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Institutionalisation and deinstitutionalisation of children 1: a systematic and integrative review of evidence regarding effects on development

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Summary

Millions of children worldwide are brought up in institutional care settings rather than in families. These institutions vary greatly both in terms of their organisational principles and structure, and in terms of the quality of care provided. Although institutions are universally recognised as providing suboptimal caregiving environments, consensus is still needed on how to interpret the evidence relating to the size, range, and persistence of the effect of institutional care on the development and wellbeing of children. This absence of consensus has led to disagreement as to whether policy should focus on eliminating, transforming, or improving institutions.

We reviewed the literature on child institutionalisation and deinstitutionalisation from a global perspective. This review included a survey of historical and cultural trends and estimates of current numbers of children in institutional care, a systematic review and meta-analysis of developmental sequelae, and a largely qualitative review of factors found to predict individual variations in such outcomes. The numbers of children in institutional care have varied enormously over the years and from region to region, driven by a range of political, cultural, and socioeconomic factors. Millions of children worldwide are known to be housed in institutions.[1] We found strong negative associations between institutional care and children's development, especially in relation to physical growth, cognition, and attention. Significant but smaller associations were found between institutionalisation and socioemotional development and mental health. Leaving institutions for foster or family care is associated with significant recovery for some developmental outcomes (eg, growth and cognition) but not for others (eg, attention). The length of time in institutions was associated with increased risk of adverse sequelae and diminished chance of recovery. However, we could not disentangle the association between developmental outcomes and the duration of institutional care as opposed to its timing, which would be required to establish the precise boundaries of sensitive periods of development.

Every effort should be made to minimise children's exposure to institutional care. Reducing the number of children entering institutions and increasing the number leaving institutions is urgently needed. Where institutional care is considered absolutely necessary, the length of stays should be as short as possible, even if care is adequate. To

Key messages

- Millions of children worldwide are housed in institutions, although the number appears to have decreased in recent years
- Many countries are increasingly supporting alternative, family-based approaches to care—eg, kinship networks, foster care, adoption, or kafalah
- Residency in an institution is associated with substantial developmental delays and other risks to children
- Longer stays in institutions are associated with larger developmental delays and atypical development in a dose–response manner
- Delays are most prominent in physical growth, brain growth, cognition, and attention; atypical attachments are also seen
- Children show rapid recovery in the years immediately after deinstitutionalisation, particularly in physical and brain growth, although substantial impairment can persist for the most seriously affected children over the longer term

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this end, preventive approaches should be promoted, keeping children in birth families when possible. When not possible, care alternatives that are family based should be supported, including extended kinship networks, adoption, and stable, high-quality fostering. Policy recommendations to support the implementation of these care reform goals at the global, regional, and local levels are set out in a linked policy *Lancet* Commission[2] published in *The Lancet Child & Adolescent Health*.

Introduction

Most children grow up in families of one type or another, with their parents, other relatives, or non-related caregivers. Families are essential units of societies and communities, which, under most circumstances, provide children with the care, nurture, socialisation, and protection required for healthy development. Unfortunately, millions of other children grow up in publicly or privately managed and staffed residential facilities that do not provide a child with a family environment. We refer to such facilities here as institutions. The quality of such institutional facilities varies greatly. Key quality dimensions include the extent of the training staff receive, the rate of staff turnover, the child-to-caregiver ratio, the quality of food, and the standard of hygiene and health care, as well as factors that are essential for the provision of engaged and responsive carer behaviour. However, in institutions, care is typically provided by teams of poorly paid staff, who often have little training and have insufficient time to provide a basic standard of care to children. Peer and staff maltreatment of children might also occur.[3] These poor standards and frequent maltreatment mean that even when basic sanitary conditions are adequate and nutritional needs are met, social and cognitive aspects of institutional care are often of low quality and are inconsistently delivered. Children living in institutions are therefore assumed to be denied the basic conditions required for positive socioemotional and cognitive development. In this Commission, we review the evidence from studies done worldwide to address two related questions: does growing up in institutions disrupt or delay physical, neural, cognitive or socioemotional development and negatively affect mental health; and, when this disruption occurs, does leaving an institution and being placed in family-based care (ie, deinstitutionalisation) promote developmental recovery or catch-up, either partially or completely? In addressing these questions, our goal is to generate the evidence base to underpin a consensus-based expert statement,[2] published in *The Lancet Child & Adolescent Health,* to promote best practice and policies for addressing the needs of children at risk of or experiencing institutionalisation worldwide. For the purposes of this Commission, we define an institution as a publicly or privately managed and staffed collective living arrangement for children that is not family based. These institutions include orphanages, children's institutions, group homes, infant homes, children's villages, and similar residential settings for children. Forensic or therapeutic care settings are excluded from this Commission.

Section 1 explores the historical and cultural context of family-based and institution-based care. In section 2, we provide estimates of the incidence of institutionalisation and deinstitutionalisation by type of care and geographical region. In section 3, we review the evidence for the effect of institutionalisation and deinstitutionalisation on development, estimated across a broad range of domains. The evidence reviewed in this section includes two systematic reviews with meta-analyses of relevant studies with appropriate comparison groups. Interpreting the results of these two meta-analyses, especially with regard to inferring a causal link between institutionalisation and deinstitutionalisation and developmental outcomes, is complicated by methodological heterogeneity and inherent research design constraints. Establishing the adverse effects of institutionalisation is especially complicated by these constraints. Randomly assigning children to either institutional care or to remain with their biological families is unethical. Consequently, research must rely on non-experimental or quasi-experimental observational designs. In these studies, institutional exposure might be confounded with pre-existing risk factors or child characteristics (eg, disability) linked to reasons for the initial entry into an institution (the study by the St Petersburg–USA Orphanage Research Team[4] is an exception because it tried to account for these confounding factors). Doubts about causes that are inferred on the basis of an observed association are likely to persist, and statistically controlling confounding differences between exposed and unexposed individuals cannot fully resolve these doubts.

An alternative strategy is to focus on variations in the dose of exposure received by the institutionalised group.[5] For instance, a comparison might be drawn between children with short versus long periods of institutional living before being placed in a family-based environment. If the risk of negative outcomes increases as a function of the amount of time children spend in institutions, causal inference is strengthened. However, even establishing such dose–response relationships does not provide definitive evidence of the causal effects of institutional care, because the age at which children enter and leave an institution might be non-randomly determined. For example, better functioning children who are institutionalised might be adopted earlier or later than children with pre-existing difficulties. Inferences can be strengthened if the possibility that dose is only a marker of increasing underlying genetic or other pre-existing biological risks can be ruled out. One way to rule out this possibility is to directly measure those risks.

By contrast, because removal from institutions is considered by most people to be a positive, rather than a harmful, event in children's lives, experimental studies

of deinstitutionalisation can be ethically justified under carefully regulated conditions. The Bucharest Early Intervention Project (BEIP)[6] is the only study to use a randomised controlled design to study the benefits of deinstitutionalisation. Following an extensive baseline assessment, 68 of the 136 children in institutions (aged 6–31 months) were randomly assigned to a high-quality foster care programme that was developed and financed by the investigators.[7] The other 68 children were randomly assigned to care as usual, which initially meant that these children remained in institutional care (appendix pp 1–2). The BEIP therefore provides a uniquely powerful test of the recuperative power of family life compared with continuing institutional care. The BEIP includes a pre-intervention assessment and a comparison group of typically developing, age-matched children from the same country. The project also introduced a degree of randomness with regard to age of placement into foster care (ie, duration of institutional care), meaning that the BEIP provides the strongest test of the causal relationship between institutional exposure and adverse outcomes that we are aware of. For these reasons, our strategy was to set the BEIP findings apart and compare them with the broader pattern of meta-analytical results relating to the benefits of deinstitutionalisation. Where the findings from the BEIP align with those of quasi-experimental and naturalistic observational studies of the association between institutionalisation and outcomes (especially where the findings show a dose–response relationship), this contributes to our confidence in drawing inferences about the causal links between these two things.

Section 4 focuses on identifying predictors of individual differences in the effects of institutionalisation and deinstitutionalisation. We addressed two questions: are there aspects of institutions or families (including duration, timing, and quality of care) that are associated with less adverse sequelae of institutionalisation or increased benefits of deinstitutionalisation; and, are some children more resilient to such adversity in institutions, or more responsive to postinstitutional enrichment? The literature addressing these questions is smaller and more fragmented than for those questions addressed in section 3. Meta-analysis was therefore not possible, except with regard to the effects of duration of institutionalisation on children still living in institutions.

