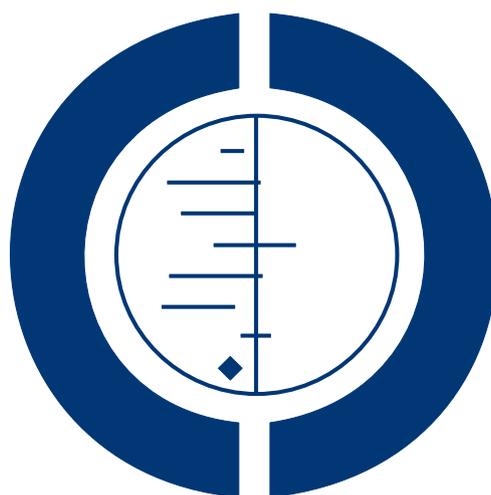


Centre-based day care for children younger than five years of age in low- and middle-income countries (Review)

Brown TW, van Urk FC, Waller R, Mayo-Wilson E



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[Intervention Review]

Centre-based day care for children younger than five years of age in low- and middle-income countries

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ABSTRACT

Background

Because of poverty, children and families in low- and middle-income countries often face significant impediments to health and well-being. Centre-based day care services may influence the development of children and the economic situation of parents by providing good quality early childhood care and by freeing parents to participate in the labour force.

Objectives

To assess the effects of centre-based day care without additional interventions (e.g. psychological or medical services, parent training) on the development, health and well-being of children and families in low- and middle-income countries (as defined by the [World Bank 2011](#)).

Search methods

In April 2014, we searched CENTRAL, Ovid MEDLINE, EMBASE, PsycINFO, ERIC and 16 other sources, including several World Health Organization (WHO) regional databases. We also searched two trials registers, websites of government and non-government agencies and reference lists of relevant studies.

Selection criteria

We included randomised and quasi-randomised controlled trials and prospective non-randomised studies with contemporaneous control groups and assessments both before and after intervention. We considered non-randomised controlled trials, as centre-based care in low- and middle-income countries is unlikely to be studied using randomised controlled trials ([Higgins 2011](#)). We included the following outcomes: child intellectual development, child psychosocial development, maternal and family outcomes and incidence of infectious diseases.

Data collection and analysis

Two review authors independently assessed risk of bias and extracted data from the single included study.

Main results

Only one trial, involving 256 children, met the inclusion criteria for this review. This study was assessed as having high risk of bias because of non-random allocation, incomplete outcome data and insufficient control of confounding factors. Results from this study suggest that centre-based day care may have a positive effect on child cognitive ability compared with no treatment (care at home) (assessed using a modified version of the British Ability Scale-II (BAS-II) (standardised mean difference (SMD) 0.74, 95% confidence interval (CI) 0.48 to 1.00, 256 participants, 1 study, very low-quality evidence). This study did not measure other variables relevant to this review.

Authors' conclusions

The single study included in this review provides limited evidence on the effects of centre-based day care for children younger than five years of age in low- and middle-income countries. This study was at high risk of bias and may have limited generalisability to other low- and middle-income countries. Many of the studies excluded from this review paired day care attendance with co-interventions that are unlikely to be provided in normal day care centres. Effectiveness studies on centre-based day care without these co-interventions are few, and the need for such studies is significant. In future studies, comparisons might include home visits or alternative day care arrangements.

PLAIN LANGUAGE SUMMARY

Centre-based day care for children younger than five years of age in low- and middle-income countries

Review question

This review evaluated the effects of centre-based day care for children younger than five years of age in low- and middle-income countries (as defined by the [World Bank 2011](#)). We considered the following outcomes: children's cognitive and psychosocial development, prevalence and incidence of infectious diseases among them and the economic situation of parents. We defined 'centre-based day care' as the supervision of children in a publicly accessible location.

Background

In low- and middle-income countries, a significant proportion of children younger than five years of age experience non-parental day care in formal and informal settings. Centre-based day care services may influence the development of children and the economic situation of parents.

Study characteristics

We included studies that assessed the effects of centre-based day care for children younger than five years of age in low- and middle-income countries. To isolate the effects of day care, we excluded interventions that involved medical, psychological or non-child-focused co-interventions. Of the 34,902 citations identified through electronic searches, we found only one study that met our inclusion criteria. This study was based in Kenya, Uganda and Tanzania/Zanzibar and included 256 children. Evidence is current to April 2014.

Key results

The one included study reported positive effects of centre-based day care on the cognitive development of children. It did not report the effects of centre-based day care on children's psychosocial development, the incidence or prevalence of infectious diseases, parental employment or household income.

Quality of the evidence

This review includes only one trial. This study did not assign participants to the intervention by chance, so the comparison groups may have differed in important ways. Therefore results must be interpreted with caution. Although current studies do not now allow for conclusive judgements regarding the effects of centre-based day care on the development of children and the economic situation of parents, this does not imply that these services are not important in low- and middle-income countries. Effectiveness studies of centre-based day care without co-interventions are few, and the need for such studies is significant.

This review is one of a pair of reviews; researchers and practitioners may find evidence from the high-income country review to be informative also ([Van Urk 2014](#)).

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

Centre-based day care compared with no intervention (care at home) for children younger than five years of age						
Patient or population: children younger than five years of age Settings: low- and middle-income countries Intervention: centre-based day care (preschool) Comparison: no intervention (care at home)						
Outcomes	Group means		Relative effect (95% CI)*	Number of participants (studies)	Quality of the evidence (GRADE)	Comments
	Control (95% CI) ^a	Day care (non-Madrasa) (95% CI) ^a				
Primary: Child intellectual development (cognitive ability) As assessed by 4 modified subscales of the British Ability Scale, which were summed for this review	Mean in the intervention groups was 240.13 (233.50 to 246.76)	Mean in the intervention groups was 207.65 (198.55 to 216.74)	0.74 (0.48 to 1.00)	256 (1)	⊕○○○ very low	Very serious risk of bias ^b
Primary: Child Intellectual development (attainment of educational goals)	No data	No data	No data	No data	N/A	N/A
Secondary: Child behaviour	No data	No data	No data	No data	N/A	N/A
Secondary: Disrupted child attachment	No data	No data	No data	No data	N/A	N/A
Secondary: Paid parental employment	No data	No data	No data	No data	N/A	N/A

GRADE Working Group grades of evidence:

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

Very low quality: We are very uncertain about the estimate.

^aCI: confidence interval.

^bThe outcome for child intellectual development (cognitive ability) was downgraded to 'very low' because random allocation was lacking, as were controls for baseline differences between control and intervention groups, and because the cognitive ability scale was not used in full and was not scored in the standard way.

BACKGROUND

Description of the condition

Paid female labour is thought to be a realistic means of alleviating individual and national poverty within low- and middle-income countries (LMICs) (Siraj-Blatchford 2008). Women are typically the primary caregivers of children in LMICs; this may limit their ability to participate in the generation of income and leaves women with less time for education, leisure and social or political activities (Addati 2008; Razavi 2008; ILO 2009; Tabbert 2009). Although social mores may hinder a mother from participating in the labour force, it is likely that the lack of child-care options is also a barrier. As a result of widespread poverty within LMICs, many biological and psychosocial hazards compromise the development of young children (Walker 2007). Risk factors include widespread infectious diseases (Carter 2003), nutritional deficiencies (Stoltzfus 2001; WHO 2004; Walker 2007), exposure to war or community and political violence (UNICEF 2004), poor sanitation and unhygienic living conditions (Ezzati 2002), high prevalence of maternal depressive symptoms (Affonso 2000), few household resources and lack of cognitive stimulation and learning opportunities (Bradley 2002; Walker 2007). Therefore, early child development intervention programmes that target the physical, cognitive and social-behavioural development of young children are greatly needed in LMICs (Center on the Developing Child 2007). Centre-based day care is one intervention that can address these needs. Recently, intergovernmental and non-governmental organisations have begun to finance loans for, orchestrate development of and donate hundreds of millions of dollars to early childhood programmes. The goal of these organisations is to facilitate the care and development of young children in LMICs (Penn 2004; UNICEF 2006; UNICEF 2012; CGECCD 2014). In tandem with this aid, many countries have created early child development programmes, some of which include centre-based day care (Engle 2007). Other LMICs have introduced policies to ensure that preschool education, often housed within centre-based day care, is obligatory for all children of a certain age (Meyers 2000). However, the number of children younger than five years of age who experience regular day care in LMICs is unknown. The proportion of children in LMICs currently enrolled in preschool is thought to be low, and significant variability has been noted between countries (World Bank 2011), settings (e.g. rural vs urban) and age groups (Yoshikawa 2007).

