Attachment in institutionalized children: A review and meta-analytic study

Abstract

In this review and meta-analysis of data from 10 attachment studies involving 399 children in institutional settings, we computed the overall attachment distribution of secure, insecure and disorganized rates and explored on these the effect of a set of moderating variables i.e., country of institutionalization, attachment assessment procedure, age at entry and age at assessment. In order to overcome the bias due to the small number of studies, we conducted both classical and Bayesian meta-analysis, obtaining comparable results. Children's attachment distribution was: 18% secure, 28% insecure and 54% disorganized/cannot classify. Compared to their family-reared peers, children living in institution were found to be at greater risk for insecure and disorganized attachment, with a similar, medium effect size for both distributions (respectively $d = 0.77$ and $d = 0.76$). The following moderating variables were associated with insecure attachment: representational assessment procedures ($d = 0.63$) and Eastern European countries of origin ($d = 1.13$). Moderators for disorganized attachment were: Eastern European countries of origin ($d = 1.12$), age at institution entry before the first birthday ($d = 0.93$) and age at assessment under three years of age ($d = 0.91$). Implications for child development and policies are discussed.

Keywords: Attachment, institution, meta-analysis, Bayesian approach

INTRODUCTION

Infants and children reared in institutions are at greater risk of growth impairment and negative cognitive and social-emotional outcomes (Juffer et al., 2011). Some known risk factors are the unfavourable caregiver-to-child ratios, impoverished environments, the frequent turnover of professional caregivers and their lack of training on how to promote the development of children experiencing stressful and helplessness feelings (Carlson, Hostinar, Mliner, & Gunnar, 2014; Soares et al., 2014; Barone, Dellagiulia, & Lionetti, 2014). Institutionalized children are also at increased risk of child sexual abuse if compared to the general population and to children in foster care (Euser, Alink, Tharner, van IJzendoorn, & Bakermans-Kranenburg, 2013).

The United Nations Convention on the Rights of the Child firstly stressed the need in 1989 to guarantee special protection by providing alternative family placements when life with its biological parents is incompatible with a child's safety (Unicef, 1989). In a randomized study (Nelson et al., 2007), it was subsequently confirmed that placement in alternative family settings such as foster care is better for adequate child development than placement in orphanages and institutional settings. Nowadays, even if most countries recognize that being placed in an institution is not the best practice for the child's wellbeing, institutionalization continues to be an option (Engle et al., 2011) and child neglect in general remains a global phenomenon of considerable extent (Stoltenborgh, Bakermans-Kranenburg, Alink, & van IJzendoorn, 2014).

According to the Society for Research in Child Development, studies demonstrating the negative effects of institutionalization have been and will be critical to changing policies and promoting alternative care conditions (Engle et al., 2011; Groza, Bunkers, & Gamer, 2011), thus enabling fulfilment of the rights of children to be protected by neglectful contexts(Stoltenborgh, Bakermans-Kranenburg, & van IJzendoorn, 2013), and to be reared in adequate environments.

Recently, a team of renowned experts on child development in conjunction with the American Orthopsychiatry Association published a consensus statement on group care contexts affirming the right of children to grow up in a family setting (Dozier et al., 2014). What is stressed is that children lacking sensitive primary parental care and experience of the sensitive exercise of adult authority are exposed to a higher risk of negative outcomes, even later in life when undergoing normal but critical developmental phases, like adolescence.

The contribution of attachment theory

Attachment theory (Bowlby, 1969) provides a relevant framework within to analyse developmental outcomes related to institutionalization because it emphasizes the important role of the early dyadic parent-child relationship for children's wellbeing. It has also given rise to the development of reliable procedures that allow the assessment of attachment relationships in both at risk and normative contexts (Cassidy & Shaver, 2008).

The absence of a primary and stable caregiving figure, also known as maternal deprivation or structural neglect because related to the structure of the institution itself (Bowlby, 1951), is the main shared feature of children living in institution. Although life in institution is not incompatible with the formation of an attachment bond (Carlson et al., 2014), attachment is significantly compromised by the frequent turnover of professional caregivers, who in any case often lack training on how to sustain children's development in these challenging conditions (Zeanah, Smyke, Koga, & Carlson, 2005; Barone, Dellagiulia, & Lionetti, 2014).

According to attachment theory, child tends to seek physical and emotional care when distressed, tired or fearful, from a specific caregiving figure, parent or parent substitute (Bowlby, 1951). Depending on the degree of sensitivity of the caregiver's response to the child's needs and signals (Ainsworth, Blehar, Waters, & Wall, 1978; Grossmann, Bretherton, Waters, & Grossmann, 2013), the child develops different mental representations of the dyadic relationship. Secure children experience constant availability and comfort from caregivers whereas insecure children have caregivers who discourage proximity and give rejecting and/or inconsistent and ambivalent responses, leading respectively to an insecure-avoidant or to an insecure-ambivalent attachment pattern. Finally, an additional category, disorganized attachment, may be applied when infants seek comfort from a caregiver who is her/himself the source of threat: the caregiver is frightening or frightened and only partially available, making it difficult for the infant to form a coherent set of expectations (Main, 1991). When no specific attachment pattern is identifiable because no clear configuration of attachment behaviour emerges, cannot classify category is applied. This latter has mainly been reported in institutionalized children and children reared in high-risk environments (Zeanah et al., 2005; Barone & Lionetti, 2012; Stoltenborgh et al., 2013; Carlson et al., 2014).