Section 1: historical and cultural context

Throughout most of history, children deprived of parental care were most often cared for by extended kinship networks—a practice that persists in much of the world. Many faiths have viewed the protection of children without parental care as a pious act. Kafalah, for example, is practised in many Muslim communities to allow children to be cared for in a family outside their biological family, without a change in kinship status.[8] The earliest reference to the institutionalisation of children was in Milan in 787 CE.[9] One of the first large institutions for infants, *Santa Maria degl'Innocenti*, was founded in 1445 in response to the problem of child abandonment. This institution housed approximately 1000 children by 1484.[10] Similar institutions were established in most major European cities and in the colonies of European powers over subsequent centuries.[11] However, despite the compassionate intent of their founders, mortality within institutional care settings was 50–70% through to the early 20th century[12–16] because of unsanitary conditions and poor nutrition, among other factors.[17–19] Children from indigenous populations have historically been especially targeted for institutionalisation, including the forced removal of Native American children or First Nations Canadian children from their families and their placement in so-called boarding schools, or the removal of Indigenous Australian children from their families and their placement in institutions, which were often run as church missions.[20]

See Online for appendix

High mortality within institutions and emerging evidence of developmental harm[21–25] instigated the transition from an institution-based to a family-based social welfare system in the USA and western Europe. In 1909, the US Conference for the Care of Dependent Children developed recommendations highlighting the importance of family-based instead of institutional care.[26] Between 1910 and 1960, the number of children in US institutions decreased by 30% from 101 403 to 70 892, and the estimated number of children in foster care and adopted homes increased by 442% from 61 000 to 270 000.[27] After decades of declining use, institutional care for young children essentially disappeared in the USA after passage of the Adoption Assistance and Child Welfare Act of 1980, which stipulated that children be placed in the least restrictive (most family-like) setting available. Many countries in the EU have also largely transitioned to family-based care, but estimates based on incomplete data suggest that around 343 000 children still live in residential care in some EU countries.[28] Institutionalisation of children increased substantially in eastern Europe and what was the Union of Soviet Socialist Republics (USSR) after the 1917 Russian Revolution and World War 2, because of high numbers of displaced and abandoned children and the insufficient development of alternatives such as fostering and adoption.[29] A sharp rise in the number of institutions in Africa followed the onset of the HIV epidemic in the 1980s, even though there was no indigenous practice of institutionalising children.[3,30] In China, child institutionalisation expanded substantially after the adoption of the one child policy in 1979.[31]

After the dissolution of the USSR in 1991 and the political transformations in eastern Europe throughout the 1990s, the profound effect of extreme deprivation on the development of children in institutions became well publicised.[6,32] Reviews of institutional practices confirmed that the closed environment and frequent absence of

robust safeguarding policies and practices inherent in many forms of institutional care, combined with other features of low-quality care, had placed children at risk of severe physical or sexual abuse, violation of fundamental human rights, trafficking for sex or labour, exploitation through orphan tourism, and risk to health and wellbeing after being subjected to medical experimentation.[3,33–36] In response, global multilateral and bilateral institutions such as the UN, the EU, the US Agency for International Development, and many non-governmental organisations are promoting reforms to reduce reliance on institutions for children by strengthening birth, kinship, adoptive, kafalah, and foster families (initiatives and agencies promoting such reforms include Changing the Way We Care,[37] the UN General Assembly,[38] and the US Government[39]).

Section 2: Global characterisation

The number of children entering institutions

According to UNICEF, an orphan is a child younger than 18 years who has lost one or both parents to any cause of death.[40] Of an estimated 140 million orphans worldwide in 2015, 15·1 million had no living parent. Most of these children lived with relatives.[40,41] A 2009 study of 21 countries in sub-Saharan Africa on HIV and AIDS and orphan status found children with no living parent constituted a minority (13·5%) of all orphans in the region.[42] The same study found that of the children with no living parent who resided in households (not institutions), around two-thirds were living with grandparents; the remainder were living with other adults. Reliable data on the number of children in institutional care worldwide are difficult to collect because these figures are not captured in household surveys or administrative data in most countries.[43] This problem with data capture is further complicated by a high proportion of institutions worldwide not being officially registered.[44] A systematic review of data from 137 countries estimated that 5·09–6·10 million children were living in institutions worldwide in 2015 using the imputation methods with the smallest root-mean-squared error, but this estimate was qualified by the absence of a standard definition of an institution and the reliability of some of the underlying data.[1] Regardless of how many children are living in institutions, this number is highly likely to have increased over the past three decades because of the HIV crisis, humanitarian emergencies, and the increased interest of private financial donors in funding the creation and operation of institutions.[45,46] Some national estimates of children in institutions are available: 604 847 in central and eastern Europe and the former USSR (2014), 500 000 in Indonesia (2009), 86 000 in China (2016), and 48 775 in Cambodia (2017).[47–50]

Factors that cause children to be placed in institutions

Despite institutions often being described as orphanages, studies show that 80–90% of children residing in them have a living parent.[47,51–54] Poverty is often cited as the main reason for institutional placement, along with access to health care and education.[3] However, the majority of poor families do not place their children in institutions, and more complex causes are involved, such as the social marginalisation that can accompany childbearing outside of marriage. Although therapeutic settings are not a focus of this Commission, children with disabilities are overrepresented in institutions worldwide[35] because they are often not placed in dedicated specialist therapeutic settings. Emergencies and disasters can also lead to a child being placed in an institution on the assumption that they were orphaned, even though they might not have been. 97·5% of the 16 204 children living in institutions in Aceh, Indonesia after the tsunami in 2007 were placed there by their families.[47]

Child abuse within families is not cited as a common reason for placement in institutions in lower-income countries, but is more so in higher-income settings.[55] One study in Kenya estimated that 8% of children in institutions were placed there because of physical and sexual abuse, although most of the children in institutions had been maltreated in some form, even if the maltreatment was not cited as the reason for placement.[56] Some institutions have been created for the purpose of placing children for international adoption.[57] However, the number of internationally adopted children has always been a small proportion of children in institutions, and since 2004, intercountry adoption has decreased by 80%.[58] In summary, the entry of children into institutions is the result of multiple drivers, such as poverty, parental mental health problems, disability, or parental death from disease. Cultural factors might also have a role in the placement of children in institutions, as is the case when children are born outside of marriage to young mothers in some societies. Very few children worldwide have access to professional case management during placement decisions.[59] Child and family participation in decisions concerning care arrangements is an important element of social work assessment and referral, and is a principle of the UN Convention on the Rights of the Child.[60]

Characteristics of institutions

Institutions vary by size, staffing, region, purpose, and funder. Although the size of an institution is an important characteristic related to quality of care, no typology of institution by size has been established under global conventions. One study distinguished between globally depriving institutions (ie, ten to 30 children per caregiver) and psychosocially depriving institutions (ie, three to six children per caregiver).[61] Published data are scarce but generally confirm that staff-to-child ratios in most institutions studied are globally depriving according to these criteria.[53,62] Institutions that are globally depriving also have high staff turnover, employ staff with little training, have poor caregiver–child interactions, and

often segregate children with disabilities or other health problems.[63] Deficits in nutrition and hormonal growth suppression contribute to psychosocial growth problems in institutions, especially in the early years of development.[64]

One quantitative study using videotaped spot observations in an institution with a daytime caregiver-to-child ratio of 1:6 and a nighttime ratio of 1:8 showed that a mean of only 6% of a child's waking time was spent interacting with caregivers. Furthermore, only 15% of time was spent in meaningful activity, such as playing or motor activities.[65] Of note, children with disabilities or who have experienced severe adversity require much more support from adult caregivers.

Funding and cost-effectiveness

Institutions in the former states of the USSR, central and eastern Europe, and China are usually state owned. In 2001, countries in eastern Europe were estimated to be spending up to 1% of gross domestic product on institutionalised care for children, although this proportion is likely to have declined with reductions in the numbers of children in institutions and the region's growth in gross domestic product.[66] In other regions, such as sub-Saharan Africa, most institutions are privately owned, often by non-governmental or faith-based organisations. In 2010, 96% of Ethiopian institutions surveyed were run by such organisations.[67] Private funding for institutions is substantial. One study found that more than US$100 million of private funding enters Haiti annually to support institutions, equivalent to 50% of the planned US foreign aid programme in 2017.[68] The few data available suggest that institutions are less cost-effective than foster care. For example, statutory residential care in South Africa costs more than 8 times as much per month as does home-based support providing for basic needs.[69] In Bulgaria, foster-care costs were estimated at €1907 per child annually, versus €14 837 in an infant home, and €4414 in a small group home (for children without a disability).[70]

The number of children leaving institutions

Children enter a variety of caregiving environments following deinstitutionalisation, including return to birth family or kinship networks, foster care, kafalah, domestic and intercountry adoption, and ageing out into adult society. Although no global sources of data exist on the number of children leaving institutions each year, some national data are available. In Russia, the number of children in institutions decreased by 27% from 2005 to 2014,[50] and in Moldova, they decreased by 86% from 2007 to 2016.[71] From 2012 to 2016, Rwanda successfully placed 2338 of 3323 children living in institutions with their biological families or into foster care, and is working to place the 935 children remaining in institutions (many of whom have a disability or little family tracing information).[72] A few countries have reported reductions in the number of institutions: in Ghana, a substantial number of unregistered institutions, which the government deemed to be of low quality, were closed between 2010 and 2015, and in Ethiopia, dozens of institutions have been closed. Reports of reductions in institutions need to be interpreted carefully. From 2010 to 2015, Russia reorganised one in four of its residential institutions for children—eg, by converting the institutions into boarding schools.[73] A substantial challenge in promoting deinstitutionalisation and closing institutions is that, whether privately or publicly funded, institutions often have large local populations of people who are dependent on the existence of the institution for employment, and who support the continuation of the facility. These institutions are often in remote areas where jobs are scarce.