Description of the intervention

In high-income countries, a significant proportion of children younger than five years of age experience non-parental day care within formal and informal settings (Melhuish 2004; NICHD ECCRN 2006; Smith 2010). Day care for children in LMICs

takes various forms but generally aligns with day care in high-income countries. Centre-based day care differs from informal care (e.g. care by parents, private nannies, friends or family) in that it provides group supervision of children in a publicly accessible location. In addition to supervision, this formal care may provide education, feeding, structured or unstructured play, materials, toys or playground equipment. Typically, centre-based care is provided in the public or private sector and is supervised by trained child development staff or by lay caregivers.

In LMICs, basic day care can be expanded to include a range of family, health, nutrition and social services that accommodate the particular needs of LMIC populations. These initiatives are often subsumed under the umbrella of so called 'Early Child Development' programmes (Penn 2004; UNICEF 2006). Depending on the quality, quantity and types of day care services provided, child outcomes can be differentially impacted (NICHD ECCRN 2005; Belsky 2007).

As in high-income countries, parents in LMICs choose to use day care for a variety of purposes. Economically, families may utilise day care as a means to enable parents (particularly mothers) to enter or participate more fully in the labour market. Parents and governments may choose to use day care developmentally as a means of enhancing child social and academic performance before entry into formal education (Lamb 2006), or as a means of providing services targeted at improvement and maintenance of child health (Silva 2000). This is particularly relevant for LMICs, where an estimated 200 million children younger than five years of age do not reach their developmental potential (Grantham-McGregor 2007).

How the intervention might work

Much early child development research has been conducted in high-income countries. Evidence obtained, along with findings of other studies of the social and economic circumstances of many children in LMICs, suggests several means by which centre-based care may affect the well-being of children and families.

First, day care often targets early cognitive development of children and ultimate improvement in the attainment of long-term educational goals. Specifically, school readiness and cognitive capacities appear to be enhanced by structured activities, psychosocial stimulation (NICHD ECCRN 2006) and responsive, verbally articulate staff (Melhuish 2004). By increasing the stimulation that a child receives, centre-based care may enhance the achievement of developmental milestones in a cost-effective manner (Masse 2000; Grantham-McGregor 2007; UNESCO 2010). Furthermore, language learning is likely to be facilitated in day care settings when children are afforded increased opportunities to interact verbally with adults and peers. In particular, high-quality centre-based care has been linked to improved language development (Clarke-Stewart 1987; Schliecker 1991). The enriched environment of a formal day care setting may be important for

children from deprived homes, particularly in LMICs, where academic averages consistently trend below global averages (Dearing 2009; Nakahara 2010). Longitudinal studies carried out in high-income countries have demonstrated that early attendance at high-quality day care centres may predict better academic outcomes, higher rates of future employment and less adult criminal activity than are seen among children who do not attend such programmes (e.g. Schweinhart 1993; Campbell 2001).

Second, day care may improve emotional and behavioural outcomes for children. Some studies have found that day care is related to positive outcomes, including improved social competence resulting from increased peer interactions (Clarke-Stewart 1994; Balleyguier 1996). However, other studies have suggested that day care may disrupt mother-child attachment (Ainsworth 1978; Sroufe 1999) and predict higher levels of externalising behaviour, including aggression and non-compliance (NICHD ECCRN 2006; Philips 2006; Belsky 2007).

Third, day care is provided to facilitate parental, specifically maternal, employment. Mothers may be better able to participate fully in the labour market when they feel their children are secure and cared for (Vandell 2002; Melhuish 2004; Sclosser 2005). Provision of day care is correlated with increased female participation in the labour force in high-income countries and an earlier return to the workforce after pregnancy (Brooks-Gunn 1994; Gelbach 2002; Esping-Andersen 2009). Although the relationship between paid female labour and day care has not been widely studied in LMICs, it is possible that increased availability of child care programmes may correlate positively with national female labour rates (Lokshin 2004; Sclosser 2005; Tabbert 2009). In turn, increased female labour rates may result in higher family income, with collateral positive effects on child outcomes, including better nutrition and enriched home environments. However, the effects of maternal employment may vary according to socioeconomic status, culture and ethnicity, as well as child age and gender (Masse 2000; Han 2001; NICHD ECCRN 2003; Lokshin 2004); this must be carefully considered in terms of child outcomes.

Finally, day care may affect children's physical health, particularly as it relates to common infectious diseases. Although some evidence suggests that day care can increase the prevalence of common infectious diseases (Schwartz 1994; Lu 2004; Ethelberg 2006), it may be that in LMICs, where children are more likely to suffer from malnutrition and stunting (WHO 2009), day care presents an opportunity for adequate feeding and nutritional supplementation. In turn, this type of intervention may reduce the duration of acute and persistent diarrhoea (Lazzerini 2013) and improve children's height and weight (Avula 2010). Improved nutrition over time could also have collateral effects on attainment of long-term educational goals (Glewwe 2001).

Why it is important to do this review

In LMICs, the proportion of children who attend day care services is unknown. However, existing evidence from studies that have examined the effects of day care must be evaluated because children younger than five years of age in LMICs are at heightened risk for cognitive and psychosocial delays, infectious diseases and extreme poverty. Day care may provide the means by which developmental and health outcomes of children in LMICs can be improved, while opportunities for parental employment are improved. A previous Cochrane review on day care was carried out a decade ago (Zoritch 2000) but included only studies from high-income countries, which limits its generalisability to LMIC populations (Penn 2004). In addition, this earlier review allowed for inclusion of day care interventions with home visit and other non-centre-based components, thereby not addressing the specific impact of centre-based care alone. To best compare effects, the intervention of centre-based day care must be isolated from co-interventions (e.g. teacher training, parent training, home visits). In addition, potential social, economic and biological confounding variables need careful consideration within intervention evaluations, as they may affect child outcomes. In the context of burgeoning interest in interventions and policies to improve the developmental outcomes of children in LMICs, a review of centre-based day care programmes in LMICs will serve as a guide for future researchers and policymakers (Walker 2007; UNESCO 2010).

OBJECTIVES

To assess the effects of centre-based day care without additional interventions (e.g. psychological or medical services, parent training) on the development, health and well-being of children and families in low- and middle-income countries (as defined by the World Bank 2011).

METHODS

Criteria for considering studies for this review

Types of studies

Controlled trials, including randomised and quasi-randomised trials, and prospective non-randomised studies with contemporaneous control groups and assessments both before and after intervention.

We considered non-randomised controlled trials because centre-based care in low- and middle-income countries is unlikely to be studied using randomised controlled trials (Higgins 2011).

Types of participants

Children younger than five years of age (at the time of enrolment) and families in low- and middle-income countries (as defined by the [World Bank 2011](#)).

Types of interventions

Centre-based day care, which we defined as the supervision of children in a publicly accessible location, may include snack and meal provision for children or a child education component. We excluded studies of day care with medical or psychological co-interventions unless these were also received by participants in control groups. We also excluded studies involving co-interventions not directed toward children and not centre-based (e.g. parent programmes, home visits, teacher training), believing that the presence of such co-interventions would weaken the extent to which findings can be attributed to centre-based care alone. We also excluded studies in which enrolment was limited to children with physical or intellectual disabilities (e.g. autism, IQ less than 80), orphans, children living in hospitals or children living with HIV or AIDS.

See [Appendix 1](#) and the protocol ([Brown 2013](#)) for details on how to handle studies if review eligibility criteria are not met by all participants.

Types of outcome measures

We assessed the effects of centre-based care on child and family well-being outcomes by extracting data on the outcomes listed below. For studies reporting more than one measure of an outcome, we extracted data for meta-analysis using methods described in successive sections (see [Measures of treatment effect](#)). Outcomes marked with asterisks below are those reported in [Summary of findings for the main comparison](#), as determined by the protocol for this review ([Brown 2013](#)).

Primary outcomes

- Child intellectual development.
 - Cognitive ability (e.g. IQ, development quotient).*
 - Attainment of educational goals (e.g. measures of reading, writing, or mathematics; retention in grade).*
- Child psychosocial development
 - Any behavioural measure (i.e. self, parent or teacher reports of externalising behaviour or aggression, prosocial or antisocial behavior).*
 - Disrupted child attachment to mother (e.g. using the Strange Situation ([Ainsworth 1978](#)) measurement or the Disturbances of Attachment Interview ([Smyke 1999](#))).*

Secondary outcomes

- Maternal and family outcomes
 - Paid parental employment (e.g. in paid work, on maternity or paternity leave, hours per week in paid work).*
 - Household income (e.g. weekly or annual income range).
- Incidence of infectious diseases
 - Incidence of diarrhoea.
 - Prevalence of diarrhoea.
 - Incidence of lower respiratory tract infection (including pneumonia).
 - Prevalence of lower respiratory tract infection (including pneumonia).