Recent meta-analytical data on children in adoptive and foster-care families, most of whom had experienced life in institution, have shown that there is some recovery of attachment in children who have been placed in family context, with age at adoption after the first birthday and institutionalization in an East Europe country associated with higher insecure and disorga-

nized attachment rates (van den Dries, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2009). Meta-analytic data on the distribution of attachment patterns in still institutionalized children for comparison with normative and adoptive populations are not available yet. Furthermore, no meta-analyses have been conducted on the effect of moderating variables on attachment in institutionalized children.

In view of this our aim was to synthesize data reported in the literature on attachment patterns as well as that for attachment moderating variables in institutionalized children. We presented a brief descriptive and updated overview - inspired by the work of Bakermans-Kranenburg et al., 2011 - of studies assessing attachment in children during their stay in institution and reported attachment distribution using the categorical approach (i.e., secure, insecure avoidant/ambivalent, disorganized). In the meta-analytic analysis, we estimated the overall attachment distribution for the secure, insecure and disorganized classifications; we computed the effect size for the influence of institutionalization vs. family context on attachment distribution; and we tested whether the selected moderators - country of institutionalization, attachment assessment procedure, age at entry into the institution and age at assessment - play a role in attachment patterns in currently institutionalized children.The Bayesian approach was used in addition to the classical meta-analytic approach in order to verify results in view of the relative scarcity of data available.

METHOD

The current study was conducted in accordance to the PRISMA guidelines for systematic reviews and meta-analyses (Moher, Liberati, Tetzlaff, & Altman, 2009).

Literature search

We searched for relevant literature in the following electronic sources: PsychInfo, ERIC, Scopus, Web of Science and PUBMED. In the database search we used the keywords institution* or residential* (the asterisk indicates that the search contained but was not limited to that word) in combination with the term attachment. Once all the published papers corresponding to these key words had been collected, we searched the reference lists to check for possible missing studies and/or unpublished manuscripts. Studies were included if (1) they reported the attachment pattern of institutionalized children using categorical data distribution; (2) either observational assessment procedures or story stem techniques had been used; (3) attachment towards a profes-

sional caregiver had been assessed during their stay in an institution; (4) children were not involved in an experimental intervention program to promote attachment relationships. For this reason, the two groups of institutionalized children belonging to the intervention condition reported in the papers of The St. Petersburg-USA Orphanage Research Team, 2008 and of Archer, 2012, were omitted. As two papers (see Bakermans-Kranenburg, Dobrova-Krol, & van IJzendoorn, 2012; Dobrova-Krol, Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2010) were partially based on the same group of children, the one with the most detailed information about the attachment distribution and sample features was included (Dobrova-Krol et al., 2010).

The search yielded ten studies reported in nine papers. Seven studies used the (adapted) Strange Situation Procedure (SSP) (Ainsworth et al., 1978), a well known observational measure; and three used story stem techniques: the Manchester Child Attachment Story Task (MCAST), (Green, Stanley, Smith, & Goldwyn, 2000) and the (adapted) Attachment Story Completion Task (ASCT) (Bretherton, Ridgeway, & Cassidy, 1990), see Table 1.

Given that not all studies differentiate among insecure attachment subcategories (Torres, Maia, Veríssimo, Fernandes, & Silva, 2012), the insecure-ambivalent (C) and insecure-avoidant (A) patterns were collapsed into a more general insecure category (A/C). Similarly, as both the disorganized and the cannot/classify pattern are considered at risk for the quality of subsequent development and have potentially common developmental pathways, following the convention in the field (Zeanah et al., 2005), the two categories were collapsed into a single disorganized pattern (D/CC).

To the study included in Bakermans-Kranenburg et al.'s review (2011) on attachment in children in institution, which inspired our paper, we have added the studies of Katsurada (2007), Torres and colleagues (Torres et al., 2012) and Barone and colleagues (Barone, Dellagiulia, & Lionetti, 2014).

Narrative review

Papers identified as eligible are reported in Table 1. The moderating variables, also shown, were selected for the reasons given below, and because they were all reported in all studies but one (Herreros, 2009; age at entry). Given the relative small number of studies, it would not have been possible to statistically test them otherwise.

The first moderator listed is country of origin as Eastern European country was found to significantly decrease the chances of secure attachment in a meta-analysis on adoptees and post-

Table 1: Studies features. The first line of each study referes to institutionalized children, the second lines to the control group. Country, method of assessment (Instrument), age at entry into institution (Age at entry), age range at assesment in months (Age), group size (n), secure (B), insecure (A/C) and disorganized/cannot classify (D/CC) attachment percentages are reported. The asterisk (*) indicates that the control group attachment distribution was derived by normative and multi-centre studies (van IJzendoorn et al., 1999; Barone et al., 2009), and n was set equal to that of the institutionalized group.

Study	Country	Instrument	Age at entry	Age	n	B(%)	A/C(%)	D/CC(%)
Vorria et al., 2003	Greece	SSP	before 1st y	11-17	86	22	9	69
				11-17	41	32	27	41
Zeanah et al., 2005	Bucharest	SSP	before 1st y	12-31	95	19	3	78
				12-31	50	74	4	22
Katsurada, 2007	Japan	ASCT	after 1st y	48-72	16	0	50	50
				48-72	16	31	38	31
St. Petersburgh Team, 2008	Petersburg	SSP	before 1st y	11-18	64	0	14	86
				12-18	64*	62	23	15
Herreros, 2009	Chile	SSP	n.a.	10-47	41	51	17	32
				12-18	41*	62	23	15
Dobrova-Krol et al., 2010, HIV	Ukraine	SSP	before 1st y	36-72	13	31	23	47
				36-72	16	44	19	38
Dobrova-Krol et al., 2010	Ukraine	SSP	before 1st y	36-72	16	25	31	44
				36-72	19	58	27	16
Archer at al., 2011	China	SSP	before 1st y	12-37	10	10	20	70
				12-37	61	57	30	13
Torress et al., 2012	Portugal	ASCT	after 1st y	48-96	19	5	79	16
				61-88	72	73	24	3
Barone et al., 2014	Ukraine	MCAST	after 1st y	55-92	39	18	31	51
				54-92	39*	63	26	11

institutionalized children (i.e. van den Dries et al., 2009). The second is the type of instrument used for investigating attachment, i.e., based on observational assessment procedures vs. story stem techniques. The third is age at institution entry (before or after the first birthday) and the fourth is age at assessment (infants aged one to three years old vs. children three to eight). These latter were included in view of the current debate about the extent to which degree of environmental influences depends on period of life (Sheridan & Nelson, 2009).