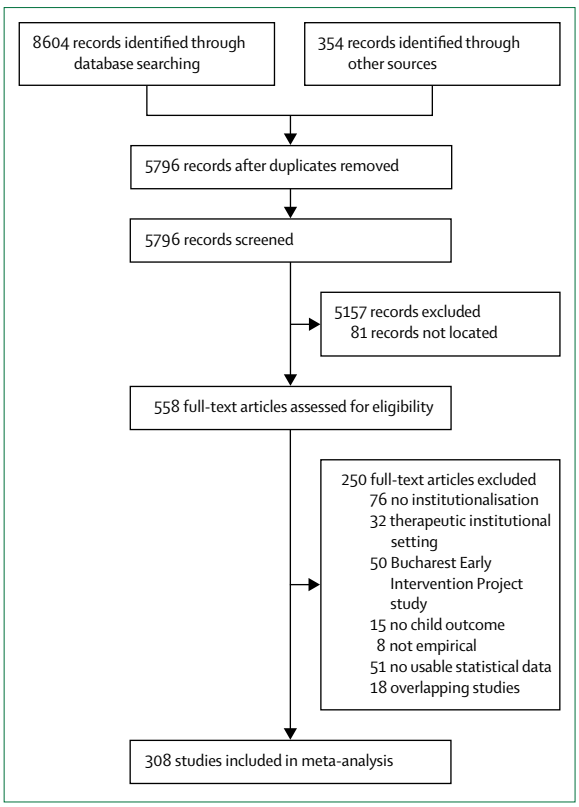

Figure 1: **Flow diagram of the search strategies used in the meta-analysis**

Section 3: the effects of institutionalisation and deinstitutionalisation on development

The search strategies we used (figure 1; appendix pp 3–4) show the breadth of the meta-analyses on the effects of institutionalisation and deinstitutionalisation on development of the child. In the past 65 years, more than 300 quantitative studies have been done across more than 60 countries on the development of children raised in institutions (figure 2). More than 100 000 children are included in these studies, of whom almost half had been

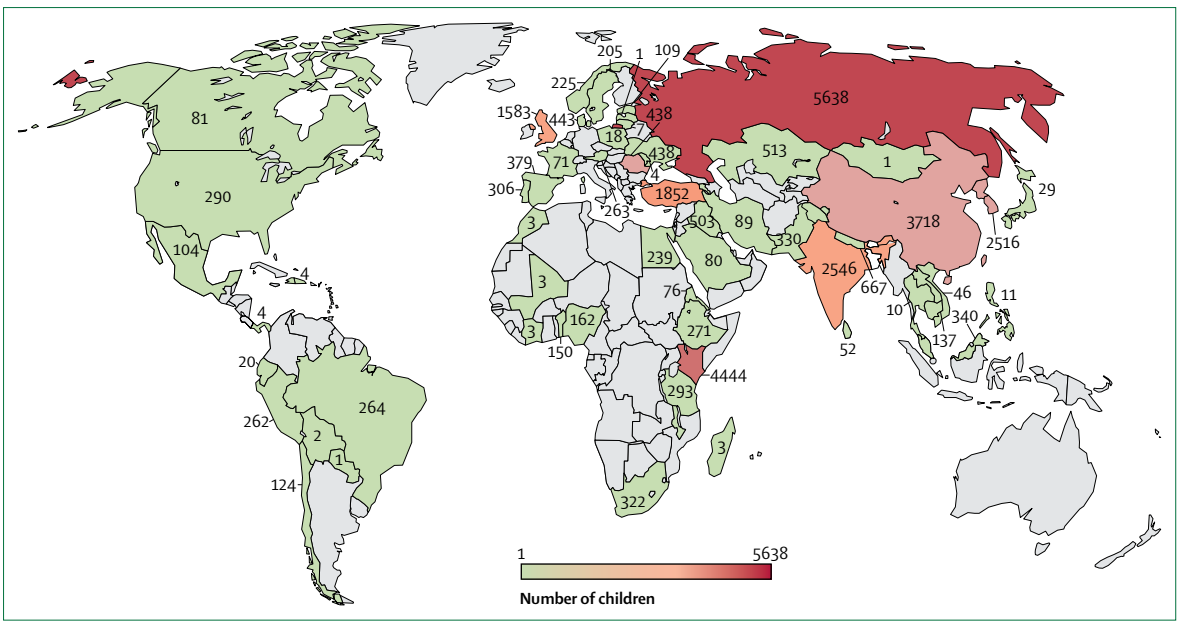

Figure 2: **Worldmap showing the 34 823 children in institutions across 68 countries included in the 202 studies on institutionalisation in the meta-analysis**
None of the studies included in the meta-analysis included children in the countries shaded in grey. Studies are not included when exact numbers of children per country are not presented in the studies.

previously living or are currently living in institutions. We did a systematic review and meta-analysis of the data from these studies and examined a broad range of developmental sequelae of institutional care and deinstitutionalisation covering the quantitative studies from the past 7 decades. The review of such a wide range of data provides a firm basis for global policy recommendations and measures that target institutionalised care for children, although it also leaves room for further, more in-depth meta-analytical and empirical studies.

We searched three electronic databases, the Web of Science, PsycInfo, and PubMed (including unpublished dissertations), to identify eligible quantitative empirical studies for our meta-analyses (figure 1). We used three strings of search terms for the type of sample, institutional setting (excluding forensic or therapeutic care settings), and developmental outcome (appendix pp 3–4 includes more details about the search terms, inclusion and exclusion criteria, and the reliability of screening and coding of moderators). Except for dissertations, the so-called grey literature has not been systematically reviewed because preliminary exploration of unpublished policy reports showed that quantitative data allowing for the meta-analytical approach were rarely presented. Therefore, we tested publication bias potentially represented by the grey literature with several meta-analytical tools.

We addressed two main questions. First, is growing up in an institution detrimental to development compared with growing up in a biological, kinship, foster, or adoptive family? To answer this question, we compared the development of children placed in institutions for reasons other than their own disability or mental health problems to that of their peers growing up in a family, or to standard norms derived from typically developing peers. Of note, although therapeutic institutional care for children with disabilities has been excluded from the meta-analyses, many children in non-specialised institutional care have been diagnosed with health issues secondary to their (social) orphan status. We documented which developmental domains show the most pronounced delays or, by contrast, seem to be more or less spared from any effect of living in an institution. Second, does deinstitutionalisation lead to recovery or catch up—ie, change for the better after the transition from the institution to a more family-like environment? Appendix p 5 gives details of the meta-analytical approach to this question.

In brief, 308 studies on institutionalisation and deinstitutionalisation were included in our meta-analyses. Studies on institutionalisation rarely use the same adjustments for potential confounders; therefore, data were extracted at the lowest level of analysis (in their rawest form), using means and SDs or similar univariate or bivariate statistics comparable across studies to compute effect sizes to be included in the Comprehensive Meta-Analysis software version 3.2.[74] Random effects models were used to account for heterogeneity of study effect sizes as indicated by the Q and I^2 statistics. Moderators included quality of the study measures and design, sample size, and age and sex of the participants (appendix pp 6–8 details the coding system and inter-coder reliabilities). Assessment of the quality of studies was based on the Cochrane Handbook for Systematic

Reviews[75] and used criteria referring to selection, performance, attrition, detection, and reporting biases. Among the indicators for lower quality ratings were the presence of convenience sampling, combining different group sizes, the failure to take account of differential attrition, the absence of reliability of central measures, and selective reporting of outcomes (appendix p 8). Robustness of the meta-analytical results was examined with meta-regression, the trim and fill method,[76,77] Egger's regression test for potential publication bias, and bootstrapping to test the influence of potential outlying values.