Search methods for identification of studies

We considered all studies returned by the search strategy (see [Appendix 2](#)) regardless of date, publication status or language, although we conducted all searches and author communications in English. Foreign language abstracts associated with titles of interest were translated by fluent speakers of the relevant foreign language. We discussed study reports with a fluent speaker, who then translated the report if the abstract did not provide conclusive information regarding the inclusion criteria. In total, 11 foreign language studies were translated in part or in full from Spanish ([Atalah 1989](#); [Vargas Catalán 1994](#); [Cueto 1999](#); [Bernal 2009](#)) and from Portuguese ([Fernandes 1981](#); [Barros 1999](#); [Corrêa 1999](#); [Gurgel 2005](#); [Curi 2006](#); [Lordelo 2007](#); [Marques da Silva 2011](#)). No foreign language studies met the inclusion criteria of this review.

Electronic searches

We searched the following databases on 24 April 2014.

- Cochrane Central Register of Controlled Trials (CENTRAL) 2014, Issue 4, part of The Cochrane Library.
- Ovid MEDLINE(R) 1946 to April Week 2 2014.
- EMBASE (Ovid) 1974 to April Week 2 2014.
- PsycINFO (Ovid) 1967 to April Week 2 2014.
- Education Resources Information Center (ERIC) (<http://eric.ed.gov/>) 1966 to 24 April 2014.
- Social Sciences Citation Index (SSCI) (Web of Science) 1956 to 24 April 2014.
- SCOPUS to 24 April 2014.
- Latin American Caribbean Health Sciences Literature (LILACS) 1982 to 25 April 2014.
- ZETOC (<http://zetoc.mimas.ac.uk/>) 1993 to 24 April 2014.

- Conference Proceedings Citations Index-Social Science & Humanities (CPCI-SSH) (Web of science) 1990 to 24 April 2014.

- Global Health Library (Ovid) 1973 to 24 April 2014.
- British Library for Development Studies (BLDS) to 25 April 2014.
- World Bank (Journal of Librarianship and Information

Science (JOLIS)) (<http://external.worldbankimflib.org/external.htm>) to 25 April 2014.

- Pan American Health Organization (PAHO) (www.paho.org/) 1902 to 25 April 2014.
- World Health Organization (WHO) Library &

Information Networks for Knowledge Database (WHOLIS) (www.who.int/library/databases/en/) 1948 to 25 April 2014.

- Population Information Online (POPLINE) (www.popline.org/) 1973 to 25 April 2014.
- WHO Regional Office for Africa Regional Database (AFROLIB) (<http://afrolib.afro.who.int/>) to 25 April 2014.
- African Index Medicus (AIM) (<http://indexmedicus.afro.who.int/>) to 25 April 2014.
- Western Pacific Region Index Medicus (WPRIM) (<http://wprim.org/>) to 25 April 2014.
- Index Medicus for South-East Asia Region (IMSEAR) (<http://imsear.hellis.org/>) to 11 May 2014.
- Open Access ProQuest Dissertations & Theses (PQDT Open) (<http://pqdtopen.proquest.com>) to 24 April 2014.
- ClinicalTrials.gov to 24 April 2014.
- International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictip/en/) to 24 April 2014.

Searching other resources

We examined reference lists from previous relevant reviews and searched for grey literature in the following databases, which we searched in May 2014.

- 3ie: International Initiative for Impact Evaluation (www.3ieimpact.org).
- Bernard van Leer Foundation (www.bernardvanleer.org).
- OpenGrey (www.opengrey.eu).
- Oxfam (www.oxfam.org/en/policy).
- Aga Khan Foundation (AKF) (www.akdn.org/akf).
- Save the Children (www.savethechildren.org/site/c.8rKLIXMGIpI4E/b.6153061/k.7E4A/Publications_and_Reports.htm).
- Christian Child's Fund (ChildFund) (www.childfund.org).
- World Bank (www.worldbank.org).

- Eldis (www.eldis.org).

- Consultative Group on Early Childhood Care and Development (www.ecdgroup.com).

- United Nations Children's Fund (UNICEF) (www.unicef.org).

Data collection and analysis

Selection of studies

Two review authors (TWB and FvU) independently screened all titles and abstracts. They collected and independently screened relevant articles to determine which studies met review inclusion criteria. Disagreements were resolved through discussion and consultation with other review authors (RW and EMW).

Data extraction and management

Two review authors (TWB and FvU) independently extracted the following data from all included studies.

General information

- Year of study.
- Country of study.
- Study design (i.e. case control, cohort).
- Unit of analysis (e.g. individual- or cluster-randomised).
- Methods used to control for confounding factors.
- Setting of study (i.e. urban or rural, specific region or city if provided).

Participants

- Number of study participants and clusters randomly assigned to each included group.
- Age.
- Sex.
- Inclusion and exclusion criteria.
- Household income (if reported).

For each intervention or comparison group of interest

- Dose of centre-based care.
- Duration of centre-based care.
- Frequency of centre-based care.
- Co-interventions provided (if any).
- Quality of care provided (if measured).

For each study, we used lists for identifying study design as recommended by The Cochrane Collaboration ([Higgins 2011](#)).

Assessment of risk of bias in included studies

Two review authors (TWB and FvU) coded the included study using the Cochrane tool for assessing risk of bias (Higgins 2011; Section 8.5.a) across the following domains: sequence generation; allocation concealment; blinding of study participants, personnel and outcome assessors; incomplete outcome data; selective outcome reporting; and other sources of bias. In addition to these, we accounted for risk of bias due to confounding and for outcome validity (see Table 1). We assigned each category a rating of low, high or unclear risk of bias based on criteria for judging risk of bias provided by the *Cochrane Handbook for Systematic Reviews of Interventions* and included in the 'Risk of bias' assessment tool (Higgins 2011; Section 8.5.c). A rating of low indicated that evidence was sufficient to judge that study authors used appropriate methods to avoid bias; a rating of high indicated that evidence was sufficient to judge that study authors did not use appropriate methods to avoid bias; and a rating of unclear indicated that information was insufficient to judge the extent to which study authors used appropriate methods to avoid bias.

We resolved disagreements as regards the 'Risk of bias' assessment process through discussion with a third review author (EMW).

Measures of treatment effect

We used Hedges' (adjusted) *g* (a standardised mean difference) for each outcome for which continuous data were provided. We used Review Manager (RevMan) Version 5.1 (Review Manager 2012) to conduct all analyses (see *Effects of interventions*). See Appendix 1 and the protocol (Brown 2013) for our proposed methods of dealing with other measures in future updates of this review.

Unit of analysis issues

Individual children were the unit of analysis for the single study included in this review. See Appendix 1 and the protocol (Brown 2013) for our proposed methods of resolving unit of analysis issues arising from cluster-randomised trials in future updates of this review.

Dealing with missing data

For all analyses, we would have used results analysed in accordance with the intention-to-treat principle when possible. See Appendix 1 and the protocol (Brown 2013) for our proposed methods of dealing with missing data in future updates of this review.

Assessment of heterogeneity

We did not assess heterogeneity because only one study met the inclusion criteria. See Appendix 1 and the protocol (Brown 2013)

for our proposed methods of assessing heterogeneity in future updates of this review.

Assessment of reporting biases

We did not assess reporting biases because only one study met the inclusion criteria. See Appendix 1 and the protocol (Brown 2013) for our proposed methods of assessing reporting biases in future updates of this review.

Data synthesis

The primary meta-analysis included all centre-based day care programmes versus non-centre-based child care (e.g. home care by a parent). We were unable to combine outcome data in a meta-analysis because only one study was included. Had additional studies been available, subgroup analysis would have been conducted as detailed. See Appendix 1 and the protocol (Brown 2013) for more information on data synthesis and on subgroup analyses.

GRADE

We summarised the evidence in *Summary of findings for the main comparison*, in which we reported comparative risks for each primary outcome as well as for the first secondary outcome. We used the GRADE (Grades of Recommendation, Assessment, Development and Evaluation) approach to assess the quality of the evidence, using criteria reported in Section 12.2.2 of Higgins 2011.

Subgroup analysis and investigation of heterogeneity

We did not conduct subgroup analyses because only one study met the inclusion criteria, and no data were found for the subgroups prespecified in the protocol of this review (Brown 2013). See Appendix 1 and the protocol for our proposed methods for conducting subgroup analyses in future updates of this review.

