IQ of Children Growing Up in Children's Homes

A Meta-Analysis on IQ Delays in Orphanages

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In this meta-analysis of 75 studies on more than 3,888 children in 19 different countries, the intellectual development of children living in children's homes (orphanages) was compared with that of children living with their (foster) families. Children growing up in children's homes showed lower IQ's than did children growing up in a family (trimmed d = 0.74). The age at placement in the children's home, the age of the child at the time of assessment, and the developmental level of the country of residence were associated with the size of the delays. Children growing up in children's homes show a substantial lower level of IQ (average IQ of 84) than their peers reared in (foster) families (average IQ of 104), and the difference amounted to 20 IQ points. More research is needed to detect the causes of the large IQ delays and to test ways of improving the intellectual development of millions of children in orphanages around the world.

Intellectual development of children growing up in orphanages is thought to be at risk. Because of care in large groups and poor environments, brain development may become delayed during the formative period after birth

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The work on this series of meta-analyses was supported by grants from VSBfonds, Fonds Psychische Gezondheid, and Stichting Kinderpostzegels Nederland to Femmie Juffer and Marinus van IJzendoorn in cooperation with the Adoptie Driehoek Onderzoeks Centrum [Adoption Triad Research Center] (www.adoptionresearch.nl). Marinus van IJzendoorn is supported by the NWO/SPINOZA Prize of the Netherlands Organization for Scientific Research. Femmie Juffer is supported by Wereldkinderen.

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Merrill-Palmer Quarterly, July 2008, Vol. 54, No. 3, pp. 341–366. Copyright © 2008 by Wayne State University Press, Detroit, MI 48201.

(Chugani et al., 2001), and the lack of challenging stimuli and stable attachments may impair the intellectual development of institutionalized children (Gunnar, Bruce, & Grotevant, 2000; Johnson, 2000; Miller, 2005; Van IJzendoorn & Juffer, 2006).

More than 30 years ago, Dennis (1973) addressed the question of how large the cognitive delay of children in orphanages was compared to children adopted into families. He studied children who were abandoned immediately after birth and were reared in children's homes in Lebanon. Some of the children were adopted around their third birthday, and others remained in children's homes. Dennis found that at age 11, the average IQ of the adopted children was within the range of normally developing children, whereas the nonadopted orphans were diagnosed as mentally retarded. In a meta-analysis on six studies, including 253 participants, we found strong evidence for Dennis's finding, as the adopted children outperformed their siblings or peers left behind in terms of their performance on an IQ test with more than one standard deviation across studies (Van IJzendoorn & Juffer, 2005; Van IJzendoorn, Juffer, & Klein Poelhuis, 2005).

The intellectual development of institutionalized children has been studied for more than 60 years. Between 1930 and 1950 the first wave of studies documented that children in orphanages often showed a low IQ and severe language delays (Crissey, 1937; Durfee & Wolf, 1933). In later studies similar delays were observed in the intellectual as well as the socioemotional domains of development (Ainsworth, 1962; Bowlby, 1952; Ferguson, 1966; Freud & Burlingham, 1944; Provence & Lipton, 1962; Rheingold, 1956; Schaffer, 1965; Skeels, 1966; Spitz, 1945; Yarrow, 1961). Children's homes have been considered natural experiments into the necessary conditions for intellectual growth (Kaler & Freeman, 1994; MacLean, 2003; Sloutsky, 1997). Recent research keeps showing the continuing negative influence of residential care on children's development (Ahmad & Mohamad, 1996; Harden, 2002; Sloutsky, 1997; Sparling, Dragomir, Ramey, & Florescu, 2005; St. Petersburg-USA Orphanage Research Team, 2005; Vorria et al., 2003; Yagmurlu, Berument, & Celimli, 2005; Zeanah, Smyke, Koga, & Carlson, 2005).

It is because of the detrimental developmental effects that in many Western countries the number of orphanages has steadily decreased during the past half a century. In the past few decades many studies on orphanages have come from developing countries (Frank, Klass, Earls, & Eisenberg, 1996). Nevertheless, children's homes still exist in the United States of America (http://www.orphanage.org) as well as in Europe. Browne et al. (2005) asked health care officials in more than 30 European countries about the number of children under 3 years of age growing up in children's homes

in 2003. They found that throughout Europe 11.2 children per 10,000 resided in children's homes, with the Czech Republic having the largest number of young children in residential care, namely 60 per 10,000. In Africa the number of children's homes is currently increasing because of the many AIDS/HIV orphans who cannot be cared for anymore by members of the extended family (Kodero, 2001; Madhavan, 2004; Nyambedha, Wandibba, & Aagaard-Hansen, 2003).

When rearing children in orphanages remains or becomes necessary because alternatives are lacking, the crucial issue is which conditions might relieve or decrease the negative impact of institutional care. Depending on the type of explanation for the intellectual delays, one may have different ideas about more or less favorable conditions in children's homes. The maternal deprivation concept (Bowlby, 1951) states that a stable and continuous attachment relationship with a sensitive caregiver is essential for socioemotional as well as for intellectual development. If this is true, children's homes with more sensitive caregivers and smaller groups might be less damaging to intellectual development. The stimulus deprivation theory (Casler, 1961) suggests that the lack of physical and social stimuli of any kind may be the most important cause of intellectual delays, and enriching the orphanage environment would result in better intellectual development. Of course, these theories are not incompatible, and they both may point to important components of more favorable children's home environments.