The results of the meta-analysis were compared with the findings from the BEIP study because the BEIP is the only randomised controlled trial that controls for confounders such as potential selection differences between children in institutions and children who have been deinstitutionalised.[6,78] However, the results from the BEIP might not be generalisable to all settings and populations. For example, the foster care initiated by the BEIP team might have delivered higher quality care than usually is found in foster care in low-income countries, and the children in the BEIP went into foster care late, at a mean age of 22 months. Nevertheless, within these generalisability restrictions, the BEIP study allows the strongest causal inference compared with other studies and has strict control of selection-related confounders. Our comparison of the effects of deinstitutionalisation shown in the meta-analysis with the effects shown in the BEIP (which compared continuing institutional care *vs* foster care groups at 144 months of age following the end of the trial at 54 months of age) was designed to examine, where possible, the convergence of the meta-analytical estimates of deinstitutionalisation with the causal findings of a randomised trial. The comparison within the BEIP at 42 months of age between the children in institutions and their peers who were never institutionalised is non-randomised, thus the comparison with the meta-analytical findings on the sequelae of institutionalisation leaves some room for alternative interpretations concerning confounders.

The effect of institutionalisation

Meta-analytical results

For the comparison of the developmental status of children in institutions with their peers who had not been institutionalised, we selected the earliest assessments after leaving the institution to avoid dilution of effect sizes with recovery effects of the postinstitutionalisation period. In 80% of the studies we analysed, the effects of institutionalisation were assessed by comparing children in institutions with norm groups (eg, with average anthropometric growth curves) or children living with their biological parents; in 20% of the studies, the comparisons were made with adopted children, with children living in foster families, or with children living in kinship care.

	Number of studies	Number of participants	Hedges' g	95% CI	Q	I^2
Growth						
Overall	55	12 797	1·18	0·98 to 1·38	1245·05	95·66
Age at assessment* (Q=28·10†‡)						
≤42 months	26	4029	1·71	1·33 to 2·09	553·57	95·48
43–120 months	17	4721	0·87	0·50 to 1·25	324·33	95·07
121–196 months	6	1749	0·40	0·02 to 0·77	28·27	82·31
≥197 months	5	2076	0·70	0·52 to 0·88	11·15	64·14
Health						
Overall	46	35 978	0·29	0·20 to 0·38	547·61	91·78
Age at assessment (Q=3·10‡)						
≤42 months	11	1411	0·53	0·22 to 0·83	66·28	84·91
43–120 months	20	12 780	0·22	0·05 to 0·39	371·36	94·88
121–196 months	8	1950	0·30	0·08 to 0·52	28·58	75·50
≥197 months	7	19 981	0·26	0·14 to 0·38	38·44	84·39
Brain (head circumference)						
Overall	20	2042	1·44	1·02 to 1·85	272·28	93·02
Age at assessment						
≤42 months	16	1425	1·49	1·00 to 1·98	218·00	93·12
43–120 months	2	112	2·18	−0·89 to 5·24	25·71	96·11
121–196 months	1	110	0·18	−0·17 to 0·53	NA	NA
Cognition						
Overall	116	12 848	0·81	0·68 to 0·94	1099·54	89·54
Age at assessment (Q=21·33†‡)						
≤42 months	65	3785	1·15	0·91 to 1·40	517·92	87·64
43–120 months	31	6509	0·48	0·30 to 0·65	241·58	87·58
121–196 months	18	2485	0·54	0·32 to 0·75	90·20	81·25
≥197 months	2	69	0·48	−0·02 to 0·98	0·37	0·00
Socioemotional development						
Overall	146	63 525	0·32	0·25 to 0·40	1789·79	91·90
Age at assessment (Q=0·74‡)						
≤42 months	33	3816	0·35	0·18 to 0·51	155·73	79·45
43–120 months	50	14 996	0·30	0·19 to 0·42	373·59	86·88
121–196 months	49	23 959	0·31	0·18 to 0·44	788·08	93·91
≥197 months	14	20 065	0·38	0·22 to 0·54	96·82	86·57
Attention						
Overall	28	9539	0·50	0·23 to 0·77	822·99	96·72
Age at assessment (Q=0·53‡)						
≤42 months	3	224	0·22	−0·05 to 0·49	1·64	0·00
43–120 months	13	2996	0·44	0·06 to 0·82	217·73	94·49
121–196 months	11	6247	0·64	0·28 to 1·00	318·21	96·86
≥197 months	1	72	0·27	−0·20 to 0·74	NA	NA

Combined effect sizes in Hedges' g (with 95% CI) are presented across number of studies and participants, with tests for homogeneity (Q and I^2) for the total set of studies in six developmental domains. Each domain is also differentiated into age-of-assessment groups. NA=not applicable. *Not reported for one study. †p<0·01. ‡Q for contrast between subgroups with four or more studies.

Table 1: **Associations of institutionalisation with child development in physical, cognitive, and socioemotional domains**

The meta-analysis found that residency in an institution is associated with substantial developmental delays and deviations (table 1; figure 3). However, the variation in delays among developmental domains is large. Institutionalisation is strongly associated with

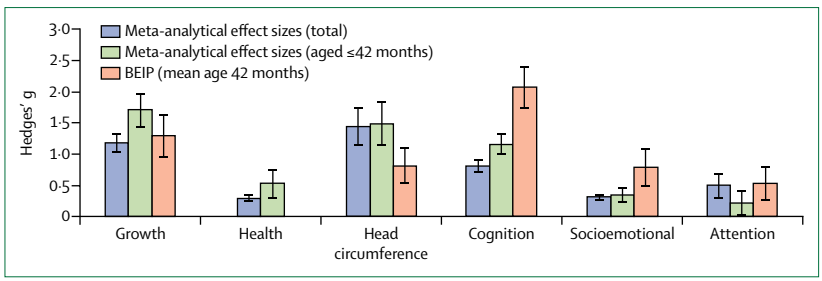

Figure 3: **Associations of institutionalisation with child development in physical, cognitive, and socioemotional domains**

The BEIP data are from a comparison of care as usual (institutionalised care) versus never institutionalised (care within families). Data are Hedges' g with 85% CI. Non-overlapping 85% CIs imply significant differences between effect sizes across developmental domains. BEIP=Bucharest Early Intervention Project.

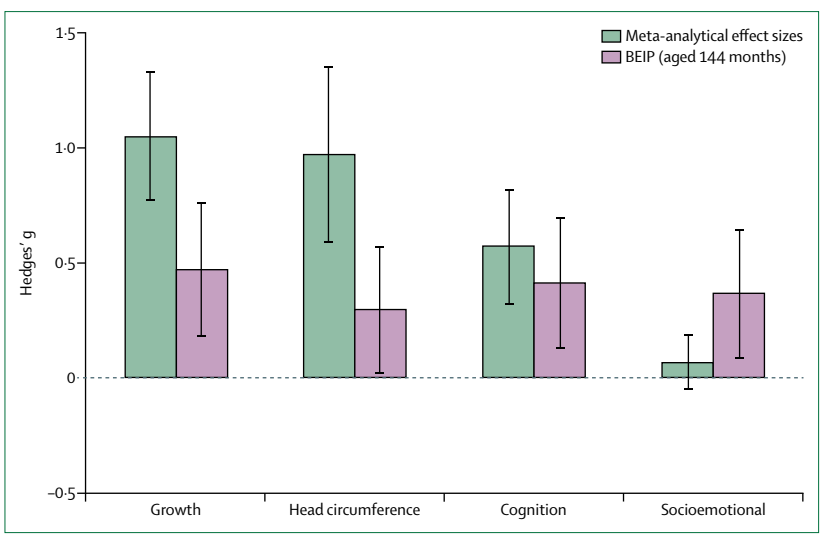

Figure 4: **Effect sizes for development catch-up in physical, cognitive, and socioemotional domains after deinstitutionalisation**

The BEIP data are from a comparison of care as usual (institutionalised care) versus foster care. Data are Hedges' g with 85% CI. Non-overlapping 85% CIs imply significant differences between effect sizes across different developmental domains. For the domains of health and attention, the numbers of studies in the meta-analysis were too small for comparisons. BEIP=Bucharest Early Intervention Project.

delays in physical growth, brain development, cognitive development, and attention, with combined effects sizes (Hedges' g) ranging from 0·50 to 1·44. The combined effect sizes for physical health (0·29) and socioemotional development (0·32) are smaller. Thus, the greatest effects on children were delayed physical growth (height and weight for age) and delayed brain and cognitive development, to the extent that in these developmental domains at least 80% of the institutionalised group are below the mean of the comparisons. Effect sizes of developmental domains including (partly) overlapping samples were compared using the 85% CI around the point estimates (figures 3, 4, 5). Absence of overlap between 85% CIs is considered a statistically significant difference under a random effects model.[79–81] For example, the non-overlapping 85% CIs for growth and health in figure 3 imply that the meta-analytical effect sizes for growth are significantly larger than those for health; the overlapping 85% CIs for growth and head circumference imply that the meta-analytical effect sizes for growth and head circumference are not significantly different.