We analyzed data on a total of 399 institutionalized children from Chile, China, Greece, Japan, Portugal, Romania, Ukraine, with around half of the studies carried out in the latter two Eastern European countries. In all studies, attachment was investigated toward the favorite (as determined by the consensus of the staff) professional caregiver.

All papers included in the meta-analysis reported a statistically significant difference between institutionally-reared children and the control group (or normative data). Nevertheless, the prevalence of the disorganized attachment category ranges widely, from 79% reported by Zeanah et al. (2005) to 16% reported by Torres and colleagues (2012). The same applies to secure vs. insecure categories, with prevalence of the secure category varying from 0 reported by Katsurada (2007) to 51% reported by Herreros (2009).

Few of the variables analyzed in the literature have been reported to increase the risk for insecure and disorganized rates in institution. Vorria and colleagues (2003) found that attachment was not predicted by birth weight, premature birth, health status, gender, ethnicity, tempera-

ment, cognitive abilities or professional caregiver's sensitivity; Zeanah et al. (2005) reported no influence for cognitive development and the only significant variable was the observed quality of the caregiving environment. In the Dobrova-Krol and the Leiden research group's (Dobrova-Krol et al., 2010) study comparing family and institutionally reared HIV and non-HIV children, institutional care but not the presence of the immunodeficiency virus was reported to be associated with higher levels of attachment insecurity and disorganization, suggesting that the structural neglect in childcare institutions may be more damaging for attachment formation than living with HIV in potentially at risk families. Torres et al. (2012) obtained similar results, reporting that being reared in institution is a risk factor for insecure and disorganized attachment, whereas the family's educational level did not affect attachment. This was true even when differences in verbal skills (the attachment task used in the study involved the use of language) were controlled for. Barone and colleagues recently published a study assessing attachment representations in one of the oldest groups of institutionally reared children (Barone, Dellagiulia, & Lionetti, 2014) so far. Interestingly, attachment distribution was independent of length of institutionalization. Given that all but six children were admitted to institution after their first birthday, this suggests that when neglect exceeds a specific window of time in development (as the first year of life) duration is less relevant.

Last but not least, we included two unpublished Ph.D. studies from Chile and China (Herreros, 2009, 2013; Archer, 2012), and one of the broadest study investigating attachment and social-emotional adaptation in orphanage children in Petersburgh (The St. Petersburg-USA Orphanage Research Team, 2008). In the Petersburg study, the authors compared attachment in different groups of children: in group one professional caregivers were trained for sensitivity and the caregiver to child ratio was reduced; in group two caregivers received training only and in group three (the one included in the current meta-analysis) no improvement was made to the rearing environment. As expected, infants reared in the first experimental condition were those who benefited the most, showing the best social-emotional adjustment. This once points to the fact that promoting caregiving skills might be protective even in such contexts.

Effect size computation and analytic plan

All studies reviewed but two compared their data with those for a control group of family-reared children. For the two that did not (The St. Petersburg-USA Orphanage Research Team, 2008; Barone, Dellagiulia, & Lionetti, 2014), we obtained normative data from multicenter or meta-

Table 2: Chi square, Cohen's d effect size (d) and variance for the between group comparison

		B vs. A/C and D/CC			D/CC vs. A/C and B		
Study	N	χ^2	d	var	χ^2	d	var
Vorria et al., 2003	127	0.90	0.17	0.03	7.42	0.50	0.03
Zeanah et al., 2005	145	39.86	1.23	0.04	39.92	1.23	0.04
Katsurada, 2007	32	3.79	0.72	0.15	0.52	0.25	0.13
St. Petersburgh Team, 2008	128	54.64	1.72	0.05	61.57	1.92	0.06
Herreros, 2009	82	0.58	0.17	0.05	2.33	0.34	0.05
Dobrova-Krol et al., 2010, HIV	29	0.11	0.12	0.14	0.01	0.03	0.14
Dobrova-Krol et al., 2010	35	2.61	0.56	0.13	2.10	0.50	0.13
Archer at al., 2011	71	5.94	0.60	0.06	13.45	0.96	0.07
Torress et al., 2012	91	26.34	1.27	0.06	2.72	0.35	0.05
Barone et al., 2014	78	14.64	0.96	0.06	13.04	0.89	0.06

analytic attachment studies according to the assessment procedure used, i.e., observational (van IJzendoorn, 1995; van IJzendoorn et al., 1999), vs. representational (Barone et al., 2009). In order to avoid inflating statistical analyses with too big sample size, the number of children in each attachment category in the new normative comparison group was computed to maintain the same distribution, but with a total group size equal to that of the institutionalized group.

For each study, we calculated the chi-square statistic for secure (B) vs. non-secure and disorganized (A/C and D/CC) and then for organized (B and A/C) vs. disorganized (D/CC). This yielded what we call from now on the insecure and disorganized attachment distribution.