The study on Metera children's home in Greece by Vorria and her colleagues (2003) showed the relevance of caregiver sensitivity for the children's development. It also showed the lower sensitivity of caregivers compared to parents and the discontinuity in care arrangements in a 24-hour residential care setting, sometimes with toddlers having experienced more than 50 different caregivers. In an earlier study in the same institution, Vorria et al. (1998a, 1998b) showed that siblings were able to derive comfort from each other's presence in the group. In a groundbreaking intervention study, Groark, Muhamedrahimov, Palmov, Nikiforova, and McCall (2005) demonstrated that promoting caregiver sensitivity leads to better socioemotional and cognitive development of the children involved and a better atmosphere in the groups consisting of children of differing ages. Caregiver-child ratio might also be important. Groark and colleagues (2005) managed to decrease the number of children per caregiver, which promoted children's development significantly.

Cognitive stimulation may be another important factor in children's homes. Morison, Chisholm, and Ames (1995) showed that with increasing amount of play materials, developmental delays decreased in children adopted from orphanages (see also Kaler & Freeman, 1994). Intervention

studies by Hakimi-Manesh, Mojdchi, and Tashakkori (1984) and Hunt, Mohandessi, Ghodssi, and Akiyama (1976) demonstrated the reversibility of intellectual delays when a more stimulating and enriched environment was offered. Similar findings emerged from correlational studies in well-equipped orphanages (Klackenberg, 1956; Tizard & Rees, 1974). Enhanced cognitive stimulation might have also been the working ingredient of the Groark et al. (2005) intervention, as their intervention changes pertained to almost all aspects of group life.

Age of the children and the duration of their stay in the orphanage may also play a role in the degree to which group care affects children's intellectual development. One would expect that younger entry into the orphanage (Sloutsky, 1997) and a longer stay (Sloutsky, 1997; Spitz, 1945) would be more detrimental, but the evidence is equivocal. For example, Vorria et al. (1998) and Kaler and Freeman (1994) did not find an association between age at entry and intellectual development. Aboud and colleagues (1991) reported even positive effects: younger children performed better on cognitive tests. With equivocal and sometimes contrasting findings, the field of research on the effects of orphanages on intellectual development is ripe for a quantitative review of the available evidence. In the current article we report on a series of meta-analyses of the extant empirical studies published during the past seven decades.

The following hypotheses were tested. First, we addressed the question of whether children reared in children's homes were delayed in their intellectual development compared to children growing up in families and how large this delay on average would be. Second, we examined some factors that may influence the delays. Besides some characteristics of the studies involved, such as year of publication, type of publication, kind of comparison group, and the type of cognitive test, we explored the influence of sample characteristics. We also tested whether gender plays a role in affecting the size of cognitive delays (Vorria et al. [1998] found that girls suffered less from their stay in a children's home) and whether the age of the children was important, not only at entry in the children's home but also at time of assessment. Our hypothesis was that earlier entry into group care would lead to larger delays later. Also, the future prospects of the children—whether they were to be adopted or not—might be relevant because the children to be adopted might be relatively less deprived to begin with (Van IJzendoorn & Juffer, 2005). Lastly, some characteristics of the children's homes were studied, in particular caregiver-child ratio and economic level of the country of residence, with the hypothesis that orphanages in richer countries and homes with more favorable caregiver-child ratio's may provide better cognitive stimulation and lead to less cognitive delay of the children in their care.

Method

Literature Search

Three different search methods were used for identifying literature for the meta-analytic review (Cooper & Hedges, 1994; Mullen, 1989). First, we searched for literature in the electronic databases PsycInfo, PubMed, Eric, Online Contents, and Social Science Citation Index. The keywords "institutionalization," "orphanage," "residential," "congregate," "group care," "deprivation," and "early experience" were used for searching these databases. Second, the references of the collected studies were searched for relevant studies. Third, orphanage and adoption researchers were contacted and asked to share pertinent studies.

Studies were included in the meta-analysis if they (a) concerned samples with children of 14 years of age or younger; (b) assessed IQ, using, for example, the Wechsler Intelligence Scale for Children (WISC) as in Dumaret (1985) or a test for developmental quotient (DQ) as used in Daunhauer (2005), but studies only assessing academic achievement, school competence, or learning problems were excluded; (c) used a noninstitutionalized comparison group of children reared in (foster) families or included measures with standardized scores (e.g., Skeels, 1966) to be compared with a norm group or reference group (e.g., when the WISC was reported an effect size was computed on the basis of a comparison with the reference group with a standardized IQ mean of 100 and an SD of 15); and (d) reported sufficient data to permit the calculation of an effect size. Cross-sectional, longitudinal, and experimental intervention studies were included. In case of intervention studies, only pretest or control group assessments were taken into account. For longitudinal studies we decided to use only the first assessment. Studies in languages other than English were included if they contained pertinent data (e.g., Spira et al., 2000). Studies published from 1940 to 2006 were included.