The more modest effect sizes for institutionalisation in the domains of physical health and socioemotional development might be partly explained by measurement issues. First, in several studies the assessments were done many months to years after the children left the institution, potentially diluting the effects of institutionalisation with postinstitutional experiences. Studies assessing the children's physical health within a year after leaving an institution showed substantial adverse effects (Hedges' g 0·63). Of note, dental health was included as part of the measurement of physical health in some studies and was sometimes better in children in institutions than in their peers who had not lived in an institution.[82] An important limitation is that most of the studies of socioemotional development (including mental health) used standard parent or caregiver questionnaires not designed to measure social deficits thought to be specific to children living in institutions. For instance, outcomes that have been described as deprivation-specific had little coverage, including signs of disinhibited social engagement and autism spectrum disorder.[83] The term deprivation-specific was first used in the English and Romanian Adoptees study to describe the unusual pattern of quasi-autism and disinhibited social engagement that was clinically distinctive and common in people who had had more than 6 months of severe global institutional deprivation, and was practically absent in people with deprivation lasting less than 6 months. The smaller effects on socioemotional development might also reflect children in institutions having learnt not to express emotion because of the oppressive and neglectful regimes under which these children often live. The results might therefore underestimate the amount of disorder in children who have left institutions.

To evaluate the effect of institutionalisation on attachment, we compared the distribution of attachment within institutions to the normative distribution in typically developing children growing up in birth families. Comparison of attachment between children in institutions and children who have left institutions is included in the larger domain of socioemotional development. Only a few children developed a secure attachment relationship with the closest caregiver within the institution. In 11 studies including 471 children (figure 6), the proportion of securely attached children in institutions (24%) was significantly lower than the normative proportion (62%; Hedges' g 0·76). The proportion of the most dysregulated category of attachments (insecure-disorganised and unclassifiable attachments, including some children for whom attachments were incompletely developed) was much higher in children in institutions (57%) than the normative proportion (15%; Hedges' g 1·18), showing the substantial effect of insti-

tutions on one of the most important components of early socioemotional development.

The effects of institutionalisation on growth and development might vary as a function of age of assessment, which ranged from infancy to adolescence. We distinguished studies with ages of assessment in four ranges, loosely mapping onto the major developmental periods. The largest delays for physical growth and for cognitive development emerge in infancy and early childhood up to age 42 months (table 1; figure 3). By contrast, attention problems tend to increase with age, possibly because executive attention generally develops later, so problems might be difficult to detect in early childhood. The meta-analytical findings suggest curvilinear growth trajectories that need to be substantiated by longitudinal data and individual participant data meta-analysis[89] as useful complementary approaches. Meta-regression suggested a moderating role of sex (table 2). In terms of cognitive and socioemotional development and attention, boys had more delays than girls after growing up in institutions. Girls had more delays in physical health. These results add to the growing literature showing sex differences in the responses children have to adversity.[90] Growth and cognition showed larger effect sizes in smaller samples. However, biases involved in the reliability and validity of the measures and designs used were not related to systematic differences in effects sizes (appendix pp 6–8).

Comparison with the Bucharest Early Intervention Project

In the BEIP, at 42 months of age the children in institutions, compared with their peers who had never been institutionalised, showed delays in physical growth (Hedges' g 1·29; 95% CI 0·82–1·76), cognitive development (2·08; 1·62–2·54), brain growth as assessed by head circumference (0·81; 0·40–1·21), socioemotional development (0·79; 0·38–1·21), and attention (0·53; 0·14–0·91) before leaving the institutions. Compared with the meta-analytical results, delays in cognitive development are more pronounced in the BEIP. The BEIP and the meta-analysis showed similar results for the other developmental domains (overlapping 95% CIs are shown in table 1), and this convergence of non-experimental results with the experimental results contributes to the robustness of our meta-analytical findings. 95% CIs are used for all comparisons between the BEIP and meta-analytical results, because the groups are non-overlapping.

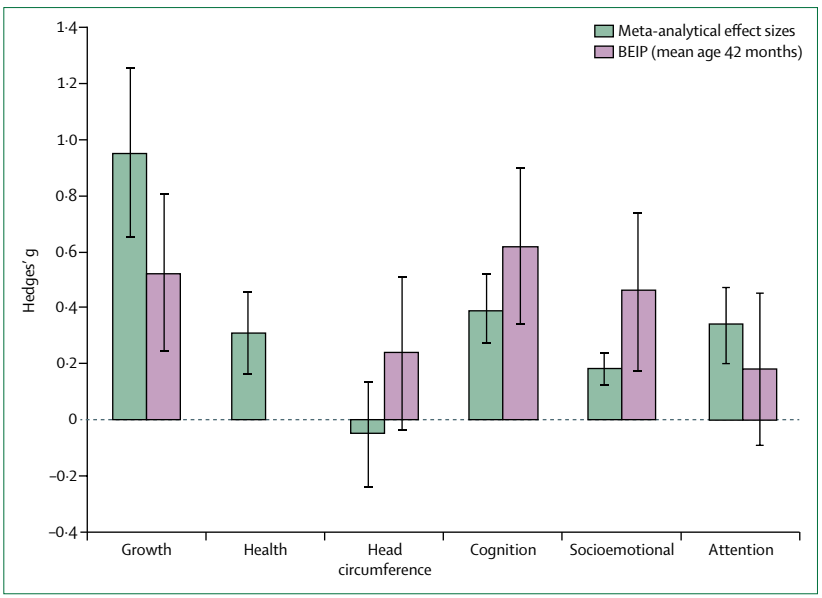

Figure 5: **Associations of duration of institutionalisation with child development in physical, cognitive, and socioemotional domains**

The BEIP data are from a comparison of care as usual (institutionalised care) versus foster care. Data are Hedges' g with 85% CI. Non-overlapping 85% CIs imply significant differences between effect sizes across developmental domains. BEIP=Bucharest Early Intervention Project.

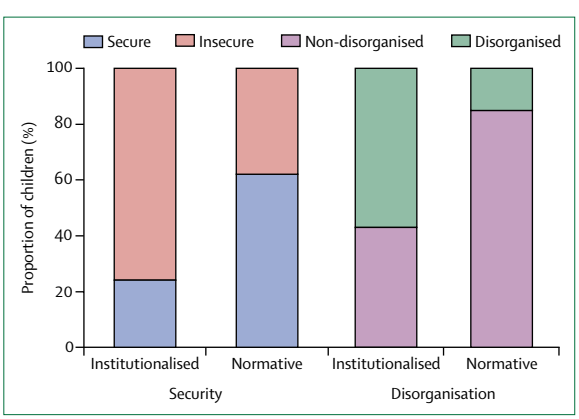

Figure 6: **Attachment security and disorganisation in children in institutions compared with children who have not been institutions**

Distributions for attachment security and attachment disorganisation were derived from Bakermans-Kranenburg et al (2011),[84] Lionetti et al (2015),[85] Barone et al (2016),[86] Lecannelier et al (2014),[87] and Quiroga et al (2017).[88]

Benefits of deinstitutionalisation

Meta-analytical results

Children show initial signs of rapid improvement following deinstitutionalisation. To examine these signs in our meta-analysis, we defined accelerated development after institutional care (catch-up following deinstitutionalisation) as the change between the earliest and the latest postinstitutionalisation assessments within a study (table 3; figure 4). This strict definition led to few eligible studies (particularly for the domains of health and attention), but guaranteed that only the changes within the postinstitutionalisation period were included. Using this approach means that for studies where the first assessment is delayed, some of the accelerated development immediately after departure from the institution could be missed. Positive sequelae of deinstitutionalisation were therefore probably underestimated, as were the negative correlates of institutionalisation. The advantage of this approach, however, is that we compared effect sizes of earliest versus latest assessments longitudinally within the same samples.