Sensitivity analysis

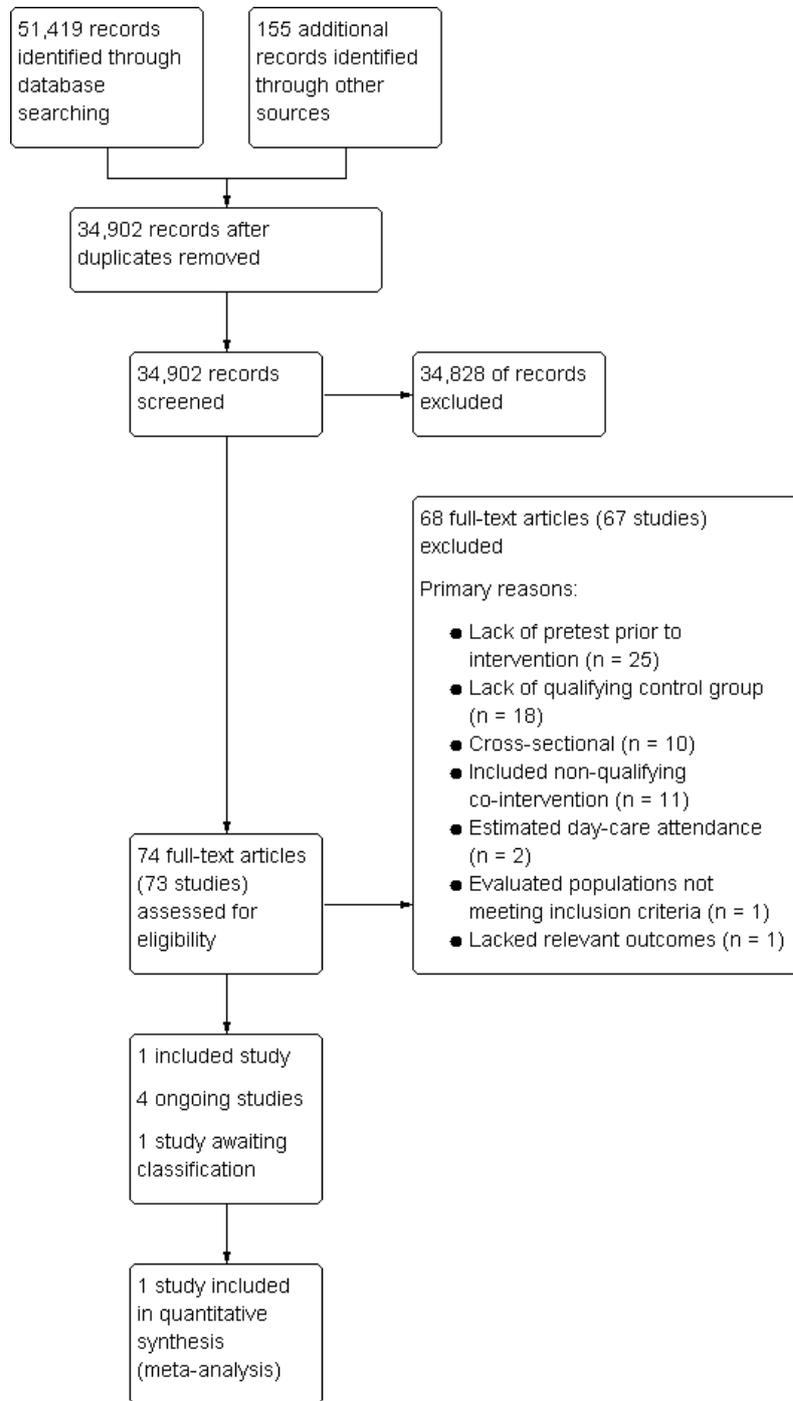
We did not perform sensitivity analyses in this review because no missing data were reported by study authors. See Appendix 1 and the protocol (Brown 2013) for our proposed methods for conducting sensitivity analyses in future updates of this review.

RESULTS

Description of studies

We included only one study in this review. We present the results of the trial selection process in Figure 1.

Figure 1. Study flow diagram.



Results of the search

Electronic searches identified 51,419 records. An additional 155 records were obtained by searching reference lists and online grey literature. After removing duplicates, we screened 34,902 records and identified 74 potentially relevant full-text reports related to 73 unique studies (see [Figure 1](#)). We were unable to access one study even after contact was made with the study authors (see [Characteristics of studies awaiting classification](#)). We identified four ongoing studies (see [Characteristics of ongoing studies](#)).

Included studies

One study met all of the inclusion criteria for this review and measured one or more of the prespecified outcomes ([Mwaura 2008](#)). This was a prospective non-randomised study with a contemporaneous control group and assessment both before and after intervention time points. We provide detailed characteristics of this study, including a 'Risk of bias' assessment, in the [Characteristics of included studies](#) table.

Location

The study setting consisted of communities in Kenya, Uganda and Tanzania/Zanzibar; however the study report provided no further information on the communities (i.e. rural vs urban) or the criteria used to select them. This study represented a subset of a larger study comprising 906 children, who were pretested upon entry into the child-care centre and were post-tested during the final three months of their second year of involvement. This resulted in the exclusion of 483 children from analyses.

Comparisons

The primary objective of [Mwaura 2008](#) was to compare outcomes for children attending different day care centres. To this end, three comparisons were made: (1) Madrasa day care centre versus home care, (2) Madrasa day care centre versus standard day care centre and (3) standard day care centre versus home care. Only the latter comparison (standard day care centre vs home care) met all inclusion criteria for this review. The Madrasa day care centres were excluded from this review because they included a non-qualifying co-intervention (i.e. a programme that educated the community about the value of early childhood education and that trained teachers using an Islamic-based curriculum). It is possible that the influence of this Madrasa co-intervention also influenced families

and children in the standard day care centre and control groups, as children within these groups were drawn from surrounding areas.

Sample

Recruitment for the sample involved four stages. First, Madrasa day care centres were non-randomly selected in each country; second, standard day cares were selected from communities surrounding the Madrasa centres-to be included, standard day care centres must have been located between one and three kilometers away from a Madrasa centre and must have been in operation for at least two years by the pretest period; third, classrooms within each of these centres were non-randomly selected; and fourth, individual children were randomly selected from within those classrooms to be compared with control group children selected from the surrounding community and cared for at home. Study duration was 24 months. Cognitive development outcomes were assessed using four modified subscales of the British Ability Scale-II (block building, verbal comprehension, early number concept and picture similarities) and three subscales of the African Child Intelligence Test (verbal meaning, exclusion and closure).

Excluded studies

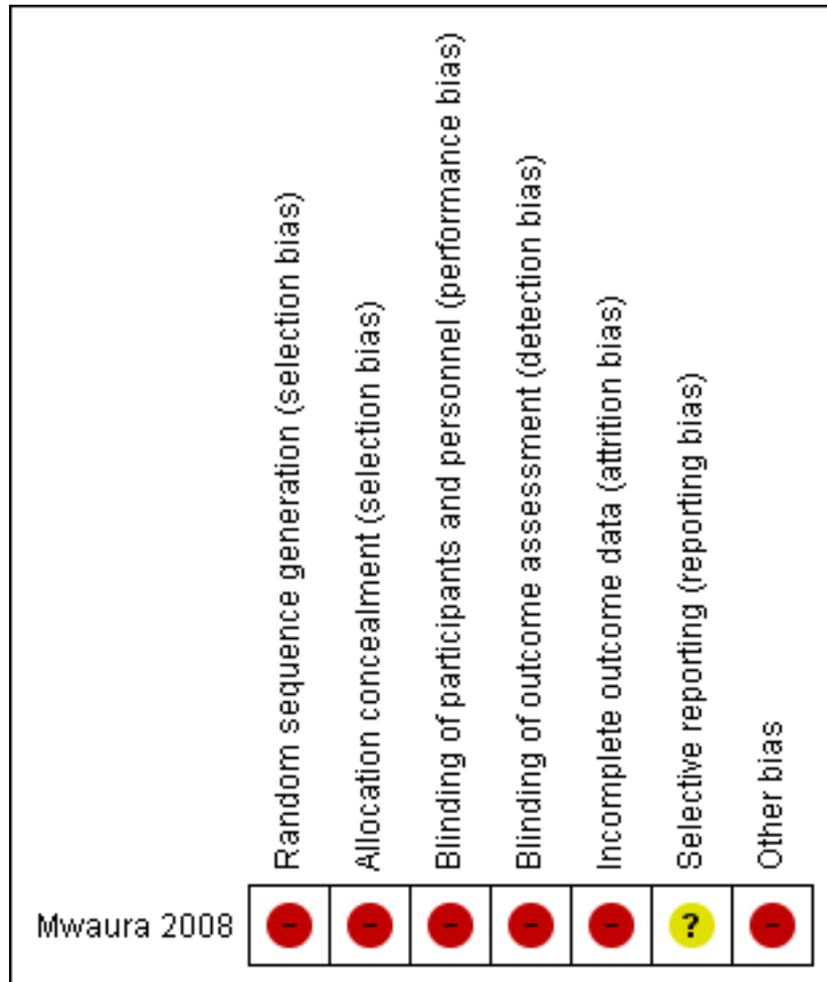
Of the 74 potentially relevant records (73 studies), 68 reports (67 studies) were excluded because they lacked a qualifying control group (n = 18), were cross-sectional (n = 10), included co-interventions (n = 11) or assessed children not meeting the inclusion criteria (n = 1). Despite reporting outcomes relevant to this review (e.g. child intellectual development, parental employment, child psychosocial development), a further 27 studies were excluded because no pretest was given before intervention was provided, or because the studies did not assess children attending day care or, in the case of one trial, did not assess an eligible outcome. These 27 studies are further detailed in [Appendix 3](#).