The selection procedure yielded 42 papers using IQ or DQ scores as an outcome. We calculated effect sizes separately for subsamples when data were presented separately for boys and girls or for different ages of the children at the time of placement in the institution or time of the assessments. These subsamples were considered as independent data points or studies in the meta-analysis. This is the reason why the number of publications (42) was smaller than the number of outcomes used in the meta-analyses (k = 75). However, every child was included only once in the pertinent meta-analyses. Table 1 provides an overview of the collected studies, and the moderators derived from each study.

Table 1. Studies Included in the Meta-Analysis

Study	Country of Study	Age at Assessment (Months)	Length of Stay at Orphanage (Months)	Sample Size		Comparison Group	Caregiver-to-Child Ratio	Type of Measurement	Outcome (d)
				Orphanage	Comparison				
Aboud et al. (1991)	Ethiopia	114.0	50.0	81	81	Family	1:8	Ravens Matrices	–0.06
Anaut et al. (1999)	France	126.0	69.6	38	42	Foster	Not reported	WISC	–0.22
Bjerring Hansen (1971)	Norway	6.0	Not reported	22	22	Family	<1:3	Hetzer-Bühler	0.18
Brossard & Decarie (1971)	Canada	2.5	Not reported	29	Norm	Norm	1:6	Griffiths	–0.40
Casler (1965)	USA	5.7	4.3	16	Norm	Norm	1:5	Gesell Schedules	–0.41
Daunhauer (2005)	Romania	1.0–46.0	Not reported	93	Norm	Norm	Not reported	Bayley Scales	2.79
Dennis & Najarian (1957)	Lebanon	3.0–12.0	Not reported	49	41	Family	1:10	Cattell test	2.73
Dennis (1973)	Lebanon	40.2	Not reported	67	Norm	Norm	Not reported	Cattell test	1.85
Dobrova (2006)	Ukraine	49.3	Not reported	18	19	Family	Not reported	SON	1.10
Dumaret (1985)	France	141.0	Not reported	20	22	Family	Not reported	WISC	1.47
DuPan & Roth (1955)	Switzerland	12.0	11.5	14	Norm	Norm	1:2.5	Gesell Schedules	0.31
Gardner & Swiger (1958)	USA	0.9	Not reported	37	47	Family	Not reported	Gesell Schedules	–2.80
Gavrin & Sacks (1963)	USA	49.0	Not reported	132	Norm	Norm	Not reported	Stanford-Binet	0.69
Goldfarb (1945)	USA	34.1	32.0	15	15	Foster	Not reported	Stanford-Binet/Cattell	1.35
Hakimi-Manesh (1984)	Iran	8.3	Not reported	28	Norm	Norm	1:10	Bayley Scales	2.67
Harden (2002)	USA	13.5	10.5	35	30	Family	1:2.6	Bayley Scales	0.37
Hunt et al. (1976)	Iran	23.0	Not reported	10	12	Family	1:10	Uzgiris-Hunt	0.42
Kaler & Freeman (1994)	Romania	35.2	26.3	25	6	Family	Not reported	Bayley Scales	1.54
Klackenberg (1956)	Sweden	11.3	7.8	90	21	Foster	1:2.5	Bühler-Hetzer	1.61
Kohen-Raz (1968)	Israel	8.9	Not reported	76	114	Family	Not reported	Bayley Scales	1.94
Levy (1947)	USA	<6.0	<6.0	83	39	Foster	1:8.5	Gesell/Kuhlmann Merrill-Palmer	0.44

Otieno et al. (1999)	Kenya	6.0	>0.5	73	146	Family	Not reported	Denver II test	0.54
Pringle & Bossio (1958)	England	132.7	Not reported	142	Norm	Norm	Not reported	WISC	0.81
Rheingold (1956)	USA	6.2	5.4	16	Norm	Norm	1:6.7	Cattell test	0.31
Roy et al. (2000)	England	80.4	>68.4	19	19	Foster	1:10.6	WISC	–0.19
Saltz (1973)	USA	42.0	12.0	13	Norm	Norm	Not reported	Stanford-Binet	0.59
Sayegh & Dennis (1965)	Lebanon	11.4	Not reported	13	Norm	Norm	Not reported	Cattell test	2.75
Schaffer (1965)	England	6.9	3.5	44	Norm	Norm	1:3.2	Cattell test	1.02
Skeels (1966)	USA	17.5	Not reported	25	Norm	Norm	1:7.4	Kuhlmann-Binet	0.93
Sloutsky (1997)	Russia	73.1	46.1	52	45	Family	1:8.8	WISC	1.94
Sparling (2005)	Romania	11.0	8.0	169	Norm	Norm	1:20	Denver II test	0.45
Spira et al. (2000)	Romania	20.0	16.0	54	Norm	Norm	1:6	Bayley Scales	3.59
Spitz (1945)	Western Hemisphere	9.0–12.0	Not reported	130	34	Family	1:4.5	Hetzer-Wolf	3.93
St. Petersburgteam (2005)	Russia	13.3	6.6	842	Norm	Norm	1:6	Battelle	1.10
Taneja et al. (2002)	India	6.0–30.0	Not reported	19	Norm	Norm	Not reported	Bayley Scales	2.34
Taneja et al. (2004)	India	6.0–36.0	Not reported	19	Norm	Norm	Not reported	Bayley Scales	2.55
Tizard & Joseph (1970)	England	24.0	>20.0	30	30	Family	1:3	Cattell test	1.25
Tizard et al. (1972)	England	40.8	>6.0	85	Norm	Norm	1:3	Minnesota	–0.94
Vorria et al. (2003)	Greece	13.1	Not reported	82	41	Family	1:5	Bayley Scales	0.95
Wolff et al. (1995)	Eritrea	68.4	32.4	74	74	Family	Not reported	Ravens Matrices	–0.54
Yagmurlu et al. (2005)	Turkey	67.7	24.0	34	76	Family	1:20	Ravens Matrices	–0.60
Zeanah (2005)	Romania	23.9	21.5	124	65	Family	1:12	Bayley Scales	2.36