Next, we transformed the chi-square statistic into Cohen's d using the formula $d = \frac{2|r|}{\sqrt{(1-r^2)}}$ where $r = \sqrt{\frac{\chi^2}{n}}$. According to Cohen's criteria, values of 0.20, 0.50, and 0.80 represent small, moderate, and large effect sizes, respectively (Cohen, 1988). In Table 2 chi-square and Cohen's d values for the insecure and disorganized attachment distribution for each study are reported.

In estimating the overall Cohen's d and in testing the moderators, we relied on a fixed-effect model because of the relative small number of studies.

The statistical software R (R Core Team, 2013) was used and two data analysis frameworks adopted: the classical one, using the `metafor` package (Viechtbauer, 2010), and the Bayesian approach using the `rjags` package (Plummer, 2014).

In the classical framework, we evaluated the effect of non-significant unpublished findings using the Duval and Tweedie's 'trim and fill' method (Duval & Tweedie, 2000a, 2000b; Duval, 2005). The fail-safe number approach (Mullen, 1989) was used to estimate the minimum number of unpublished studies that would be needed to overturn conclusion reached in the meta-analysis. To analyze whether the overall effect size changes significantly when the combined effect sizes are calculated after the successive removal of one effect size at a time, we used the jackknife method

(Tukey, 1958).

In the Bayesian framework, we adopted a skeptical prior (Spiegelhalter, 2004; Spiegelhalter, Abrams, & Myles, 2004). Beysian parameters and Highest Density Interval (HDI; Kruschke, 2013), as 95% credible interval, were derived by our estimated posterior distribution. The `JAGS` scripts (Plummer, 2003) for the considered models are reported in the appendix. Assuming a skeptical prior reduces the chances of identifying a spurious effect (Wagenmakers, Wetzels, Borsboom, & Van Der Maas, 2011); this means that the Bayesian approach with a skeptical prior is more conclusive in refuting an association and, conversely, gives more certainty when an effect is detected.

RESULTS

Attachment distribution

Overall attachment distribution for the 399 institutionalized children involved in the studies was as follows: around 18% secure (B), 28% insecure (A/C) and 54% disorganized/cannot classify (D/CC). The attachment distribution for the overall control group of family-reared children was comparable to that reported for the low-risk normative population in previous meta-analytic studies (van IJzendoorn, 1995; van IJzendoorn et al., 1999) and it was: around 56% secure (B), 24% insecure (A and C) and 21% disorganized/cannot classify (D and CC). Figure 1 shows total overall attachment distributions (attachment distribution for each study is reported in Table 1).

Are institutionalized children more insecure than their peers?

A medium positive effect size for the insecure attachment distribution (i.e., B vs. A/C and D/CC) was found $d = 0.77$ (95% CI = 0.62-0.92).

The 'trim and fill' results, reported in the funnel plot in (Figure 2A), show that publication bias was actually trivial. The fail-safe number (representing number of studies that have to be added to reduce the significance of meta-analysis) was very high $k = 343$. Using the jackknife procedure we obtained the same estimate of the overall effect size, i.e., $d_J = 0.77$ (95% CI = 0.67-0.85).

In the Bayesian framework, we adopted a skeptical prior setting the true fixed effect distribution as follows: $\theta \sim \mathcal{N}(0, \sigma^2)$ setting $\sigma^2 = 1/10$, in which 10 refers to the prior precision parameter. In Figure 2B are depicted the prior (gray dotted line) and the posterior effect size distributions

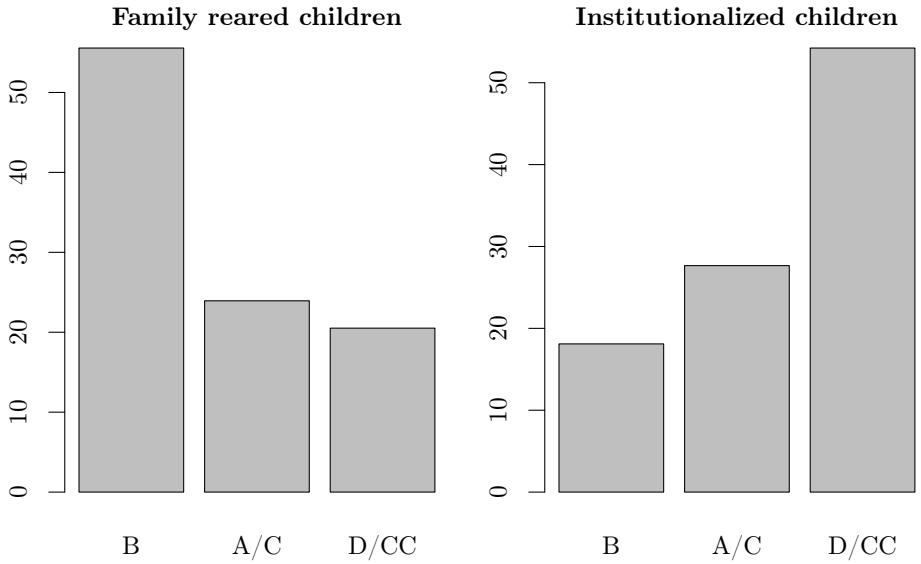

Figure 1: Attachment patterns distribution in percentage

based on 10000 MCMC iterations. The estimated effect size was $d_B = 0.73$ (HDI = 0.58-0.87). Institutionalized children thus appear to be more insecure than their peers, with comparable results obtained in both statistical approach employed: the classical meta-analytic and the Bayesian.

Are institutionalized children more disorganized than their peers?

Next, we investigated the effect size for the disorganized distribution compared to the organized (i.e., D/CC vs. B and A/CC). A medium effect size of $d = 0.76$ (95% CI = 0.61-0.91) was found by the classical meta-analytic approach. The funnel plot (figure 3A) shows an estimated number of 2 missing studies on the right side. Nevertheless, the fail-safe number was again high, i.e. $k = 310$. The effect size and CIs estimated by the jackknife procedure were slightly lower: i.e., $d_J = 0.72$ (95% CI = 0.61-0.78).