An additional four studies were ongoing ([Pradham 2013](#); [Alvarez; Carneiro; Rubio-Codina](#)), and one study was not accessible ([Temcharoen 1988](#)).

Risk of bias in included studies

We describe in detail in the 'Risk of bias' table the results of the risk of bias assessment of the single included study, and we summarise these assessments in [Figure 2](#).

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



In summary, risk of bias was judged to be high in relation to selection bias, performance bias (inherent in the nature of the intervention), outcome assessor bias, attrition bias and baseline equivalence. The study was judged unclear in relation to reporting bias, given that the trial was not registered and no protocol was published before the study was reported.

Effects of interventions

See: [Summary of findings for the main comparison](#)

Effects of day care on outcomes relevant for this review that were addressed in the included study are presented below. Because this review includes only one study, no pooled ('total') effect sizes were calculated.

Primary outcomes

Child intellectual development

Cognitive ability (e.g. IQ, development quotient)

The included study measured cognitive ability using modified versions of the British Ability Scale-II (BAS-II) and the African Child Intelligence Tests (ACIT). Neither scale was used in full nor scored in the standard way. The BAS-II contains six measures, only four of which were reported. The ACIT contains 11 measures, only three of which were reported. The overall score for child cognitive ability on each scale is intended to be derived from the subscales and normalised to child age; however, Mwaura 2008 reported only subscale scores separately and did not normalise scores to child age.

In this review, we report the BAS-II effect estimate by summing the effects of the four subscales (standardised mean difference (SMD) 0.74, 95% confidence interval (CI) 0.48 to 1.00, 256 participants,

1 study, very low-quality evidence) (see [Summary of findings for the main comparison](#)). For the 'Summary of findings' table, we summed the BAS-II effect estimates because this scale has been published and validated as a measure of child cognitive ability, although we note that it may not be valid in the East African communities assessed by [Mwaura 2008](#). Available subscale effect estimates of BAS-II are as follows: building blocks (SMD 0.13, 95% CI -0.12 to 0.38, 256 participants, 1 study), verbal comprehension (SMD 0.48, 95% CI 0.23 to 0.74, 256 participants, 1 study), number concept (SMD 0.55, 95% CI 0.29 to 0.80, 256 participants, 1 study) and picture similarities (SMD 0.33, 95% CI 0.08 to 0.58, 256 participants, 1 study). We did not include ACIT effect estimates in [Summary of findings for the main comparison](#) because we could not locate a published version of the measure, we identified no evidence that it has been validated in any context and only a small portion of the total measure was reported. The three available subscale effect estimates of the ACIT are as follows: verbal meaning (SMD 0.33, 95% CI 0.08 to 0.58, 256 participants, 1 study), exclusion (SMD 0.56, 95% CI 0.30 to 0.82, 256 participants, 1 study) and closure (SMD 0.66, 95% CI 0.40 to 0.91, 256 participants, 1 study). In practice, little difference was noted between results for the BAS-II and the ACIT, and the evidence was very limited, so focusing on one measure rather than the other would not change the conclusions of this review.

In addition to providing unadjusted means of the individual subscales, the included study reported the results of a regression analysis that investigated the relationship between day care attendance and cognitive ability post intervention. Cognitive ability was measured as an aggregate score of all seven subscales (BAS-II and ACIT), and the regression analysis controlled for children's baseline cognitive ability, age and gender and for parental education. As suggested by the standardised mean differences, results of this regression analysis indicate that centre-based day care may have a beneficial effect on the cognitive ability of children (standardised $\beta = 0.204$, P value < 0.05).

The included study did not report data related to attainment of educational goals (a primary outcome) nor on child psychosocial development (another primary outcome).

Secondary outcomes

The included study provided no data on any of the secondary outcomes, namely, maternal and family outcomes and incidence of infectious diseases.

DISCUSSION

Summary of main results

This is the first systematic review of trials that have assessed the effects of centre-based day care without additional co-interventions on children and families in low- and middle-income countries. It

includes one study, which examined the effects of centre-based day care in Kenya, Uganda and Tanzania/Zanzibar ([Mwaura 2008](#)). Some evidence of benefit was noted, but results of this trial do not provide conclusive evidence on the effects of day care on the development and health of children, or on parental employment and income. We identified four ongoing studies that may meet eligibility criteria for inclusion in an updated version of this review following trial completion ([Alvarez](#); [Carneiro](#); [Rubio-Codina](#); [Pradham 2013](#)).

Overall completeness and applicability of evidence

The inclusion of only one study without significant detail on community demographics restricts the generalisability of the evidence discussed in this review. It is unclear to what extent this evidence would apply to groups or LMICs outside of those included in the study ([Mwaura 2008](#)). Lack of data on outcomes assessed further limits the completeness of evidence regarding how centre-based day care affects children and families in LMICs.

Potential biases in the review process

In this review, we used a comprehensive search strategy to minimise publication bias affecting the review process, but we may have missed some studies because they are not indexed in electronic databases. We searched for grey literature to minimise this potential bias but may have missed internal reports put forth by government departments or non-profit organisations.

Differences between this review and previous reviews reflect the stringent inclusion criteria of this review intended to isolate the effects of centre-based day care. Studies of centre-based day care often include other early childhood co-interventions. Had we included studies with co-interventions in addition to centre-based day care, our review would have likely included a larger set of studies (see [Agreements and disagreements with other studies or reviews](#)), which would have resulted in different conclusions.

Agreements and disagreements with other studies or reviews

The present review was conducted in tandem with a review of day care in high-income countries ([Van Urk 2014](#)), which included one trial that provides inconclusive evidence regarding the effects of centre-based day care for children younger than five years of age and families in high-income countries.

Several other reviews of day care are available (e.g. [Belsky 1988](#); [Melhuish 2004](#); [Burger 2010](#); [Engle 2011](#); [Leroy 2011](#)), including several meta-analyses (e.g. [Zoritch 2000](#); [Gorey 2001](#); [Camilli 2010](#)). It should be noted that previous reviews include evaluations of day care with additional interventional components and thus include a greater number of studies than are included in the current review. Only two previous reviews focused on the needs

of children in LMICs (Engle 2011; Leroy 2011), and findings reported in reviews of non-LMICs do not generalise well to LMICs. All studies included in Leroy 2011 were excluded from the present review because they were retrospective, or because they estimated day care attendance instead of directly assessing participation. The present review nevertheless agrees with Leroy 2011 in calling for more rigorous studies that examine the effects of centre-based day care in LMICs. All but one study (Mwaura 2008) included in Engle 2011 were excluded from the present review because they lacked a qualifying control group, they did not perform a pretest before providing the intervention or they included a non-qualifying co-intervention. The present review conducted the most comprehensive search of day care trials in LMICs performed to date and provides the most complete list of controlled trials evaluating centre-based day care (see the Excluded studies table).

AUTHORS' CONCLUSIONS

Implications for practice

In recent years, significant attention has been given to improvement of early childhood education in low- and middle-income countries (LMICs). Many governmental, intergovernmental and non-profit organisations have developed and implemented interventions, which often include some form of centre-based day care. This review found only one study that met the inclusion criteria and assessed the prespecified benefits or harms of such centre-based care as a sole intervention for children younger than five years of age and their families in LMICs. The study provides little robust information that parents, policymakers and other stakeholders can use in making decisions about the use of such services.

Evidence from systematic reviews that include study designs beyond those meeting the inclusion criteria of this review and assess day care as an isolated intervention (i.e. without significant

co-interventions) may offer some guidance to those concerned. However, high-quality evidence on this widely available service of centre-based day care is lacking, and recommendations for future research are provided in the next section.

Implications for research

Although many studies have examined different components of day care, a paucity of rigorous studies evaluating centre-based day care alone versus alternative day care options (including care at home by parents or co-parents) has been discovered. Of the 139 LMICs currently classified by the World Bank, this review identified completed randomised controlled trials (RCTs) from only two countries that had examined the effects of centre-based day care. These studies were excluded on the basis of their target population (Martinez 2012) and their inclusion of non-eligible co-interventions (Pérez-Escamilla 1995). We did include four ongoing RCTs that may meet eligibility criteria for inclusion in an updated version of this review following trial completion (Alvarez; Carneiro; Rubio-Codina; Pradham 2013). Taken together, these RCTs demonstrate that it is feasible to utilise more rigorous methods when studying the impact of centre-based day care in LMICs.

Whether designed as an RCT or a non-RCT, future studies that evaluate centre-based day care should attempt to measure intermediary variables (e.g. curricula, feeding programmes) that may help to explain the pathways of impact (Leroy 2011). Similarly, in light of the likelihood for day care programmes to differ in both design and intensity, future studies should fully report the cultural context while detailing each intervention component (e.g. quality of care, co-interventions, duration and dose of the programme).