Note. In studies without a comparison group, standardized scores were used.

Coding System

The coding system for design and sample characteristics is presented in Table 2 (a more detailed version can be requested from the authors). The study characteristics included type of publication outlet, year of publication, type of IQ test, and kind of comparison group. Most studies were published in refereed scientific journals, but the meta-analytic review also included unpublished reports, books, or book chapters. Therefore, we examined whether effects found in scientific journals differed from effects found in nonrefereed reports or books and book chapters. We also contrasted recent publications (1990 and later) with older publications (before 1990), and we compared studies using standardized IQ tests versus those that did not.

We coded for the kind of comparison group. We hypothesized that it would make a difference whether children growing up in children's homes were compared with (a) peers who were reared by their birth parents (e.g., Tizard & Joseph, 1970), (b) peers reared in foster families (e.g., Goldfarb, 1945), or (c) norms on standardized tests, for example, when institutionalized children were assessed with the WISC (as in Pringle & Bossio, 1958) and the standardized IQ mean of 100 (SD = 15) was used for comparison. We wished to examine whether different effect sizes for intellectual development of institutionalized children could be attributed to the different kinds of comparison groups.

We coded the age of the children when they entered the children's home, age at assessment, duration of their stay, gender, and whether the children were selected to be adopted. We examined meta-analytically whether early entry into the children's home (until 1 year of age) resulted in different effects compared to later entries. We also contrasted studies with assessment ages of younger and older than 4 years of age. Because several studies (Sloutsky, 1997; Spitz, 1945) documented the increasing negative effects on intellectual development with longer stays in orphanages, we included duration of stay in the children's home in our coding system. The category "adoption" was included because children in orphanages to be adopted may be a positive selection (regarding intellectual, motor, or social development) of the available children. Prospective adoptive status might thus be associated with smaller IQ delays.

Lastly, two characteristics of the orphanages were coded. First, we included the caregiver-child ratio in the groups in which the children were reared, with smaller ratios indicating potentially worse conditions for intellectual development (see, e.g., Dennis & Najarian, 1957; Klackenberg, 1956). Second, the living standard in the country of the children's home was determined through the Human Development Index (HDI), provided by the United Nations Development Programme (2005) for almost all

Table 2. Coding System for Studies Included in the Meta-Analysis

Variable	Coding System
Design	
Sample size	Sample size of orphanage children and nonorphanage children (comparison group) for which results are reported
Publication outlet	1 = journal article
	2 = book
	3 = dissertation
	4 = other
Comparison group	1 = family
	2 = foster
	3 = norm group
Year of publication	1 = 1930–1949
	2 = 1950–1969
	3 = 1970–1989
	4 = 1990–2006
Country	Country of origin of study, used to determine Human Development Index
IQ test	Type of IQ test used
Standardized IQ test	1 = standardized
	2 = not standardized
Sample	
Age at placement	Age at placement in orphanage (in months)
Age at study	Age at time of study (in months)
Length of stay	Length of time spent in orphanage (in months)
Child-caregiver ratio	Number of children to one caregiver
Adoption	1 = available for adoption
	2 = not available for adoption
Gender	1 = male
	2 = female
	3 = mixed
	4 = not reported

countries in the world. The HDI is computed on the basis of indicators for life expectancy, educational level, and national income. Countries like Eritrea and Kenya score low on the HDI, whereas most Western industrialized countries score high. Lower HDI might mean more impoverished conditions in the children's homes, and thus a less stimulating environment.

All studies were coded by two coders. Intercoder reliabilities ranged from .81 to 1.0 (kappas or intraclass correlations).

Meta-Analytic Procedures

For each study we calculated an effect size: the standardized difference between the means of two groups (Cohen's *d*). According to Cohen's (1988) criteria, *d*s up to 0.20 are considered small effects, *d*s of about 0.50 moderate effects, and *d*s of about 0.80 and higher can be seen as large effects. Effect sizes indicating delays in institutionalized children's development got a positive sign (as we expected that these children would be outperformed by their family-reared peers), whereas effect sizes indicating better intellectual development for residential children got a negative sign. When a paper reported more than one outcome for the same domain—for example, two IQ tests—we averaged these outcomes within the study in order to have one effect size per study (Cooper & Hedges, 1994; Mullen, 1989). Because the studies included in the meta-analysis reported various statistics, Mullen's (1989) Advanced Basic Meta-Analysis program was used to transform all results into a Cohen's *d*. Mullen (1989) and Mullen and Rosenthal (1985, chap. 6) provided the formulae for transformation of *t*, *r*, or *F* statistics into Cohen's *d*. Studies with null results got an estimated effect size of $d = .00, p = .50$.

