under utilized muscles while in institutional care. Developmental motor milestones may be delayed as a consequence of deprived physical activity. Cognitive development is also vulnerable to early institutional care, particularly for those children adopted after they were 6 months old (Rutter, 1998). Language delays are commonly observed (Loman, Wiik, Frenn, Pollak, & Gunnar, 2009). Although once adopted, PI children show similar developmental sequences in language production as infants without a history of institutional care (Snedeker, Geren, & Shafto, 2007), language delays often continue to be observed at older ages (Roberts, Pollock, & Krakow, 2005; van Ijzendoorn, et al., 2005).

Fortunately, the developing system is highly plastic, and despite initial delays, children often exhibit massive growth in several domains. Once in a family, children have demonstrated steep improvements across domains (Johnson, et al., 2010; Van Ijzendoorn, Bakermans-Kranenburg, & Juffer, 2007), including weight and head circumference (Rutter & O'Connor, 2004), as well as showing evidence during childhood and adolescence of improvement on cognitive testing (Beckett, et al., 2006; Fox, Almas, Degnan, Nelson, & Zeanah, 2011; van den Dries, Juffer, van Ijzendoorn, & Bakermans-Kranenburg, 2010; van Ijzendoorn & Juffer, 2006). Although remarkable, the catch-up may not always be complete (van Ijzendoorn & Juffer, 2006). For example, as described by Zeanah and colleagues (Zeanah, Gunnar, McCall, Kreppner, & Fox, 2011), the odds of attaining full physical growth potential even once adopted into a stable home are likely to be low as a result of multiple

risk factors (e.g., early puberty, prenatal factors, and growth retardation). Thus, despite early increases in growth rate, adults with a childhood history of institutional care may be smaller individuals. Similarly, despite demonstrating overall cognitive competence, children may exhibit some degree of impairment in specific domains (e.g., executive functioning, language, or memory) (Behen, Helder, Rothermel, Solomon, & Chugani, 2008). Nonetheless, the ameliorative effects of adoption into a family are striking (van Ijzendoorn & Juffer, 2006), and these domains of catch-up (even if not entirely complete) demonstrate the powerful healing effect of a stable home environment on human development.

However, there can be areas of behavior that are less amenable to change, and often these behaviors lie in the emotional domain. Described broadly, PI children are at high risk for difficulties in intimate social attachments, emotion regulation, and interpretation of facial expressions (Hodges & Tizard, 1989; Moulson, Fox, Zeanah, & Nelson, 2009; O'Connor, Marvin, Rutter, Olrick, & Britner, 2003; Tottenham, et al., 2010). As a group, PI children are able to form attachments to their adoptive parents, although the attachment relationship is much more likely to be classified as insecure (Chisholm, 1998; Hodges & Tizard, 1989; O'Connor, et al., 2003; van Londen, Juffer, & van Ijzendoorn, 2007; Zeanah, Smyke, Koga, & Carlson, 2005). A related but independent behavior termed "indiscriminate friendliness", is very common (approximately 2/3 of preschool aged institutionalized children may show this behavior)(Zeanah, Smyke, & Dumitrescu, 2002) and may persist for years after adoption (Hodges & Tizard, 1989). Although it tends to be shallow, indiscriminate friendliness manifests as highly intimate behaviors directed at unfamiliar adults and a willingness to go off with a stranger (Chisholm, 1998). Why children may direct intimate behaviors to unfamiliar adults is unclear at this time. It has been suggested that indiscriminate friendliness serves an adaptive function in an institutional care setting where caregiving is sparse, a claim which is supported by the finding that those children who exhibit higher degrees of indiscriminate friendliness are those reported to have been a "favorite" in the orphanage (Chisholm, 1998). Deficits in face processing that have been observed in many PI children may provide some initial clues into these emotional alterations.

Face processing is an environmentally-shaped skill that guides social interactions. Relative to age-matched peers without a history of institutional care, PI children are less likely to correctly identify the emotional expressions of faces (Fries & Pollak, 2004) and tend to show neural hypoactivation to faces as measured by EEG (Moulson, Fox, et al., 2009). Face processing is skill requiring extensive experience, and the social deprivation of institutional care may not provide adequate amounts of early experience to fully hone this skill. Emotional facial expressions can be highly arousing for PI children, and have been shown to interfere with behavior. For example, emotional faces tend to increase impulse-control errors in a behavior regulation task for PI children (Tottenham, et al., 2010). This interference caused by emotional stimuli may be one of several examples of emotion regulation difficulties common to PI children. The ability to regulate behavior, particularly under emotional contexts, is a common source of difficulty for PI children. These regulation difficulties have additionally been evidenced by increased internalizing (Casey, et al., 2009) and externalizing behaviors in some samples of children with a history of institutional care (see meta-analysis in Juffer & van Ijzendoorn, 2005) (although PI children show fewer internalizing and externalizing behavior problems than children adopted domestically). By some estimates, 20 percent of PI children reach clinical threshold for anxiety and 19 percent for ADHD (Zeanah et al., 2009). It should be noted that the literature is mixed with regard to how robust the findings with regard to internalizing problems during childhood are (some studies fail to find evidence of internalizing problems (see Gunnar, van Dulmen, and the International Adoption Project Team, 2007 for review). A large epidemiological study has found that internalizing and externalizing behaviors were significantly elevated in children