	Sample size			Sex*			Study quality		
	I	z	R^2	I	z	R^2	I	z	R^2
Growth	0·63	–2·67†	0·19	0·38	0·80	0·06	0·39	0·33	0·00
Health	0·17	–1·54	0·00	–0·04	2·54‡	0·22	0·17	–0·38	0·00
Brain (head circumference)	0·83	–0·71	0·00	0·52	0·53	0·03	0·92	–1·68	0·02
Cognition	0·45	–2·85†	0·12	0·69	–2·20‡	0·00	0·35	0·77	0·00
Socioemotional development	0·18	–0·53	0·00	0·26	–2·32‡	0·02	0·21	–1·26	0·05
Attention	0·27	–0·44	0·00	0·72	–2·56‡	0·20	0·23	0·15	0·00

Meta-regressions testing the influence of the continuous moderators sample size, sex, and study quality on the effect sizes for institutionalisation in the six developmental domains; the intercept (I) indicates the effect size at the mean level of the moderator, the significance of the slope is tested with the z-statistic, and the variance explained by the moderator is represented by R^2. *Proportion female children, this proportion is estimated to be 50% if it is not reported in the study. †p<0·01. ‡p<0·05.

Table 2: **Associations of institutionalisation with child development in physical, cognitive, and socioemotional domains**

	Number of studies	Number of participants	Hedges' g	95% CI	Q	I^2
Growth	21	3935	1·05	0·67 to 1·43	318·88	93·73
Brain (head circumference)	7	506	0·97	0·45 to 1·49	41·71	85·62
Cognition	14	3112	0·57	0·23 to 0·91	156·08	91·67
Socioemotional development	11	3542	0·07	–0·10 to 0·23	40·62	75·38

Combined effect sizes in Hedges' g (with 95% CI) are presented across number of studies and number of participants, with tests for homogeneity (Q and I^2) for developmental catch-up in four developmental domains. For health and attention, the number of studies (three for each) was too small for a robust meta-analysis.

Table 3: **Effect sizes for developmental catch-up in physical, cognitive, and socioemotional domains after deinstitutionalisation**

Physical growth showed a catch-up of 1 SD after deinstitutionalisation (Hedges' g 1·05; 95% CI 0·67–1·43; figure 4). Substantial recovery because of deinstitutionalisation was also found for brain growth as inferred by changes in head circumference (0·97; 0·45–1·49) and cognitive development (0·57; 0·23–0·91). Based on the estimated delayed physical and brain growth at the start of deinstitutionalisation for the younger age group being –1·71 SDs below average (table 1), this recovery would mean that the children developed into the normal range. A recovery in children's socioemotional problems after deinstitutionalisation seemed largely absent. Too few studies were available to estimate and compare the sequelae of deinstitutionalisation on attention problems. However, the English and Romanian Adoptees study[91] found evidence for strong persistence of attention-deficit hyperactivity disorder through to early adulthood. Accelerated development after exiting the institution might represent a short-term catch-up at the expense of delayed development at a later developmental stage.[92,93]

Children who have had extended deprivation can develop secure attachments with their new parents from adoption or foster placements, even after being exposed to severe deprivation. Using the strange situations procedure in children at age 4 years, the proportion of children placed into families developing secure attachments was 60% in the English and Romanian Adoptees study[94] and 49% in the BEIP.[95] In the English and Romanian Adoptees study, the proportion of children forming secure attachments was slightly lower than in the control group of children in the UK who had been adopted and not institutionalised, and the likelihood of secure attachment was lower for children with a longer duration of deprivation. In the BEIP, the proportion of children forming secure attachments in the foster-care group was 24% higher than among children who had been in institutions, but still lower than for the Romanian children living with their biological families.

Comparison with the Bucharest Early Intervention Project

The effects of deinstitutionalisation in the BEIP (continuing institutional care *vs* foster care groups at age 144 months) and the meta-analytical estimates (table 3) were similar for all developmental domains as evident from overlapping 95% CIs. Figure 4 shows the effects of foster care on growth (Hedges' g 0·47; 95% CI 0·08 to 0·86), head circumference (0·30; –0·07 to 0·67), cognitive development (0·41; 0·03 to 0·80), and socioemotional development (0·37; –0·02 to 0·75) in the BEIP at age 144 months. Foster care did not lead to improvements in all domains (eg, head circumference), and of those domains that did improve, some were affected by the age of the child when they were placed in foster care (these ages were interpreted by the investigators as being sensitive periods of development: see section 4 for details about these periods) and some were not (figures 3 and 6). Furthermore, in many of the domains that did show an intervention effect, children in foster care rarely did as well as children who had never been institutionalised. For example, the IQ of children in foster care was consistently higher than that of children in the care-as-usual group, but lower than that of children who had never been institutionalised. Whether this absence of full remediation reflects late age at placement (ie, average age at placement was about 22 months) or sample bias (eg, are children who were abandoned by their parents different from children who were not abandoned) is unclear.

The rapid expansion of foster care in Bucharest during the BEIP meant that many children in the care-as-usual group moved to foster families (at 54 months when the trial was completed, 52% of the children were living in families and at 12 years of age, 66% of the children were living in families). Therefore, the BEIP's intention-to-treat analysis might have led to an underestimation of the effects of deinstitutionalisation. However, correlational and natural experimental studies might overestimate effects because these studies do not control for baseline differences resulting from selective retainment of the most deprived children in institutional care. These overestimates are also possible if non-institutionalised control groups are not well matched for

ethnicity. For instance, institutionalised children are often adopted internationally and compared with individuals in the receiving countries. The convergence of the correlational meta-analytical results and the experimental BEIP findings is reassuring for both the internal validity of the meta-analytical results (potential confounders do not seem to dominate the meta-analytical outcome) as well as the external validity of the BEIP results. The convergence reciprocally supports both approaches.

Robustness of the meta-analytical findings

The robustness of the meta-analytical results was examined with meta-regression, the trim and fill method,[76,77] Egger's regression test for potential publication bias, and bootstrapping to test the influence of potential outlying values. The meta-regressions showed that the quality of the measures and design of the studies (appendix p 8) did not moderate effect sizes within developmental domains. Larger sample sizes were only associated with smaller effect sizes in the domains of growth and cognitive development (table 2). The trim and fill method test of the funnel plots[76,77] and Egger's regression test for potential publication bias did not show substantial bias. Taken together, these tests did not support a large influence of non-published reports and findings, although we only systematically searched for dissertations as a component of the grey literature. To explore the influence of single studies on the combined effect size, bootstrapping with one outcome removed was applied, which did not alter the combined effect size estimates. The Q and I^2 statistics showed that most combined effect sizes seemed heterogeneous, indicating that the random effects approach was more adequate than the fixed effects method (tables 1, 3, 4).

Section 4: accounting for individual variations in the sequelae of institutional care

The developmental sequelae of institutional care are well established. However, as is the case for exposure to, and escape from, other putatively adverse circumstances, a child's response to institutionalisation and deinstitutionalisation will differ between individuals. Some children in institutions will have serious negative consequences in multiple domains, whereas other children might have negative consequences in only some domains, and other children might be largely unaffected. Likewise, some children will recover quickly after they leave an institution, whereas other children will have lasting harm. Understanding the source of such variation can help to improve care after a child leaves an institution and to drive therapeutic innovation for individuals with institution-related impairment and disorder. In this section, we identify contextual (institutional and postinstitutional) and child characteristics (vulnerability and resilience) that are associated with such variation.

	Number of studies	Number of participants	Hedges' g	95% CI	Q	I^2
Growth	17	1873	0·95	0·53 to 1·36	245·19	93·47
Health	11	2762	0·31	0·11 to 0·52	54·36	81·61
Brain (head circumference)	2	210	–0·05	–0·31 to 0·20	0·10	0·00
Cognition	27	2425	0·39	0·21 to 0·56	92·82	71·99
Socioemotional development	48	7697	0·18	0·10 to 0·26	111·97	58·03
Attention	12	2179	0·34	0·15 to 0·52	34·84	68·43

Combined effect sizes in Hedges' g (with 95% CI) are presented across number of studies and number of participants, with tests for homogeneity (Q and I^2) for the associations between duration of institutionalisation and assessments in six developmental domains.

Table 4: **Associations of duration of institutionalisation with child development in physical, cognitive, and socioemotional domains**

Preinstitutional context

Given the reasons that children are placed in institutions, these children are highly likely to have been exposed to a range of risks before being institutionalised. This preinstitutional exposure to risks represents a substantial confounder in estimates of the effects of subsequent exposures. These preinstitutional risks include prenatal and postnatal exposures and events, although postnatal effects can be ruled out in many studies because children enter institutions soon after birth. Neurodevelopmental disorders and mental disorders (such as attention-deficit hyperactivity disorder and autism spectrum disorder) shown by children in institutions are also associated with prematurity and intrauterine exposure to alcohol, tobacco, and other toxins in children who are not institutionalised.[93,96] However, data on these factors are rarely available or controlled for in studies of the subsequent effects of institutional care on development.