Results derived from the Bayesian approach, with a skeptical prior equal to that adopted for the distribution of the insecure category, yielded similar results. In Figure 3B are represented effect size posterior distributions based on 10000 MCMC iterations. The estimated effect size was $d_B = 0.72$ (HDI = 0.57-0.87); thus only slightly lower than that obtained within the classial approach. The evidence in favor of a higher prevalence of disorganized attachment in institutionalized children compared with their normative peers was, again, quite convincing.

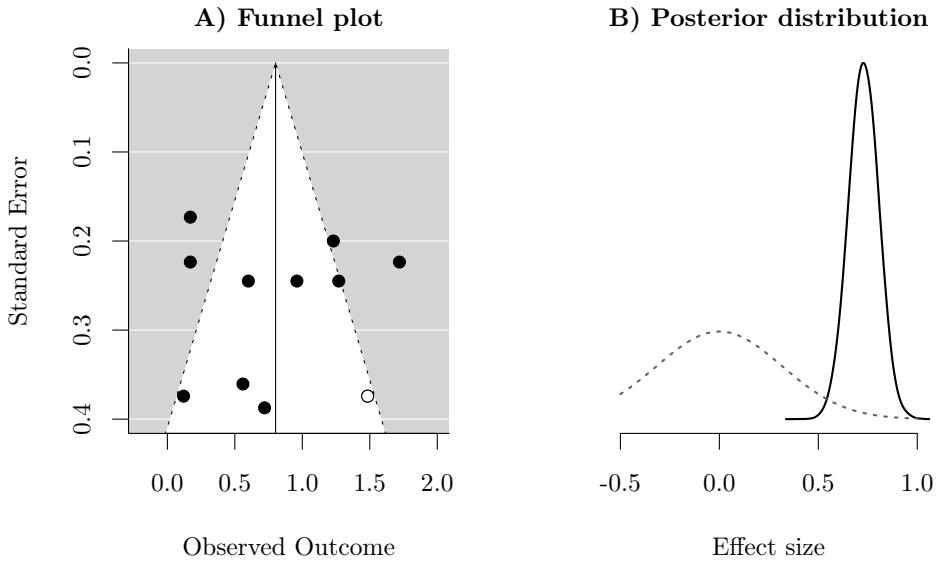

Figure 2: Insecure attachment. A) Funnel plot: black dots are observed d as a function of standard error. White dot represents a missing study; B) Posterior distribution of effect (mean = 0.73, HDI = $[0.58 - 0.87]$); gray dotted line represents the skeptical prior.

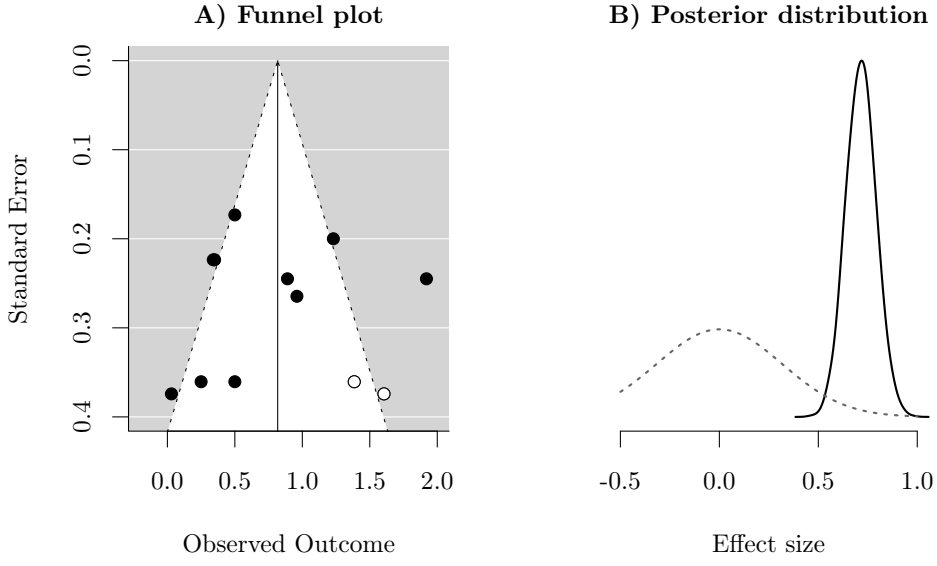

Figure 3: Disorganized attachment. A) Funnel plot: black dots are observed d as a function of standard error. White dots represent missing studies; B) Posterior distribution of effect (mean = 0.72, HDI = $[0.57 - 0.87]$); gray dotted line represents the skeptical prior.

Table 3: Cohen's d effect size (d) and its associated 95% Confidence Interval (CI_l and CI_u), Q statistic test of Moderators (and associated p-value), Bayesian effect size (d_B) and its associated Highest Density Interval (HDI). b_0 refers to model intercept (i.e. reference group parameter, Country = East Europe; Instrument = observational; Age at entry = before 1st birthday; Age at assessment = 1 to 3 years old), b_1 represents difference between reference and other group (i.e. Country = non-East Europe; Instrument = representational; Age at entry = after 1st birthday; Age at assessment = 3 to 8 years old).