The resulting study effect sizes were analyzed using Borenstein, Rothstein, and Cohen's (2005) Comprehensive Meta-Analysis (CMA) program, version 2.2.023. The CMA allows for computation of combined effect sizes using random effects models. Significance tests and moderator analysis in fixed models may be regarded as applying only to the specific set of studies at hand (Cooper & Hedges, 1994). In random effects models (Hedges & Olkin, 1985), generalization is to the population of studies from which the current set of studies was drawn (Rosenthal, 1995). Our goal was to make summary statements about likely differences between institutionalized and family-reared children's intellectual development even when the sources of discrepancies between study results were poorly understood (Raudenbush, 1994). No outlying effect sizes ($z < -3.26$ or $z > 3.26$) (Tabachnick & Fidell, 2001) were detected in the meta-analytic dataset after conversion into Fisher *Z* (Mullen, 1989).

The Q-statistics were computed to test the homogeneity of the specific set of effect sizes (Borenstein et al., 2005). We also computed 95% confidence intervals around the point estimate of each set of effect sizes. Depending on the homogeneity of the set, the confidence intervals were based on either fixed or random estimates. The Q-statistic was used to test

for moderator effects. In the current meta-analyses with almost no homogeneous (sub)sets of study outcomes, the random model test for between-studies differences was applied.

We used the "trim and fill" method (Duval & Tweedie, 2000a, 2000b) to calculate the effect of potential data censoring on the outcome of the meta-analyses. Using this method, a funnel plot is constructed of each study's effect size against the sample size or the standard error. These plots should be shaped like a funnel if no data censoring is present. However, since smaller or nonsignificant studies are less likely to be retrieved, studies in the bottom left-hand corner of the plot are often omitted (Sutton, Duval, Tweedie, Abrams, & Jones, 2000). In our case, the *k* rightmost studies considered to be symmetrically unmatched were trimmed. The trimmed studies can then be replaced and their missing counterparts imputed or "filled" as mirror images of the trimmed outcomes. This then allows for the computation of an adjusted overall point estimate and confidence interval (Gilbody, Song, Eastwood, & Sutton, 2000; Sutton et al., 2000).

From empirical studies (Lipsey & Wilson, 1993) it can be derived that published research reports on average larger effect sizes than unpublished research. Published papers are easier to retrieve than unpublished manuscripts. Because meta-analytic datasets are at risk to include relatively few unpublished papers, they might overestimate the combined effect sizes. This file-drawer problem can be addressed by estimating the fail-safe number (Mullen, 1989; Rosenthal, 1979). This number estimates the number of studies with nonsignificant findings needed to reduce the combined effect size to nonsignificance. Rosenthal (1979) proposed a lower limit for this fail-safe number, related to the number of studies included in the dataset at hand, $5k+10$ (Lipsey & Wilson, 2001; Mullen, 1989).

Results

IQ of Children Growing Up in Orphanages

The combined effect. We found 42 papers on 3,888 children in total (N = 2,902 children from orphanages) that compared the IQ (or comparable intellectual development test) of children in children's homes with that of family-reared children. From the 42 papers we derived 75 independent and nonoverlapping study outcomes. The combined effect size across the 75 study outcomes was $d = 1.10$, 95% CI = 0.84–1.36, $p < .01$. For most samples, absolute IQ/DQ averages were available. When we compared the absolute IQs and DQs of the two groups, the children reared in orphanages showed on average an IQ/DQ of 84.40 (SD = 16.79, N = 2,311, $k = 47$); the

average IQ/DQ of children raised in families was 104.20 (SD = 12.88, N = 456, k = 16). This difference of almost 20 IQ points was significant (t = 3.58, $p < .01$). Children growing up in children's homes showed a substantial delay in intellectual development, amounting to more than one standard deviation.

Publication biases. The fail-safe number was k = 9,023, which is the number of unpublished studies in the file drawers with null effects required to make the combined effect nonsignificant. This number was much larger than the minimum value for a robust finding, k = 385 in the case of a dataset of 75 study outcomes (Mullen, 1989; Rosenthal, 1979). In order to test whether a publication bias against small studies with small effects existed, we used the trim-and-fill method. In the meta-analysis on the 75 study outcomes, 14 outcomes had to be trimmed (Duval & Tweedie, 2000a, 2000b). Indeed, smaller studies with small or negative effect sizes were lacking, which may indicate a publication bias. The recomputed effect size for the trimmed and filled dataset amounted to $d = 0.74$, 95% CI = 0.48–1.01, $p < .01$.

Moderators Influencing the Effect Sizes

The Q test for homogeneity showed considerable heterogeneity among the 75 study outcomes ($Q = 752.48$, $p < .001$). We conducted moderator analyses with study characteristics, sample characteristics, and characteristics of the orphanages. The results for the moderator analyses are presented in Table 3. In this table, the overall tests for differences between all categories of a moderator (except "not reported") are presented, whereas in the text below specific contrasts will be described.