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Mwaura 2008

Methods	<p>Study design: Prospective, non-randomised design with a contemporaneous control group and outcome assessment conducted both before and after intervention. This study evaluated 2 centre-based day care intervention groups (children attending Madrasa Resource Centres and children attending standard centre-based care) against 1 comparison group (children cared for at home)</p> <p>Sampling: Standard day care centres were chosen according to their proximity to Madrasa Resource Centres. It is unclear how these initial Madrasa centres were selected. Classrooms within each day care centre were non-randomly selected, then children were randomly selected from within each classroom, starting with 3-year-olds</p> <p>Follow-up duration: 24 months</p>
Participants	<p>Setting: Communities in Kenya, Uganda and Tanzania/Zanzibar; further information on the setting of these communities (e.g. rural vs urban) and the criteria used in their selection was not provided</p> <p>Participants: This study was a subset of a larger study comprising 906 children. The data reported in this study included only children who were pretested upon entry into the centre and were post-tested in the last 3 months of their second year of involvement. This resulted in the exclusion of 483 children from analyses. Of the remaining 423, 167 received Madrasa Resource Centre care, which included a non-qualifying co-intervention. Thus, the final comparison included in this review comprised 157 children attending standard centre-based day care versus 99 children cared for at home. At pretest, most of the children in the total sample were between 4 and 5 years of age (70%), and 3-year-olds constituted 19% of the sample. A small number (8%) were older than 5 years of age, as they were attending classrooms serving younger children. 45% of the sample was from Tanzania/Zanzibar, and 33% and 22% were from Kenya and Uganda, respectively. 49% of the children were female</p>
Interventions	<p>Intervention group: Children receiving community- or government-run, centre-based care (preschool) using standard learning pedagogy; teachers at these centres were trained, supervised and mentored by the District Centre for early Childhood Education (DICEDCE)</p> <p>Comparison group: Children recruited from intervention neighbourhoods who were cared for at home</p>
Outcomes	<p>Cognitive development</p> <ul style="list-style-type: none"> • 4 of 6 subscales (block building, verbal comprehension, early number concept, picture similarities) were modified from the British Ability Scale-II • 3 of 11 subscales (verbal meaning, exclusion, closure) were modified from the African Child Intelligence Test
Notes	<p>The primary objective of this study was to evaluate the effects of different types of centre-based care. Three separate comparisons were made in this effort: (1) Madrasa Resource Centre versus home care, (2) Madrasa Resource Centre versus standard day care centre and (3) standard day care centre versus home care. Only the latter comparison (standard day care centre vs home care) met the inclusion criteria for this review. The Madrasa</p>

	Resource Centres were excluded for including a non-qualifying co-intervention (i.e. an intervention that educated the community about the value of early childhood education and trained teachers using an Islamic-based curriculum). It is possible that the influence of these Madrasa-based co-interventions also influenced the families and children of the standard day care centre and control groups, as they were chosen from surrounding areas	
Risk of bias		
Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Non-randomly selected day care centres and classrooms within day care centres. Randomly selected children from school rosters and non-randomly selected controls from children in the surrounding community who were cared for at home
Allocation concealment (selection bias)	High risk	Did not use random allocation
Blinding of participants and personnel (performance bias) All outcomes	High risk	The nature of the intervention (obvious difference between receiving day care and not receiving it) makes this form of blinding impossible
Blinding of outcome assessment (detection bias) All outcomes	High risk	All cognitive assessments of children and interviews with parents were conducted on a one-to-one basis. Each data collector visited the school for a continuous period of 2 weeks. Thus assessors were not blind to intervention status
Incomplete outcome data (attrition bias) All outcomes	High risk	Of 906 children, 483 were not included in the analyses of this study for lack of pretest before intervention; it is unclear whether these children significantly differed from those included in the analyses. In addition, of the 48 day care centres recruited at baseline, 1 dropped out, but no details were given regarding the effect of this attrition on final mean estimates
Selective reporting (reporting bias)	Unclear risk	We could not find any prepublished protocol. Study authors used only modified portions of the British Ability and African Child Intelligence scales and did not score subscales in the standard way. A protocol was not available, so it is unclear whether modifications to scoring and analysis of these measures were prespecified

Mwaura 2008 (Continued)

Other bias	High risk	The study report does not provide enough information about baseline characteristics or sample settings to allow determination of additional risks of bias
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Characteristics of excluded studies [ordered by study ID]

Study	Reason for exclusion
About 2006	Cross-sectional
About 2008	Inclusion of a non-qualifying co-intervention (parenting programme and book lending)
About 2011	Lack of qualifying control group. Evaluated improved preschool programme; also included non-qualifying co-intervention (parenting programme)
Armezin 2006	Inclusion of a non-qualifying co-intervention (home visits by health workers); also lacked qualifying control group
Asoegwu 2013	Longitudinal but lacked pretest before centre-based intervention
Atalah 1989	Lack of qualifying control group
Attanasio 2004	Longitudinal but lacked pretest before centre-based intervention
Attanasio 2009	Longitudinal but lacked pretest before centre-based intervention
Attanasio 2012	Longitudinal but lacked pretest before centre-based intervention
Baba 1996	Cross-sectional
Baker-Henningham 2009	Lack of qualifying control group; evaluated improved preschool programme
Barros 1999	Lack of qualifying control group (original study translated from Portuguese)
Behrman 2004	Longitudinal but lacked pretest before centre-based intervention
Behrman 2005	Inclusion of non-qualifying co-interventions
Berlinski 2008	Longitudinal but lacked pretest before centre-based intervention
Berlinski 2009	Estimated day care attendance instead of measuring it
Berlinski 2011	Estimated day care attendance instead of measuring it

(Continued)

Bernal 2009	Evaluated populations not meeting inclusion criteria; also included non-qualifying co-interventions (home visits and a parent education programme)
Bernal 2013	Inclusion of non-qualifying co-interventions (home visits and a parent education programme)
Bénéfice 1994	Longitudinal but lacked pretest before centre-based intervention
Corrêa 1999	Longitudinal but lacked pretest before centre-based intervention (although measurement was taken just shortly after enrolment); emphasis on nutritional intervention within day care
Cueto 1999	Longitudinal but lacked pretest before centre-based intervention
Cueto 2009	Inclusion of a non-qualifying co-intervention (a parenting programme aimed at promoting child-rearing practices centred around child needs)
Curi 2006	Lacked pretest before intervention; retrospective
Doan 1993	Cross-sectional
Fernandes 1981	Lack of qualifying control group
Fonseca 1996	Longitudinal but lacked pretest before centre-based intervention; retrospective
Habibov 2012	Cross-sectional
Hallman 2002	Cross-sectional
Harding 2012	Cross-sectional
Hernández 1999	Longitudinal but lacked pretest before centre-based intervention
Hillis 1992	Longitudinal but lacked pretest before centre-based intervention
Hillis 1994	Longitudinal but lacked pretest before centre-based intervention
Instituto Nacional de Salud Publica 2012	Longitudinal but lacked pretest before centre-based intervention
Kagitcibasi 2001	Longitudinal but lacked pretest before centre-based intervention
Kaytaz 2004	Lack of qualifying control group
Leuning 1995	Lack of qualifying control group
Lokshin 2000	Lack of qualifying control group

(Continued)

Lordelo 2007	Longitudinal but lacked pretest before centre-based intervention
Malmberg 2011	Lack of qualifying control group
Marques da Silva 2011	Inclusion of non-qualifying co-interventions
Martinez 2012	Inclusion of a non-qualifying co-intervention (a parental programme that encouraged parents to enrol their children in the intervention and participate in parenting meetings and maintenance activities)
Miller 1975	Lack of qualifying control group
Montie 2006	Lack of qualifying control group
Moore 2008	Lack of qualifying control group; evaluated improved preschool programme
Morris 2009	Lack of qualifying control group; evaluated improved preschool programme
Nakahara 2010	Lack of qualifying control group
Opel 2009	Lack of qualifying control group; evaluated improved preschool programme
Pandey 1991	Inclusion of non-qualifying co-interventions (home visits by health workers and a parenting programme aimed at proper child nutrition and health)
Poudel 2004	Cross-sectional
Pérez-Escamilla 1995	Inclusion of non-qualifying co-interventions (medical intervention and home visits); evaluated populations not meeting inclusion criteria
Raine 2003	Lack of qualifying control group; evaluated improved preschool programme
Rao 2012a	Longitudinal but lacked pretest before centre-based intervention
Rao 2012b	Longitudinal but lacked pretest before centre-based intervention
Richter 1994	Cross-sectional
Rolla San Francisco 2006	Lack of qualifying control group; evaluated improved preschool programme
Ruel 2006	Cross-sectional
Santos 2013	Lack of qualifying control group; evaluated improved preschool programme
Sarkar 2013	Lack of outcomes assessed in this study
Seguel 2013	Longitudinal but lacked pretest before centre-based intervention

(Continued)