	mods		d	CI_l	CI_u	Q	p	d_B	HDI_l	HDI_u
Insecure	Country	b_0	1.13	0.90	1.35			1.13	0.90	1.34
		b_1	-0.65	-0.95	-0.34	17.53	0.00	-0.64	-0.96	-0.36
	Instrument	b_0	0.69	0.52	0.86			0.69	0.52	0.85
		b_1	0.36	0.01	0.72	3.98	0.05	0.36	-0.01	0.70
	Age at entry	b_0	0.78	0.60	0.97			0.78	0.60	0.97
		b_1	0.27	-0.10	0.63	2.08	0.15	0.27	-0.08	0.63
	Age at assessment	b_0	0.73	0.55	0.92			0.73	0.55	0.92
		b_1	0.13	-0.19	0.45	0.60	0.44	0.13	-0.19	0.46
Disorganized	Country	b_0	1.12	0.89	1.34			1.11	0.89	1.35
		b_1	-0.63	-0.94	-0.33	16.54	0.00	-0.63	-0.92	-0.31
	Instrument	b_0	0.84	0.66	1.01			0.84	0.67	1.02
		b_1	-0.30	-0.65	0.04	2.99	0.08	-0.30	-0.65	0.04
	Age at entry	b_0	0.93	0.74	1.13			0.93	0.75	1.12
		b_1	-0.40	-0.75	-0.05	4.92	0.03	-0.40	-0.74	-0.05
	Age at assessment	b_0	0.91	0.73	1.10			0.91	0.72	1.10
		b_1	-0.44	-0.76	-0.13	7.59	0.01	-0.44	-0.76	-0.12

What moderators affect the insecure and disorganized attachment distributions?

Finally we tested a set of four moderators - country of origin (Eastern European vs. non-Eastern European countries), the instrument used for investigating attachment (observational assessment procedures vs. story stem techniques), age at institution entry (before or after the first birthday) and age at assessment (infants aged one to three years old vs. children aged three to eight).

The results are summarized in Table 3. The intercept, i.e. the parameter estimated in the reference categories is referred to as b_0; and b_1 is the difference between the reference and the comparison group. A positive value for b_1 means that the comparison group has a greater effect size than the reference group; a negative value means the opposite.

Classical meta-analysis results showed that children in Eastern European institution were more often insecure and disorganized; representational assessment methods were associated with a higher prevalence of insecure attachment; while a younger age at assessment and a younger age at children's entry into an institution were associated with disorganization (Table 3).

The results of Bayesian analysis (see d_B values), gave similar effect sizes. More details on Bayesian model definition are provided in the appendix.

Discussion and conclusion

There is an increasing body of evidence to show that attachment may be compromised in institutionalized children (Bakermans-Kranenburg et al., 2011). Such results are of interest to policy makers and child welfare organizations, but to draw compelling conclusions, given the relatively few studies published so far, larger data sets are needed.

We thus conducted a meta-analysis on data from 10 studies to explore the influence of life in institutions on children's attachment; and tested a set of key moderators associated with non-secure and disorganized attachment patterns. In order to verify our results, in view of the scarcity of data available, we used the Bayesian approach to meta-analysis in addition to the classical one. Bayesian statistics confirmed the results we obtained using the classical meta-analytic approach, firmly supporting the conclusion that life in institutions is a risk factor for insecure and disorganized attachment.

The effect size obtained for attachment distribution was the same as that reported by a meta-analysis on maltreated children (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010), suggesting that in terms of attachment life in institution may amount to a form of maltreatment. The high prevalence of insecure and disorganized rates identified in children reared in institutions requires attention not only to improve the current quality of children's development, but also because of long-term consequences that non secure patterns, especially the disorganized pattern, have on subsequent development (Lyons-Ruth & Jacobvitz, 2008; Pasco Fearon & Belsky, 2011; Barone, Bramante, Lionetti, & Pastore, 2014).

Moving to the analysis of moderating variables, Eastern European country of origin and assessment instruments based on representational procedures were associated with higher rates of insecure patterns. Risk for disorganized attachment was associated with Eastern European country, entering an institution before the first birthday and being aged less than 3 years old at the attachment assessment phase. Concerning Eastern European country as a risk factor, this could be due to the unfavorable caregiver to child ratio. For example, in Zeanah et al.'s study (2005) in Bucharest the ratio was 1:12; whereas in Vorria et al.'s study in Greece it was of 1:4/6. However, this remains speculative: caregiver to child ratio was not included in the meta-analysis because data were not available for all studies.

Concerning age at entry into an institution and age at assessment, our data seem to support the notion of a sensitive period in attachment development. The early experience hypothesis postulates that profound changes in brain development known to occur during the first year of life lead to a

greater sensitivity to the environmental influences (Sheridan & Nelson, 2009). It is indeed during the first year of life that attachment patterns are consolidated and become observable; being placed in an institution early in life may threaten or prevent the development of an organized pattern, leading to a higher rate of disorganized/cannot classify category in younger children. These data thus strongly support a policy of avoiding institutional settings and placing each child in a family environment as soon as possible.

To sum up, we can state with a high degree of confidence that institutionalization negatively impacts on children's attachment. Moving into adoptive or foster care families leads to significant (although not always complete) recovery (van den Dries et al., 2009; Lionetti, 2014). Again, early family placement should be always the preferred alternative. Despite all the evidence and recommendation (Unicef, 1989; Dozier et al., 2014), however, a lot of work remains to be done to ensure that children actually are moved into a sensitive family-environment as the best alternative option in the absence of a stable and caring biologic family. We hope that our paper have shed some further light on the risk of insecure and disorganized attachment in institutions, and that Bowlby's (1951) observation that children should be reared in adequate family environments, will come closer to being implemented in policy makers in charge of neglected and maltreated children.

Acknowledgments

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References

Ainsworth, M., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: Assessed in the strange situation and at home.* Hillsdale, NJ: Erlbaum.

Archer, M. (2012). *Attachment in institutionalised and community children in china.* Unpublished doctoral dissertation, UCL (University College London).