Contextual variations within institutions

Of great clinical importance is whether associations between institutionalisation and outcomes vary as a function of the duration and timing of exposures and the quality of care. The potential for recovery might be constrained for exposures exceeding a specific duration or severity, or that occur during specific sensitive periods of development.

Duration and timing of institutional care

Many studies have reported a relationship between the duration of institutionalisation and both the severity of adverse outcomes and the scale of recovery observed after deinstitutionalisation. Our meta-analyses addressed the issue of the severity of adverse outcomes by examining the 89 studies that chart the longitudinal relationship between duration of children's stay in institutions and developmental outcomes. We found a dose–response association, with longer stays in the institution predicting larger developmental delays and deviations. Overall, the combined effect sizes for duration of institutional stay across all domains were moderately large, with substantial differences between domains. Physical growth showed

the most dramatic dose–response relationship: longer duration predicted more delayed growth (Hedges' g 0·95; 95% CI 0·53–1·36; figure 5).

The effect sizes for most other developmental domains were significant but smaller than for growth. These results converged with the BEIP effect sizes at age 42 months, comparing children who had remained in an institution with children who had been randomly assigned to foster care and thus spent less than 42 months in institutionalised care. At age 42 months, children in institutions showed delays in physical growth (Hedges' g 0·52; 95% CI 0·13 to 0·91) and cognitive development (0·62; 0·24 to 1·00), and an increase in atypical socioemotional development (0·46; 0·07 to 0·84; figure 5). Brain growth as assessed by head circumference (0·24; –0·29 to 0·52) and attention (0·18; –0·19 to 0·54; figure 5) were not different between children remaining in institutions and their peers who had transited into foster care. As the overlapping 95% CIs show, the BEIP effect sizes are in the same range as the meta-analytical effect sizes (table 4). The BEIP duration effects are almost certainly underestimations, because 42 months is being compared in a dichotomous way with 6–31 months of institutionalisation without differentiation between the exact number of months in the institution. The clearest example of the relationship between duration of deprivation and the scale of postinstitutional recovery comes from the English and Romanian Adoptees study. In this study, even after 20 years in adoptive homes, children who had extended institutional care showed significantly elevated prevalence of autism spectrum disorder, attention-deficit hyperactivity disorder, and disinhibited social engagement symptoms. Children exposed to shorter durations of institutional care were largely indistinguishable from the non-deprived adoptive control group. This difference between children exposed to extended or short periods of institutional care was already established by the age of 6 years.[97]

Data highlighting the importance of the duration of institutionalisation raise clinically important questions about the necessary and sufficient conditions under which the link between institutional exposure and negative outcomes is established. Whether there are sensitive or critical periods in development depends on the answers to these questions.[98,99] We use sensitive period to refer to a time in development when individuals are especially sensitive to adverse exposures in a way that increases the risk of negative outcomes. Such exposures might be necessary for an adverse outcome to occur, but they are not always sufficient (not everyone exposed is affected). The relationship between exposure and outcome is probabilistic in nature. By contrast, we define critical periods as being times during development when exposure to specific experiences (or an absence of experiences) leads to inevitable and permanent negative outcomes.[100,101] Such exposures might not be necessary for poor outcomes, but are sufficient (all children exposed will be affected), which has not been observed in the institutionalisation studies reviewed here.

Identifying the boundaries of critical or sensitive periods of human development with any precision is extremely challenging methodologically. Although animal models allow experience to be manipulated experimentally (eg, by depriving an animal of light or sound between particular ages), human studies rely on events creating natural experiments. The removal of children being neglected in institutions to foster or adoptive families is a situation that allows the isolation of early exposures from later circumstances. However, because in such situations children typically enter institutions very early in infancy, disentangling the specific effects of the timing of the institutional exposure (eg, from the first to the sixth month of life) from its duration (6 months long) is impossible.

Few studies ran the necessary analyses to test for non-linear relationships between duration and timing of institutional care and outcomes, so these relationships could not be addressed using meta-analysis. However, evidence from individual studies shows that exposures of a specific duration during infancy might be necessary (but not sufficient) for negative outcomes to occur, suggesting a sensitive period instead of a critical period. For instance, studies from Greek orphanages suggest that if children are placed in institutions after infancy, they avoid the most serious effects of institutional care.[102] In the English and Romanian Adoptee study, the children entered institutions in the first few weeks of life and remained there for up to 43 months before being adopted. Under these circumstances, children who spent only 12–24 months in the institutions were affected as severely as children who spent more than 24 months. However, children who spent only up to the first 6 months of life in even the most grossly depriving environments of the Romanian orphanages seemed to be largely unaffected.[103] Combined, these studies suggest that age 6–24 months constitutes an especially sensitive period for the effects of institutional care.

However, in the BEIP, several outcomes were significantly less affected—although not unaffected—in children who spent less than 24 months in institutions than in children who were institutionalised for more than 24 months. These outcomes included absence of stereotypes, expressive and receptive language, security of attachment, absence of indiscriminate social behaviour, and normalisation of electroencephalogram (EEG) in the α and θ frequencies.[78] Some of these outcomes in children who spent less than 24 months in institutions were not apparent at the first assessment after leaving the institution. Children might have a greater capacity for recovery if removed from institutional care in infancy.

Although the specific age at exposure to an institution and the duration of that exposure vary between studies, taken together, the results suggest that the earlier in

life children are removed from adverse caregiving environments, the more likely they are to recover and the fuller their recovery is likely to be.

Care quality

Institutional quality is affected by structural staffing differences and care practices. A meta-analysis of the effects of these factors was not possible because only a few studies provided relevant systematic measurement. However, a qualitative review supports an association between care quality or extent of deprivation and developmental outcomes. The effects of institutional care have been studied across a broad gradient of care quality. At one end of that gradient were the brutally depriving institutions in Romania during the Ceaușescu regime of the 1980s. These institutions housed many hundreds of children with inadequate staff-to-child ratios, very poor hygiene, inadequate food, and an absence of personalised care marked by little cognitive and social stimulation.[104] The English and Romanian Adoptee study found that this pattern of global deprivation was associated with the persistence of a broad range of neurodevelopmental problems through to early adulthood, more than 20 years after individuals were adopted into high-functioning families as young children.[97] In the postcommunist era in Romania, even in institutions in which basic care quality had improved, children showed a range of cognitive deficits and behavioural problems.[6] Negative developmental outcomes might be less common in children who had higher quality care. For instance, in institutions with smaller caregiver-to-child ratios, such as London's residential nurseries in the 1960s and 1970s,[105] or the Metera Babies Centre in Athens in the 2000s,[106] young children had IQs in the low-to-average range, although in both studies, the IQs of children in institutions were significantly lower than in children who had not been institutionalised.

The link between care quality and outcomes is shown by a quasi-experiment by the St Petersburg–USA Orphanage Research Team.[4] The intervention used in this experiment (without randomisation and thus with the risk of pre-existing differences influencing the outcomes) was to improve the quality of institutions to stabilise their structure (eg, by employing fewer and more consistent caregivers, integrating groups of fewer children, and having no periodic graduations of children to new groups) and to make the interactions between caregivers and children more engaged and responsive. The investigators directly compared outcomes of young children in three Russian baby homes in which these structural staffing changes and caregiver training were manipulated in a quasi-experimental design. The intervention showed that care that is more stable and supportive enhances children's physical, cognitive, and socioemotional development, both while the children are in institutional care and when they are adopted into families. Notably, although many of the children in these institutions were classified as disabled, the benefits associated with the intervention were also observed in children who did not have specific diagnoses. Strikingly, growth benefits were observed without any change in diet.

Variations of experiences within institutions might also be important. Both retrospective and prospective studies have indicated that being a favourite child or having a preferred attachment figure in an institution is associated with less indiscriminate social behaviour.[107] In Portugal, not having a preferred caregiver predicted indiscriminate social behaviour over and above prenatal and family risk conditions that preceded the child's institutionalisation.[108] Whether these preferences are due to some characteristic of the child (eg, physical attractiveness or easy temperament) or whether children benefit from caregiver interest and emotional investment that is unrelated to child characteristics is not clear.