Sempértégui 1995	Longitudinal but lacked pretest before centre-based intervention
Silva 2000	Cross-sectional
Silva 2011	Inclusion of a non-qualifying co-intervention (a parenting programme aimed at encouraging parental participation in day care)
Taiwo 2002	Longitudinal but lacked pretest before centre-based intervention
Urzua 2010	Longitudinal but lacked pretest before centre-based intervention
Vargas Catalán 1994	Longitudinal but lacked pretest before centre-based intervention
Watanabe 2005	Inclusion of a non-qualifying co-intervention (study evaluated a teacher training programme related to child-centred teaching)

Characteristics of studies awaiting assessment [ordered by study ID]

Temcharoen 1988

Methods	
Participants	
Interventions	
Outcomes	
Notes	Review authors were unable to obtain reports associated with this title

Characteristics of ongoing studies [ordered by study ID]

Alvarez

Trial name or title	Bolivia-BO early childhood care and development in the poorest and most vulnerable urban districts of La Paz and El Alto
Methods	Objective is to reduce child-care constraints for unemployed or precariously employed young mothers and promote their quality of life as well as the education, health and cognitive development of their children (from conception to 6 years of age). This goal will be attained through the provision of sustainable and culturally appropriate early child development services in 18 districts in the cities of La Paz (6) and El Alto (12)
Participants	Children and families in Bolivia
Interventions	Unclear

Alvarez (Continued)

Outcomes	Unclear
Starting date	20 August 2012
Contact information	
Notes	World Bank Report No: ISR11294 World Bank Project ID: P130580 Accessed: 15 August 2014

Carneiro

Trial name or title	Alternative models of early child care: daily centre-based care versus parental training
Methods	This evaluation gathers data on 2 cohorts comparing 2 treatments: (1) drawing from a randomised trial of weekday child-care centres compared with no public care, with a cohort of 5000 children entering crèches in 2008, the evaluation will gather student development information, providing results on the relative impact of weekday child-care centres versus no government care on both parenting activities and child development. (2) The pilot PIC evaluation allows a multi-arm evaluation of weekday child-care centres versus the PIC versus no government care. For this evaluation, 10 pilot centres will be picked, so that all main geographic units in Rio de Janeiro are represented. A lottery will take place to determine which children from a cohort of 2400 are offered which types of public child care (and if any offer is made at all). The existing lottery for weekday child-care services will be supplemented in such a way that children who participate in the PIC will also be drawn randomly from among candidate children
Participants	Children entering centre-based care
Interventions	This study examines 2 programmes being implemented by the government of Rio de Janeiro in its municipality. These include weekday child-care centres that provide full-day child care from Monday to Friday, and Saturday child-care centres that provide both child care and 2 hours of parenting training (called PIC)
Outcomes	Children's cognitive performance will be measured using diagnostic tests, and children's health will be measured through growth measures (height and weight) and survey information on morbidity. Parental labour supply and investments in children will be measured through surveys. Certain characteristics measured at baseline (e. g. family's socioeconomic status) can be compared with treatment indicators to examine differential impact for different subgroups
Starting date	2008
Contact information	Pedro Carneiro, Orazio Attanasio, Ricardo Paes de Barros
Notes	3ie link: http://www.3ieimpact.org/en/evidence/impact-evaluations/details/200/ Accessed: 15 August 2014

Pradham 2013

Trial name or title	Evaluating a community-based early childhood education and development programme in Indonesia
Methods	Study design: cluster-randomised controlled trial with supplementary matched control group
Participants	Children aged 0 to 6 and their families in Indonesia. Baseline survey included children and families from 310 villages
Interventions	Community-based early education and development programme; may include centre-based care as well as additional co-interventions
Outcomes	Outcomes include (1) community access to early childhood education services, (2) community participation in early childhood education services, (3) age at first school enrolment, (4) child 'school readiness,' (5) community awareness about the importance of early childhood education and (6) persistence of breastfeeding rates, improved nutrition and improved early childhood stimulation Cognitive development, as measured by the Early Development Instrument (EDI), the Strengths and Difficulties Questionnaire (SDQ), Dimensional Change Card Sort (DCCS) and other child tasks. These measures have been pilot-tested and validated for the communities
Starting date	2006
Contact information	Corresponding author: Sally A Brinkman sallyb@ichr.uwa.edu.au
Notes	The programme was developed in collaboration with the World Bank with a total budget of US\$127.7 million and targets an estimated 738,000 children aged 0 to 6 years living in approximately 6000 poor communities. The aim of the programme is to improve access to early childhood services; the secondary aim is to improve school readiness Accessed: 15 August 2014

Rubio-Codina

Trial name or title	Evaluation of centres for infant development: an early years intervention in Colombia (provisional award)
Methods	Randomised controlled trial
Participants	Unclear
Interventions	3 versions of centre-based day care
Outcomes	Child development and demand for day care
Starting date	Unclear
Contact information	Unclear
Notes	3ie link: http://www.3ieimpact.org/en/evidence/impact-evaluations/details/739/ Accessed: 15 August 2014

DATA AND ANALYSES

Comparison 1. Centre-based day care (preschool) vs control

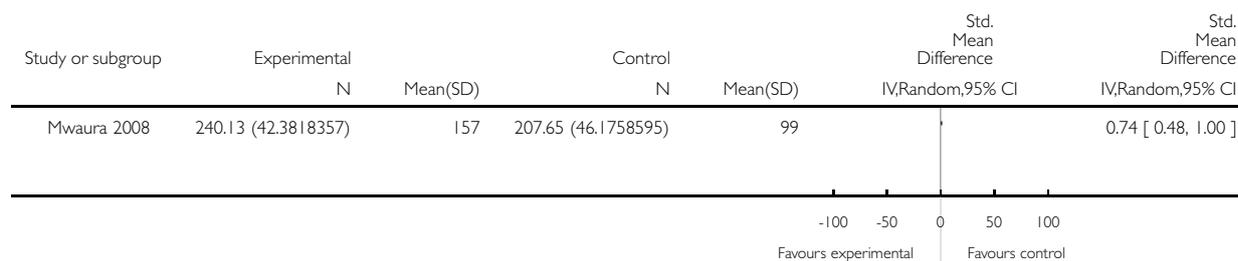
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Child cognitive ability (as measured by British Ability Scales-aggregate score)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
2 Cognitive ability (as measured by British Ability Scales-block building subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
3 Cognitive ability (as measured by British Ability Scales-verbal comprehension subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
4 Cognitive ability (as measured by British Ability Scales-number concept subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
5 Cognitive ability (as measured by British Ability Scales-picture similarities subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
6 Cognitive ability (as measured by African Child Intelligence Test-verbal meaning subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
7 Cognitive ability (as measured by African Child Intelligence Test-exclusion subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected
8 Cognitive ability (as measured by African Child Intelligence Test-closure subscale)	1		Std. Mean Difference (IV, Random, 95% CI)	Totals not selected

Analysis 1.1. Comparison 1 Centre-based day care (preschool) vs control, Outcome 1 Child cognitive ability (as measured by British Ability Scales-aggregate score).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: 1 Centre-based day care (preschool) vs control

Outcome: 1 Child cognitive ability (as measured by British Ability Scales—aggregate score)

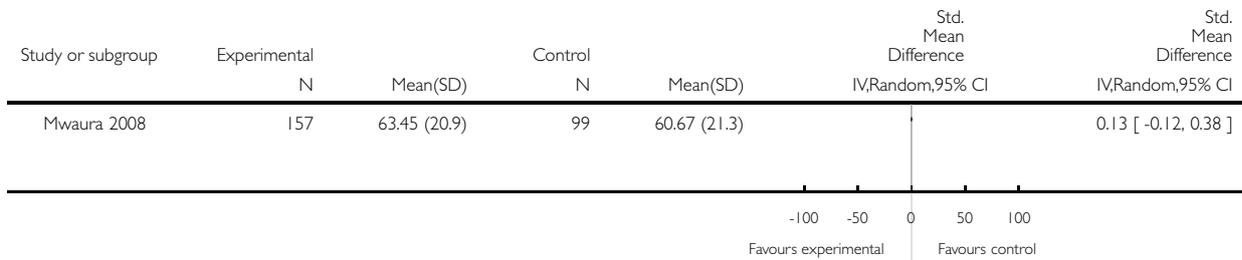


Analysis 1.2. Comparison 1 Centre-based day care (preschool) vs control, Outcome 2 Cognitive ability (as measured by British Ability Scales-block building subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: 1 Centre-based day care (preschool) vs control

Outcome: 2 Cognitive ability (as measured by British Ability Scales – block building subscale)