Bakermans-Kranenburg, M. J., Dobrova-Krol, N. A., & van IJzendoorn, M. H. (2012). Impact of institutional care on attachment disorganization and insecurity of Ukrainian preschoolers Protective effect of the long variant of the serotonin transporter gene (5HTT). *International Journal of Behavioral Development*, *36*(1), 11–18.

Bakermans-Kranenburg, M. J., Steele, H., Zeanah, C. H., Muhamedrahimov, R. J., Vorria, P., Dobrova-Krol, N. A., ... Gunnar, M. R. (2011). Iii. attachment and emotional development

in institutional care: characteristics and catch up. *Monographs of the Society for Research in Child Development*, *76*(4), 62–91.

Barone, L., Bramante, A., Lionetti, F., & Pastore, M. (2014). Mothers who murdered their child: an attachment-based study on filicide. *Child abuse & neglect*.

Barone, L., Del Giudice, M., Fossati, A., Manaresi, F., Perinetti, B. A., Colle, L., & Veglia, F. (2009). METHODS & MEASURES: Psychometric properties of the Manchester Child Attachment Story Task: An Italian multicentre study. *International Journal of Behavioral Development*, *33*(2), 185–190.

Barone, L., Dellagiulia, A., & Lionetti, F. (2014). When the primary caregiver is missing: Investigating proximal and distal variables involved in institutionalized children's adjustment. *Child Abuse Review*.

Barone, L., & Lionetti, F. (2012). Attachment and emotional understanding: a study on late-adopted pre-schoolers and their parents. *Child: care, health and development*, *38*(5), 690–696.

Bowlby, J. (1951). *Maternal care and mental health.* World Health Organization Geneva.

Bowlby, J. (1969). *Attachment and loss, volume I: Attachment.* Hogarth Press.

Bretherton, I., Ridgeway, D., & Cassidy, J. (1990). Assessing internal working models of the attachment relationship. *Attachment in the preschool years: Theory, research, and intervention*, 273–308.

Carlson, E. A., Hostinar, C. E., Mliner, S. B., & Gunnar, M. R. (2014). The emergence of attachment following early social deprivation. *Development and psychopathology*, *26*(02), 479–489.

Cassidy, J., & Shaver, P. (2008). *Handbook of Attachment: Theory, Research, and Clinical Applications. 2nd.* The Guilford Press New York, NY, USA:.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Psychology Press.

Cyr, C., Euser, E. M., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2010). Attachment security and disorganization in maltreating and high-risk families: A series of meta-analyses. *Development and psychopathology*, *22*, 87–108.

Dobrova-Krol, N. A., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2010). The importance of quality of care: Effects of perinatal HIV infection and early institutional rearing on preschoolers' attachment and indiscriminate friendliness. *Journal of Child Psychology and Psychiatry*, *51*(12), 1368–1376.

Dozier, M., Kaufman, J., Kobak, R., O'Connor, T. G., Sagi-Schwartz, A., Scott, S., ... Zeanah, C. H. (2014). Consensus statement on group care for children and adolescents: A statement of policy of the american orthopsychiatric association. *American Journal of Orthopsychiatry*, *84*(3), 219.

Duval, S. (2005). The trim and fill method. *Publication bias in meta-analysis: Prevention, assessment and adjustments*, 127–144.

Duval, S., & Tweedie, R. (2000a). A nonparametric "trim and fill" method of accounting for publication bias in meta-analysis. *Journal of the American Statistical Association*, *95*(449), 89–98.

Duval, S., & Tweedie, R. (2000b). Trim and fill: A simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, *56*(2), 455–463.

Engle, P. L., Groza, V. K., Groark, C. J., Greenberg, A., Bunkers, K. M., & Muhamedrahimov, R. J. (2011). VIII. The situation for children without parental care and strategies for policy change. *Monographs of the Society for Research in Child Development*, *76*(4), 190–222.

Euser, S., Alink, L. R., Tharner, A., van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2013). The prevalence of child sexual abuse in out-of-home care: A comparison between abuse in residential and in foster care. *Child Maltreatment*, 221-231.

Green, J., Stanley, C., Smith, V., & Goldwyn, R. (2000). A new method of evaluating attachment representations in young school-age children: The Manchester Child Attachment Story Task. *Attachment & Human Development*, *2*(1), 48–70.

Grossmann, K., Bretherton, I., Waters, E., & Grossmann, K. (2013). Maternal sensitivity: observational studies honoring Mary Ainsworth's 100th year. *Attachment & human development*, *15*(5-6), 443–447.

Groza, V. K., Bunkers, K. M., & Gamer, G. N. (2011). VII. IDEAL COMPONENTS AND CURRENT CHARACTERISTICS OF ALTERNATIVE CARE OPTIONS FOR CHILDREN OUTSIDE OF PARENTAL CARE IN LOW-RESOURCE COUNTRIES. *Monographs of the Society for Research in Child Development*, *76*(4), 163–189.

Herreros, F. (2009). Attachment security of infants living in a chilean orphanage. In *Poster session presented at: The biennial meeting of the society for research in child development.*

Herreros, F. (2013). *An investigation of the attachment formation and organization of infants living in chilean institutions.* Unpublished doctoral dissertation, THE NEW SCHOOL.

Juffer, F., Palacios, J., Le Mare, L., Sonuga-Barke, E. J., Tieman, W., Bakermans-Kranenburg,

M. J., ... Verhulst, F. C. (2011). II. Development of adopted children with histories of early adversity. *Monographs of the Society for Research in Child Development*, *76*(4), 31–61.