Study characteristics. The contrast for type of publication was nonsignificant ($Q[df = 1] = 0.17$, $p = .68$), and year of publication did not matter either: studies published before or after 1990 reported similar findings ($Q[df = 1] = 0.09$, $p = .77$). Contrasting various comparison groups we did not find significant differences in effect sizes. It did not make a difference whether children from orphanages were compared to children from families or with a norm (or reference) group ($Q[df = 1] = 0.73$, $p = .39$) or whether orphans were compared with children from biological families or from foster families ($Q[df = 1] = 1.74$, $p = .19$) or with children from a norm group or from foster families ($Q[df = 1] = 1.42$, $p = .23$). Lastly, results were not different between studies using standardized IQ tests or nonstandardized intelligence tests ($Q[df = 1] = 0.36$, $p = .55$).

Characteristics of the children. Gender did not appear to be a significant moderator (see Table 3); whether the studies included only males or only females did not yield different effect sizes ($Q[df = 1] = 0.07$, $p = .80$).

Also, the future status of the children was not relevant: whether or not they were going to be adopted did not affect the effect sizes for IQ ($Q[df = 1] = 0.14, p = .71$). Age of assessment was relevant, however; children assessed before their second birthday were more delayed than children who were assessed after their second year ([$d = 1.30$, $k = 51$, and $d = 0.73$, $k = 24$], $Q[df = 1] = 4.50$, $p = .03$). This difference remained significant when we used 4 years of age as a cutoff ($Q[df = 1] = 6.43$, $p = .01$). Children from orphanages assessed before 4 years of age performed less well compared with children assessed after their fourth birthday. Age at entry into the children's home was also a relevant moderator. Children placed into the orphanage before 12 months of age did less well than their peers reared in families, and this delay was significantly larger than with children who entered the orphanage after 12 months ([$d = 1.10$, $k = 24$, and $d = -0.01$, $k = 9$], $Q[df = 1] = 13.00$, $p = < .001$). In fact, only the youngest children showed IQ delays, but it should be noted that for many studies the information on age at entry was missing and that in this subset of studies with missing data a large effect size was found.

Lastly, we tested whether a longer stay in the orphanage would lead to larger intellectual delays. Contrary to the hypothesis, we did not find an overall significant effect (see Table 3). Specific contrasts were not significant either, such as between children staying less than 12 months in the children's home versus children who remained longer ([$d = 0.78$, $k = 20$, and $d = 0.85$, $k = 16$], $Q[df = 1] = 0.05$, $p = .83$). A cutoff at 24 months did not make a difference either ($Q[df = 1] = 0.30$, $p = .59$).

Characteristics of the children's homes. Differences in caregiver-child ratio between the orphanages were not significantly related to differences in effect sizes (see Table 3 for the overall test). Even the contrast between the most favorable caregiver-child ratio (maximum of 3 children per caregiver) versus the other orphanages did not lead to a significant difference ($Q[df = 1] = 2.62$, $p = .11$; $k = 39$).

Socioeconomic level of development of the country of origin made a difference. The HDI showed a significant overall contrast (see Table 3). More specifically, contrasting the countries with a high HDI versus countries with a lower HDI, we found that the test for a difference in combined effect sizes related to the studies conducted in those two sets of countries became significant as well ($Q[df = 1] = 5.08$, $p = .02$). Countries with a high HDI showed smaller delays in children's intellectual development ($d = 0.79$, $p < .001$; $k = 45$) than countries with a lower HDI ($d = 1.40$, $p < .001$; $k = 29$). It should be noted that the three lowest-scoring countries (Eritrea, Ethiopia, and Kenya) showed no discrepancy between family-reared and institutionalized children (see Table 3).

Table 3. Moderators of the Combined Effect Size in the Meta-Analysis

Study Characteristics	k	d	N	95% CI	Q	Between Q	p
Type of publication						0.17	.68
Journal	69	1.08***	3611	0.81~1.36	673.88***		
Other	6	1.28**	277	0.41~2.15	76.87***		
Year of publication						4.19	.24
1930–1949	3	1.86**	236	0.64~3.08	64.40***		
1950–1969	31	1.28***	864	0.85~1.71	262.76***		
1970–1989	15	0.65*	372	0.03~1.27	70.09***		
1990–2006	26	1.06***	2416	0.64~1.47	344.77***		
Adoption?						0.14	.71
Yes	32	0.79***	1232	0.40~1.18	278.66***		
No	10	0.65*	948	0.01~1.30	225.00***		
Not reported	33	1.55***	1708	1.17~1.94	170.06***		
Gender						2.73	.26
Males	13	1.49***	182	0.82~2.17	64.51***		
Females	4	1.59*	62	0.36~2.82	25.47***		
Both	34	0.83***	1986	0.45~1.20	499.00***		
Not reported	24	1.26***	1658	0.81~1.72	136.54***		
Comparison group						2.25	.33
Family	31	1.29***	1688	0.89~1.70	529.98***		
Foster family	8	0.67	446	−0.08~1.41	43.94***		
Normgroup	36	1.05***	1754	0.66~1.44	163.52***		
Standardized IQ test?						0.36	.55
Yes	64	1.13***	3464	0.85~1.41	663.32***		
No	11	0.90*	424	0.20~1.60	87.38***		
Caregiver-child-ratio						3.26	.20
1:1–1:3,0	9	0.48	370	−0.25~1.20	43.46***		
1:3,1–1:9	22	1.19***	1699	0.72~1.67	212.64***		
> 1:10	8	0.85*	447	0.07~1.64	114.85***		
Not reported	36	1.29***	1372	0.90~1.67	353.61***		