who had been adopted after 24 months (but not in those children adopted earlier) (Gunnar, van Dulmen, et al., 2007). The risk for internalizing and externalizing disorders increases for those individuals with a history of multiple adversities (van der Vegt, van der Ende, Ferdinand, Verhulst, & Tiemeier, 2009), and there is evidence that such problems may either emerge or exacerbate as children enter adolescence (Verhulst, Althaus, & Versluis-den Bieman, 1990) and adulthood (Tieman, van der Ende, & Verhulst, 2005). Taken together, these findings suggest that emotion regulatory abilities are highly vulnerable and may pervade several domains of functioning.

These difficulties, while certainly not experienced by all PI children, are highly susceptible to the effects of institutional rearing (Rutter & O'Connor, 2004), can persist for years, and may even exacerbate as children transition into adolescence (Colvert, et al., 2008). The length of time that these behaviors persist is noteworthy given that PI children are adopted for the most part by very high-functioning families who have a great desire to care for their children. In general, families in the United States that adopt internationally come from a higher than average socio-economic background, where average yearly household income is significantly higher than the rest of the nation (Hellerstedt, et al., 2008). Additionally, families often must be able to afford traveling to the child's birth country for long periods and have often worked very hard, waiting for extensively long periods to adopt their children. Therefore, we take these facts of international adoption to suggest that children adopted internationally are typically adopted by committed parents who can provide enriched developmental environments for their children. It is perhaps for this reason that the physical and cognitive gains exhibited by PI children once in their homes is not at all surprising. To be clear, the evidence seems to suggest that it is the *desire* of the parents to provide a stable home environment that is beneficial for the child, not a high family income. For example, significant developmental gains have been observed in children assigned to live with Romanian foster families, who presumably maintain a lower yearly income than the average North American family who adopts internationally. Moreover, another study showed that restoration of PI children to their biological families, who were ambivalent about providing care to their children, was not associated with any cognitive gains, whereas cognitive gains *were* observed in other PI children who had been adopted by families with a desire to provide care (Hodges & Tizard, 1989). In contrast to some of these stated gains, emotional difficulties seem more resistant to change.

What are some of the long-term mediators of this behavioral persistence? The likely answer lies in neural substrates that have been influenced by the adverse rearing conditions during a time of rapid brain development. Changes that occur during this sensitive period can be long-lasting and may explain many of the long-term effects on emotional behavior. Adversity does not impact the whole brain in a uniform fashion, but instead the effects are region specific, exhibiting some of the largest effects in the amygdala. In adult animals, stress or administration of stress hormones increases the growth and activity of amygdala neurons (Armony, Corbo, Clement, & Brunet, 2005; Liberzon, et al., 1999; Rauch, et al., 2000). In the developing animal, adversity can also impact amygdala activity, perhaps even more so than adversity that occurs later in life (Tottenham & Sheridan, 2010). This long-lasting effect may in part be related to the resistance of amygdalar cells to show recovery once a stressor is removed, unlike other regions of the brain (Vyas, Pillai, & Chattarji, 2004). Studies of the amygdala in PI children have shown enlarged volumes even though measurements were taken years after removal from institutional care (Mehta, et al., 2009; Tottenham, et al., 2010). Neural connections (i.e., uncinat fasciculus) between the amygdala and cortex tend to show decreased structural integrity (Eluvathingal, et al., 2006). Additionally, PI children show an exaggerated amygdala response to emotional faces (Tottenham, et al., 2011), which may in part explain some of the previously described emotional behavior difficulties in processing facial expressions (Tottenham, et al., 2010).



Indeed, amygdala hyperactivity has been shown to be a mediator between early institutional rearing and subsequent social behavior (i.e., decreased face-to-face eye contact) (Tottenham, et al., 2011). Amygdala development has also been associated with increased anxiety and lower social competence in PI children (Tottenham, et al., 2011; Tottenham, et al., 2010). Taken together, these data suggest that changes in brain development, in particular the amygdala, mediate many of the difficulties in emotional behavior observed in PI children.