Kruschke, J. K. (2013). Bayesian estimation supersedes the *t* test. *Journal of Experimental Psychology: General*, *142*(2), 573.

Lionetti, F. (2014). What promotes secure attachment in early adoption? the protective roles of infants' temperament and adoptive parents' attachment. *Attachment & human development*(ahead-of-print), 1–17.

Lyons-Ruth, K., & Jacobvitz, D. (2008). Attachment disorganization: Genetic factors, parenting contexts, and developmental transformation from infancy to adulthood.

Main, M. (1991). Metacognitive knowledge, metacognitive monitoring, and singular (coherent) vs. multiple (incoherent) models of attachment. *Attachment across the life cycle*, 127–159.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, *151*(4), 264–269.

Mullen, B. (1989). *Advanced basic meta-analysis*. Hillsdale, NJ: Erlbaum.

Nelson, C. A., Zeanah, C. H., Fox, N. A., Marshall, P. J., Smyke, A. T., & Guthrie, D. (2007). Cognitive recovery in socially deprived young children: The Bucharest Early Intervention Project. *Science*, *318*(5858), 1937–1940.

Pasco Fearon, R., & Belsky, J. (2011). Infant–mother attachment and the growth of externalizing problems across the primary-school years. *Journal of child psychology and psychiatry*, *52*(7), 782–791.

Plummer, M. (2003). JAGS: A program for analysis of Bayesian graphical models using Gibbs sampling. In *Proceedings of the 3rd International Workshop on Distributed Statistical Computing (DSC 2003). March* (pp. 20–22).

Plummer, M. (2014). rjags: Bayesian graphical models using MCMC [Computer software manual]. Retrieved from `http://cran.r-project.org/package=rjags` (R package version 3-13)

R Core Team. (2013). R: A Language and Environment for Statistical Computing [Computer software manual]. Vienna, Austria. Retrieved from `http://www.r-project.org`

Sheridan, M., & Nelson, C. A. (2009). Neurobiology of fetal and infant development. *Handbook of infant mental health*, *3*, 40–58.

Soares, I., Belsky, J., Oliveira, P., Silva, J., Marques, S., Baptista, J., & Martins, C. (2014). Does early family risk and current quality of care predict indiscriminate social behavior in

institutionalized Portuguese children? *Attachment & human development*(ahead-of-print), 1–12.

Spiegelhalter, D. J. (2004). Incorporating bayesian ideas into health-care evaluation. *Statistical Science*, 156–174.

Spiegelhalter, D. J., Abrams, K. R., & Myles, J. P. (2004). *Bayesian approaches to clinical trials and health-care evaluation* (Vol. 13). John Wiley & Sons.

Stoltenborgh, M., Bakermans-Kranenburg, M. J., Alink, L. R., & van IJzendoorn, M. H. (2014). The prevalence of child maltreatment across the globe: Review of a series of meta-analyses. *Child Abuse Review*.

Stoltenborgh, M., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2013). The neglect of child neglect: a meta-analytic review of the prevalence of neglect. *Social psychiatry and psychiatric epidemiology*, *48*(3), 345–355.

The St. Petersburg-USA Orphanage Research Team. (2008). The effects of early social-emotional and relationship experience on the development of young orphanage children. The St. Petersburg-USA Orphanage Research Team. *Monographs of the Society for Research in Child Development*, *73*(3), vii.

Torres, N., Maia, J., Veríssimo, M., Fernandes, M., & Silva, F. (2012). Attachment security representations in institutionalized children and children living with their families: links to problem behaviour. *Clinical psychology & psychotherapy*, *19*(1), 25–36.

Tukey, J. W. (1958). Bias and confidence in not-quite large samples. In *Annals of Mathematical Statistics* (Vol. 29, pp. 614–614).

Unicef. (1989). Convention on the Rights of the Child.

van den Dries, L., Juffer, F., van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (2009). Fostering security? A meta-analysis of attachment in adopted children. *Children and Youth Services Review*, *31*(3), 410–421.

van IJzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: a meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological bulletin*, *117*(3), 387.

van IJzendoorn, M. H., Schuengel, C., & Bakermans-Kranenburg, M. J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and psychopathology*, *11*(02), 225–250.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of*

Statistical Software, *36*(3), 1–48. Retrieved from `http://www.jstatsoft.org/v36/i03`

Wagenmakers, E.-J., Wetzels, R., Borsboom, D., & Van Der Maas, H. L. (2011). Why psychologists must change the way they analyze their data: the case of psi: comment on bem (2011).

Zeanah, C. H., Smyke, A. T., Koga, S. F., & Carlson, E. A. (2005). Attachment in institutionalized and community children in Romania. *Child development*, *76*(5), 1015–1028.

Appendix: JAGS code

JAGS code for fixed effects model via Bayesian estimation method was as follows:

```
model {
  for (i in 1:n) {
    d[i] ~ dnorm(theta,precision.d[i]) # likelihood
    precision.d[i] <- 1/var.d[i]
  }
  theta ~ dnorm(0,10) # skeptical prior
}
```

where `n` = 10 is the number of studies, `d` and `var.d` are estimated effect sizes and variances respectively and `theta` represented model parameter.

For each moderator the model code was:

```
model {
  for (i in 1:n) {
    d.hat[i] <- b0 + b1*x[i]
    d[i] ~ dnorm(d.hat[i],precision.d[i]) # likelihood
    precision.d[i] <- 1/var.d[i]
  }
  b0 ~ dnorm(0,.01) # b0 prior
  b1 ~ dnorm(0,.01) # b1 prior
}
```

where `n` = 10 is the number of studies, `d` and `var.d` are estimated effect sizes and variances respectively, `x` the moderator variable and `b0` and `b1` the model parameters (intercept and slope, respectively).