continued

Table 3. *Continued*

Study Characteristics	k	d	N	95% CI	Q	Between Q	p
Country of origin (HDI)						14.36***	.00
High HDI	26	1.58***	1801	1.19~1.97	223.80***		
Medium HDI	45	0.79***	1474	0.49~1.09	289.78***		
Low HDI	3	−0.02	529	−1.02~0.98	24.39***		
Not reported	1	3.93***	84	3.17~4.70	0		
Age at assessment						7.34	.12
0–1 year	36	1.22***	1455	0.83~1.61	349.14***		
1–2 year	15	1.47***	897	0.91~2.03	102.63***		
2–4 year	10	1.13**	373	0.43~1.83	69.32***		
4–10 year	10	0.38	810	−0.25~1.02	124.04***		
> 10 year	4	0.65	353	−0.43~0.88	6.93		
Age at entry						12.25**	.00
0–12 months	24	1.12***	1767	0.70~1.53	130.10***		
12–24 months	0	0	0	0	0		
24–48 months	6	−0.04	391	−0.85~0.78	89.74***		
> 48 months	3	0.05	242	−1.09~1.18	8.01*		
Not reported	42	1.38***	1488	1.03~1.74	395.07**		
Duration of stay						5.23	.16
0–12 months	20	0.79**	1130	0.29~1.29	80.04***		
12–24 months	7	1.05**	692	0.29~1.83	102.02***		
24–48 months	5	1.34**	328	0.36~2.31	91.33***		
> 48 months	4	−0.01	280	−1.05~1.03	8.06*		
Not reported	39	1.40***	1458	1.02~1.78	392.37***		

Note. CI = 95% Confidence interval; HDI = Human Development Index.

*$p < .05$, **$p < .01$, ***$p < .001$. For test of differences, the category "not reported" was not taken into account.

Discussion

Children growing up in orphanages showed a substantial delay in IQ compared with children reared in (foster or biological) families. Dependent on whether or not we take potential publication bias into account, the combined effect size in 75 studies on more than 3,800 children in 19 different countries ranged from more than one standard deviation (uncorrected *d*) to three-quarters of a standard deviation (corrected *d*). Both effect sizes are

large according to conventional criteria (Cohen, 1988). When we compared the absolute IQs and DQs in the two groups of children, we found a large difference of almost 20 IQ points. From the perspective of intellectual development, growing up in a family certainly should be preferred above living in an orphanage, which according to the Convention on the Rights of the Child (1989) should indeed be the last resort for a child in need of care and protection. It was exactly this position that Bowlby (1951) took in his report on childcare in Europe after World War II. It should be noted, however, that in the current meta-analysis we only included studies on IQ, which of course is only part of children's development. Other costs and benefits should not be overlooked in considering a child's well-being in the physical, socioemotional, and cognitive areas of development (van IJzendoorn & Juffer, 2006).

It was difficult to ascertain in the current set of meta-analyses what component of living in a children's home is responsible for the large intellectual delay. We did not find any explanation in terms of design issues or in terms of gender of the children or their potential adoptive status. To our surprise, the caregiver-child ratio was not associated with smaller or larger delays either, although the ratio's ranged from 1:1 to 1:20. It should be noted, however, that children with the most favorable caregiver-child ratio (maximally three children per caregiver) did not significantly lag behind their peers reared in families. This means that in residential care with small groups intellectual development of the pupils may not lag behind substantially.

This small-scale type of group care is, of course, costly and may be feasible only in developed countries. In less-developed countries the discrepancies between the IQ of residential and family-reared children was indeed largest. However, with one exception, the three African countries with the lowest HDI showed almost no difference between family-reared and orphanage-reared children. In the latter countries the IQ delays were negligible, perhaps because of the extreme poor living conditions for both categories of children (family-reared and orphanage-reared) in those African countries. Wolff (1995) even suggested that in Eritrea children living in orphanages were better off than children reared by their parents. Similarly, Kodero (2001) found that AIDS/HIV orphans in Kenya received better care in children's homes than in other forms of care, including care by the extended family.

Children who were younger at assessment and those who were younger at placement in the orphanage appeared to lag behind more than did their older peers. This may be due to the preplacement experiences with a more stimulating family life of those children who entered orphanages at a later stage. One or two years of family life in infancy may provide a (relatively) firm basis for further intellectual development, even when children have to

grow up in a poor environment of group care later on. But longer stay in the orphanage was not always most detrimental. In fact, in four studies including children (N = 280) who stayed for more than four years in children's homes, almost no delays in IQ were observed. An explanation may be that the children who had stayed for more than four years in an orphanage consisted of a group of stronger (and maybe more intelligent) children who had survived institutional care. Several authors (e.g., Dennis et al., 1957; Johnson, 2004; Miller, 2005, p. 27) documented that children suffer alarmingly high death rates in their first year of institutionalization and that for a long time high mortality rates in orphanages were not at all exceptional. Another explanation may be that older children in children's homes start attending play groups or school, which may boost their IQs (Aboud et al., 1991).