While the data strongly indicate that a history of institutional care significantly increases the risk for emotional difficulties, there are many exceptions to this rule. The data presented thus far rely on statistical tests that calculate average outcomes for each group of children. There are huge individual differences within those average values. Institutional care does not deterministically result in poor emotional outcomes. However, it does dramatically increase the risk. The challenge is to determine what ameliorative factors might positively influence outcome. Age of adoption has consistently been a strong influential factor. For example, experimental randomization has shown that timing matters – improvements in cognitive, language, and emotional development, including attachment behaviors and anxiety, were most significant for those children removed from orphanage care early (Nelson, Furtado, Fox, & Zeanah, 2009; Nelson, et al., 2007; Smyke, Zeanah, Fox, Nelson, & Guthrie, 2010; Zeanah, et al., 2009). Across several domains, Rutter and colleagues have found that children adopted before 6 months old do not show reliable differences from age-matched peers who do not have a history of institutionalization (O'Connor, et al., 2003; Rutter, 1998; Rutter, et al., 1999), and effects of institutionalization were more severe the older children were at the age of adoption thereafter. Under less severe institutional care conditions, others have found this cut-off to be near 12 or sometimes 24 months of age (Juffer & van Ijzendoorn, 2005) (van Ijzendoorn, et al., 2005) (Nelson, et al., 2007). Similarly, age of adoption has been shown to influence brain development in two separate samples, where older age at time of adoption was associated with larger amygdala volumes (Mehta, et al., 2009; Tottenham, et al., 2010). Although age of adoption as a variable does not imply that children who stay in an orphanage for an equivalent duration experience the same amount of risk, the repeatedly found dose-response associations suggest that longer duration in institutional care is a reliable proxy for the amount of risk to which a child is exposed and is associated with severity of impact on amygdala development. These data are consistent with the notion that shorter stays in institutional care are generally associated with more optimal outcomes.

Age of adoption is an important variable because it indexes differential exposures to risk; in other words, children adopted early are exposed to a shorter duration of risk than children adopted at older ages. However, there may be cases where risk is held constant and yet outcome varies across individuals. That is, there are individual differences in developmental outcome, despite exposure to the same amount of risk. A related construct to risk is resilience, a potentially powerful concept that addresses the question of why two children who experience the same adversity may show very different outcomes, and it remains an empirical challenge to identify resilience factors. There are several possible factors that could bias outcomes, and these include, but are not limited to, post adoption factors, physical growth, and genetics. For example, post-adoption factors, such as parenting stress and socio-economic factors, have been shown to moderate the effects of early institutionalization (Chisholm, 1998; MacLean, 2003). Likewise, physical growth of the child, which can serve as an index of stress-induced allostatic load, have also been found to moderate the association between early institutional care and mental health outcome. Allostatic load is a concept that describes the accumulation of physiological dysregulation and has been hypothesized to impair the developing system's ability to meet the physical and psychological growth needs of the child (Evans, 2003). A recent study has found that post-adoption outcomes such as indiscriminate friendliness and elevated evening cortisol

levels are most problematic for children who show linear growth delays (i.e., growth stunting) (Johnson, Bruce, Tarullo, & Gunnar, 2011). Factors intrinsic to the child, such as genetics, may also influence outcome. One of the more widely-cited studies with adults who were maltreated during childhood has suggested that genetic predispositions may render some individuals more resilient to the development of psychiatric disorders (e.g., depression) (Caspi, et al., 2003). Examination of genetic influences within PI samples, have similarly suggested a moderating role of genetics. For example, ameliorative effects of foster care intervention were observed only in those children who carried genetic functional polymorphisms (5httlpr, BDNF) that conferred greater neural plasticity (Drury, Gleason, et al., 2011). Other genetic alleles including those that code for COMT, DAT1, and 5HTT have shown to interact with experience in institutional care to predict mental health outcomes, such as emotional difficulties, ADHD, and depression (Stevens, et al., 2009)(Kumsta, et al., 2010)(Drury, Theall, et al., 2010). These variables seem to be increasingly important to include in examination of mental health following institutional care as they explain, in part, some of the heterogeneity in outcome.

## Conclusion

The scientific adage that development is probabilistic, not deterministic is a particularly useful guide for understanding growth in children who have been adopted for institutional care. Heterogeneity in outcome is common. Institutionalization represents an atypical rearing environment for the human infant that increases the risk for atypical development. However, adoption into a home environment represents a significant, if not the largest, intervention possible. Some children may continue to struggle, but many thrive once adopted into stable homes. Even within a child, some characteristics may show resilience, while others are more vulnerable to risk factors associated with institutional care. Currently, the state of the science on resilience factors associated with good outcome is in its infancy, although this information is surely soon to come. These scientific findings should not prevent potential parents from adopting a child, but are necessary to provide parents, teachers, and clinicians with adequate knowledge for raising children in the healthiest means as possible.

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