Subnutrition (defined as a bodyweight of 1·5 SDs below the expected norm) in institutions has been studied indirectly by using weight at the time of removal from institutions as an index. For example, in the English and Romanian Adoptee study, even among infants with less than 6 months of exposure to deprivation, subnutrition was associated with head circumferences that were nearly 3 SDs below the mean at age 6 years. Infants with no subnutrition who left institutions before the age of 6 months showed no significant reduction in head growth. The same study showed that subnutrition contributed to worse or less optimal developmental outcomes independent of psychosocial deprivation.[109] Even when children are not underweight for their height at adoption, micronutrient deficiencies, most notably iron deficiency, predicts some of the effects of institutional care on attention problems and IQ.[110,111]

Postinstitutional influences

Parent and family resources

The degree and rate of recovery after deinstitutionalisation and the ultimate level of functioning that children have might be affected by characteristics of the receiving families. Families who adopt children from institutions through international adoption tend to have high socioeconomic status.[112] As in many aspects of child development, the education of the parents and the family income and access to resources might have an important role, with maternal education, family income, and the stability of the family structure predicting educational outcomes.[113] However, unrealistic expectations for achievement in families of high social status might undermine their adoptive children's self-confidence and negatively affect the mental health of these children.[114] The number of children from institutions placed in a single family might also affect outcomes after deinstitutionalisation, especially if the children show institutionally associated deficits, because their special needs can overwhelm the family's resources.[115]

Quality of postinstitutional care

The type of postinstitutional placement might also affect children's socioemotional and cognitive development. For example, in the BEIP, investigators compared one group of children living in BEIP-sponsored foster families who had benefited from specialised training and support with another group of children placed with government-sponsored foster parents who came forward as part of child protection reform efforts. After controlling for duration of time spent in foster care, children in the BEIP foster group at 54 months of age had fewer symptoms of attention-deficit hyperactivity disorder and, in girls only, fewer symptoms of internalising problems.[116]

Individual differences in parenting

Children adopted internationally often become an ethnic or racial minority in another culture with two parents from the majority racial and ethnic group. The key issue is how families can provide transracially adopted children with the skills to buffer themselves against discrimination.[117] Notably, self-esteem in adopted children does not seem to differ as a function of transracial adoption.[118] However, families differ in the extent to which they discuss the issue of race openly and affirmatively. Among adolescent adoptees, more positive engagement in the family and higher amounts of maternal control were associated with the family acknowledging the importance of racial and ethnic differences and constructing a multiracial or multiethnic family identity.[119]

Aspects of parenting quality also influence outcomes for deinstitutionalised children.[120] For example, parent structure and limit-setting predict self-regulatory competence, a domain of functioning that is often problematic for children who have previously been institutionalised.[121] In addition, the use of mental state language by parents predicts the development of emotional understanding in children who have been deinstitutionalised.[122] Furthermore, in these children parental sensitivity and responsiveness helps to normalise reactivity of the hypothalamic–pituitary–adrenocortical system.[123]

Child-related factors

Genetic factors

Several studies of candidate genes for specific disorders have shown that genetic variations might affect the susceptibility of a child to both negative effects of institutional care and positive responses to placement in a supportive family. For example, children living in institutions who have the short allele of the *5-HTT* gene (*SLC6A4*; index of a broader genetic pathway leading to susceptibility to the effects of environmental exposures) are more likely than children without this allele to show emotional problems generally,[124] and socially indiscriminate behaviour specifically.[125,126] Additionally, the risk for signs of attention-deficit hyperactivity disorder associated with early institutional deprivation has been shown to be moderated by the *DAT1* (*SLC6A3*) genotype.[127] Gene polymorphisms that confer a general susceptibility to environmental exposures might be related to both exacerbated negative effects of adversity and increased benefits of enrichment. *BDNF* Val66Met is one such genotype. In one study, children adopted earlier with at least one *BDNF* Val66Met allele had fewer attention problems than children with the same allele who were adopted later.[128] However, the small sample sizes, the absence of replication of these initial results, and the focus on single genetic markers to characterise biological pathways preclude strong conclusions at this stage.

Child characteristics

The developmental status of a child at the time of their placement in a family after institutional care might influence the recovery trajectory of that child. One prediction might be that the more ingrained the effects of deprivation are, the less amenable to recovery and the more persistent the problems might be. Few studies have tried to quantify the extent to which individual variations in characteristics at the time of placement in a family determine medium-term to long-term outcomes. A relationship has been found between physiological dysregulation linked to the effects of institutional care and functioning after removal from the institution. Hypocortisolism in the years following deinstitutionalisation was predicted by poorer social care in the institution and mediates attention and peer relationship problems years after placement in families.[129] Likewise, children aged 49–56 months who have been deinstitutionalised had greater left frontal EEG asymmetry than children who have never been institutionalised, and this asymmetry, as with hypocortisolism, partially mediated attention problems.[130] What is unclear, however, is whether these physiological systems have a mechanistic role in attention and behaviour problems or just reflect the degree of adversity children face before deinstitutionalisation, with the degree of adversity being the active factor influencing behavioural outcomes.

Conclusion

We found compelling evidence that institutional care is associated with negative developmental outcomes. The negative effects are greatest with regard to physical growth (including brain growth as indexed by head circumference) and cognition, and are strong in relation to attention problems (eg, attention-deficit hyperactivity disorder). Effects appear to vary as a function of the type of institutional care—ie, its duration and quality—with the suggestion that children aged 6–24 months are especially susceptible to the effects of institutional care. Although confounding risks and study artifacts cannot be definitively ruled out, the balance of probabilities favours a direct causal role for institutionalisation in the reported adverse outcomes, especially given the convergence

of results across observational, quasi-experimental, and experimental studies.

Evidence of catch-up or recovery following deinstitutionalisation has been shown, although many affected children do not show full catch-up, especially children with extended deprivation. For these individuals, even in supportive and well resourced foster care and adoptive homes, impairment can continue into adulthood.[97] Despite this, many children who have left institutions adapt reasonably well. Given the corroboration of observational results by data from the BEIP randomised controlled trial data, evidence for the causal benefits of deinstitutionalisation is quite strong.

Some limitations of this review of data and set of meta-analyses should be noted. First, precise demographic and epidemiological data on how many children are living in institutions globally, where the institutions are based, and what sorts of institutions children are housed in are scarce. Reliable information about the number of children leaving institutions and the nature of alternative care these children enter is rarely available. We had to work with estimates that represent the best evidence available, but systematic collection of more reliable data is urgently needed. Second, although we excluded specialised therapeutic and forensic settings from the meta-analyses to increase focus on more common institution types and child-rearing experiences, a wide range of studies with different designs and with methods of diverse quality were included. To compensate for the heterogeneity of effects that this range of studies typically generates, we used a random effects model and carefully examined various risks of bias, including publication bias. These risks of bias did not seem to substantially influence the results. Last, many correlational or quasi-experimental studies on institutionalisation and deinstitutionalisation had no evidence concerning pre-existing genetic or environmental risks or reasons for placement in institutions. Nevertheless, meta-analytical estimates converged with the findings of the only experimental trial in this field, the BEIP,[6] which controlled for potential differences between children in institutions using random assignment to foster care or prolonged institutionalisation. More experimental and quasi-experimental studies are needed that make creative use of alternative approaches, such as propensity score matching, instrumental variables, or Mendelian experiments, to broaden the evidence base.[131]

In general, we suggest that the evidence presented here underestimates rather than overestimates the effect of institutionalisation and deinstitutionalisation on children's development. This underestimation is due to two things: the intention-to-treat approach in the BEIP; and caregiver reports in correlational studies being based on standard instruments instead of carefully established clinical presentations, which might have shown even more serious psychiatric and physical health symptoms. In particular, the commonly used instruments might not capture some of the unique effects of institutional care, and typical outcomes such as quasi-autism and indiscriminate social behaviours are often not systematically assessed. The average effect of institutionalisation is an underestimation for some children and an overestimation for other children.[132] Not all children are affected to the same extent, and which individual factors make them more or less susceptible to the negative effect of institutional care needs further investigation.

Our findings provide the basis for the *Lancet* policy Commission, published in *The Lancet Child & Adolescent Health* by Philip Goldman and colleagues.[2] The policy Commission has two core propositions: that children's exposure to institutionalised living should be avoided completely if possible, or minimised if not, and that to achieve this first proposition, extended kinship families need to be supported where possible, and adoptive or stable foster-family care should be supported where necessary.[133] These propositions, together with alternative policy positions are explored and concrete policy recommendations are made for the reform of care in terms of global, national, and local organisation of services.

Contributors

All authors were fully involved in conceptualisation, designing, and writing of the paper. MHvI, MJB-K, GCMS, SR, and RD did the systematic review and meta-analysis, including the literature search, screening, coding, data analyses, and data interpretation. EJSS-B initiated the review and defined the initial conceptual framework and review structure and coordinated the writing. CAN provided data from the Bucharest Early Intervention Project for the meta-analyses. MHvI led the meta-analyses and wrote the first draft of the sections on the meta-analyses.

Declaration of interests

PSG works with Catholic Relief Services and UNICEF. All other authors declare no competing interests.

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