The current meta-analytic study shows some weaknesses that may limit the validity of its findings. The collected empirical studies appear to have produced rather heterogeneous effect sizes, and we were obliged to apply the more conservative approach of the random effects model that takes this heterogeneity into statistical account. We argue that this heterogeneity is not caused by the domain of study: we selected only research on intellectual development in the strict sense, as defined by the use of IQ tests such as Raven's Matrices (Raven, 1958) or similar instruments such as the Bayley Scales of Infant Development (Bayley, 1993). We also left out studies on other dimensions of cognitive development (language, school achievement, meta-cognition) because too few studies were done to include them in a meta-analysis. Research on children in orphanages is difficult to conduct, which is the reason why we found relatively many missing data (on age of entry, duration of stay, caregiver-child ratio) that limited the use of (multivariate) analyses.

Another limitation is the use of Western IQ tests in a non-Western setting in many of the studies included in the current meta-analyses. MacLean (2003) suggested that the measures developed in another culture might have a poor fit with the new populations in which they are used and might lead to underachievement in these groups. In some studies, however, adapted versions of cognitive tests were used without yielding outlying effect sizes (e.g., Sloutsky, 1997; Taneja, 2002, 2004). The comparison of the institutionalized children's IQ score with the average score (100) of a population (the standard scores approach) in those cases where a comparison group was missing might work in an opposite direction. Flynn (1987) noted that older intelligence tests might give inflated profiles of one's intelligence as the average IQ level of a younger cohort becomes substantially higher than 100. Because of the Flynn effect (Flynn, 1987), therefore, the estimated average IQ of 100 in our meta-analysis might be underestimating

the average IQ level of Western populations who during the past five decades have shown remarkable increases in mean IQ scores (Flynn, 1987). Thus, comparing the institutionalized children's IQ with an average IQ of a measure that has not been updated during the last 10 or even 20 years may underestimate their intellectual delays (O'Connor et al., 2000). However, we did not find differences in effect sizes between studies with a built-in comparison group and those without such a comparison.

A last limitation is the correlational nature of the primary studies as well as the current meta-analysis that precludes causal inferences. We are inclined to attribute the IQ delays between children in orphanages and children reared at home to the detrimental effects of the institutional group care setting. However, we cannot exclude the alternative hypothesis that children with lower IQ scores might be sent to orphanages more often as they may require more resources and special care than is available in their extended family. The absence of an effect for length of stay in the children's home on IQ delays might be interpreted as an argument against the detrimental (dose-response) effects of orphanages.

Other data, however, make this alternative interpretation implausible. In a previous meta-analysis, we found a comparable difference of about one standard deviation between adopted children's IQ and that of their peers left behind in institutions (Van IJzendoorn et al., 2005; Van IJzendoorn & Juffer, 2005), converging with the findings from the current meta-analysis. Adoption may recover the IQ delays and increase the IQ of children who lived in institutions before being adopted. In the same vein, Zeanah and his colleagues (2003) found in a randomized intervention study that foster care increases developmental prospects of children from institutional care substantially. Most importantly, environmental interventions within children's homes (e.g., Hakimi-Manesh et al., 1984; Groark et al., 2005; Spira et al., 2000) have shown large positive effects on children's IQ as well, thus indicating that regular orphanages provide suboptimal care. But more randomized intervention experiments focusing on the quality of care provided within the institution are needed to generalize these promising findings to all sorts of institutional care.

Conclusions

The United Nations Convention on the Rights of the Child affirms that each child is entitled to be reared in a family context. However, if a child is temporarily or permanently deprived of his or her family environment, "the States Parties shall in accordance with their national laws ensure alternative care for such a child. Such care could include, inter alia, foster placement,

kafalah of Islamic law, adoption or if necessary placement in suitable institutions for the care of children" (United Nations, 1989). From this convention it is clear that institutional care in orphanages or children's homes should be considered the last resort, only to be brought to bear if no other solution can be found.

Against the background of our meta-analytic study this guideline based on children's rights seems evidence-based. Children growing up in orphanages show substantial intellectual delays amounting to about 20 IQ points, which in the lower IQ ranges might mean the difference between normal and retarded intellectual development (cf. Dennis, 1973). Adoption should be considered a viable alternative, as previous meta-analyses documented its beneficial effects on children's cognition and their development in a broader sense (Juffer & Van IJzendoorn, 2005, 2007; Van IJzendoorn & Juffer, 2006). Although the negative effects on intellectual development are not uniform across studies, in the current meta-analysis it proved to be difficult to find protective or risk factors within the context of group care that affect the degree to which children lag behind their peers reared in families. More research is needed to detect the causes of the large IQ delays. We only found some evidence for the benefits of children's homes in societies with an extremely low HDI. In poor countries, orphanages may provide care and cognitive stimulation equal to what (extended) families without resources are able to offer. If orphanages are here to stay as a last resort for children (temporarily) deprived of a family, there is an urgent need to improve the institutional environment in order to foster the (intellectual) development of millions of children in orphanages around the world.

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