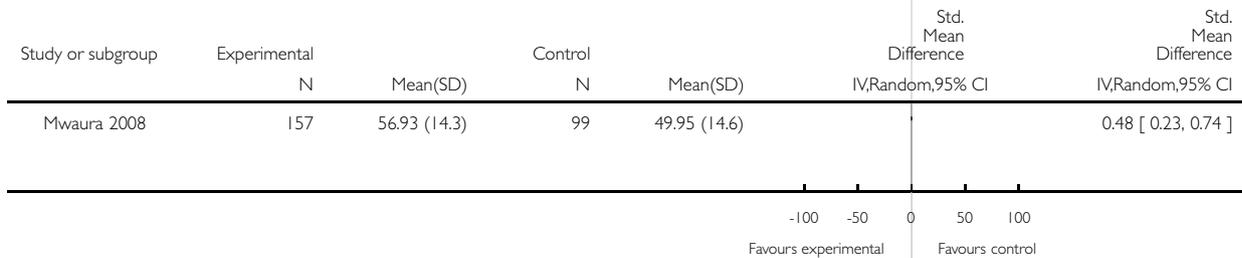


Analysis 1.3. Comparison 1 Centre-based day care (preschool) vs control, Outcome 3 Cognitive ability (as measured by British Ability Scales-verbal comprehension subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: 1 Centre-based day care (preschool) vs control

Outcome: 3 Cognitive ability (as measured by British Ability Scales—verbal comprehension subscale)

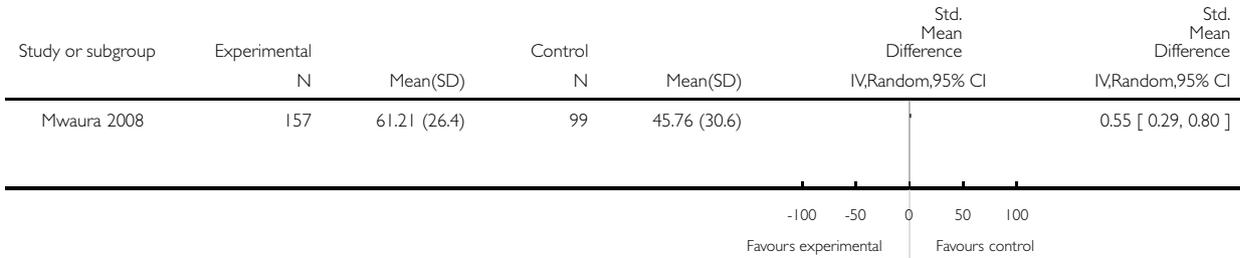


Analysis I.4. Comparison I Centre-based day care (preschool) vs control, Outcome 4 Cognitive ability (as measured by British Ability Scales-number concept subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: I Centre-based day care (preschool) vs control

Outcome: 4 Cognitive ability (as measured by British Ability Scales—number concept subscale)

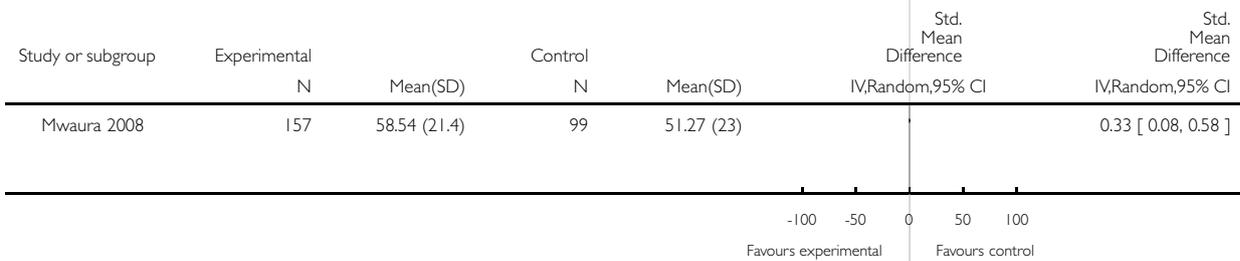


Analysis I.5. Comparison I Centre-based day care (preschool) vs control, Outcome 5 Cognitive ability (as measured by British Ability Scales-picture similarities subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: I Centre-based day care (preschool) vs control

Outcome: 5 Cognitive ability (as measured by British Ability Scales—picture similarities subscale)

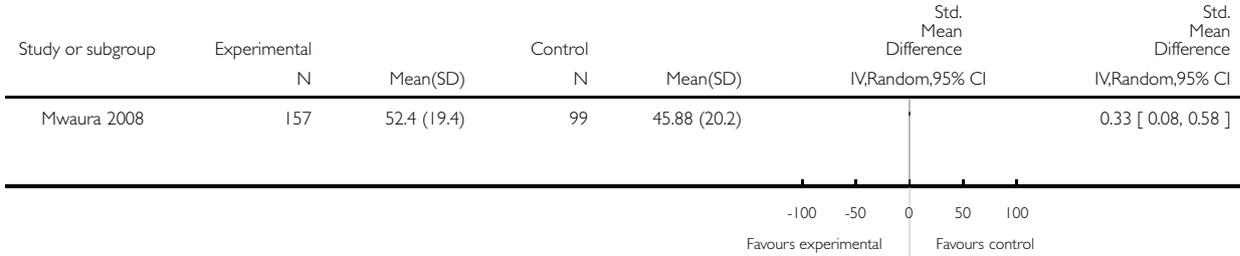


Analysis I.6. Comparison I Centre-based day care (preschool) vs control, Outcome 6 Cognitive ability (as measured by African Child Intelligence Test-verbal meaning subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: I Centre-based day care (preschool) vs control

Outcome: 6 Cognitive ability (as measured by African Child Intelligence Test—verbal meaning subscale)



Analysis I.7. Comparison I Centre-based day care (preschool) vs control, Outcome 7 Cognitive ability (as measured by African Child Intelligence Test-exclusion subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: I Centre-based day care (preschool) vs control

Outcome: 7 Cognitive ability (as measured by African Child Intelligence Test—exclusion subscale)

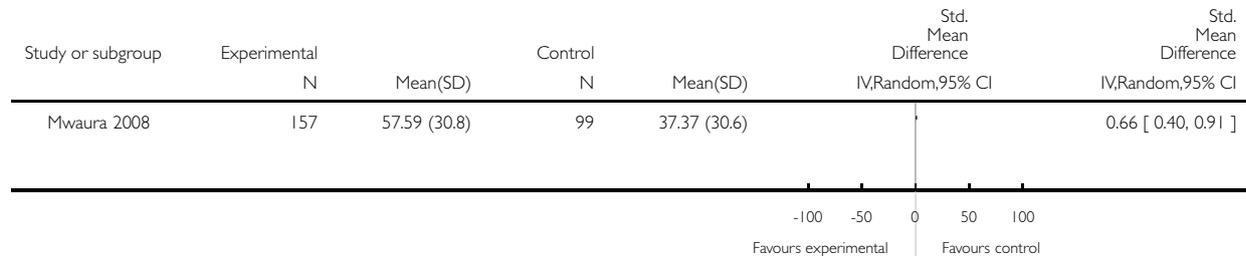


Analysis 1.8. Comparison 1 Centre-based day care (preschool) vs control, Outcome 8 Cognitive ability (as measured by African Child Intelligence Test-closure subscale).

Review: Centre-based day care for children younger than five years of age in low- and middle-income countries

Comparison: 1 Centre-based day care (preschool) vs control

Outcome: 8 Cognitive ability (as measured by African Child Intelligence Test—closure subscale)



ADDITIONAL TABLES

Table 1. Risk of bias due to possible confounders

Mwuara 2008		
Potential confounder	Authors' judgement	Support for judgement
Age of child	Unclear risk	Children in the intervention group were, on average, younger than those in the control group; this was not controlled for when point estimates of the mean effect were calculated. It is unclear whether mean effect estimates were confounded by differences in ages of children between comparison groups. Study authors included child age as a potential confounding factor in regression analyses and found that it had a statistically significant impact on overall child cognitive performance (see study report)
Sex of child	Low risk	More females (53%) were included in the intervention group as compared with the control group (44%); this baseline difference was not controlled for when mean point estimates of effect were calculated. However, child sex was included by the study authors as a potential confounding factor in regression analyses and was statistically non-significant (see study report)
Neighbourhood	Low risk	Children in control and intervention groups were selected from the same community. It is unlikely that study results were confounded by differences between children's neighbourhoods

Table 1. Risk of bias due to possible confounders (Continued)

Household income	Unclear risk	No information on differences in household income was reported
Water availability	Unclear risk	No information on water availability was reported
Water (drinking) quality	Unclear risk	No information on water (drinking) quality was reported
Excreta disposal	Unclear risk	No information on excreta disposal was reported
Children younger than 5 in household	Unclear risk	No information on numbers of children younger than 5 years in intervention and control group households was reported
Child history of illness	Unclear risk	No information on child history of illness was reported
Malnutrition at baseline	Unclear risk	No information on malnutrition at baseline was reported
Mother's education	Low risk	Detailed data on parental education were not included in the report and were not controlled for when mean point estimates of effect were calculated. However, parental education was included as a potential confounding factor in regression analyses and was not statistically significant (see study report)
Father's employment	Unclear risk	No information on father's employment was reported
Mother's employment outside the home	Unclear risk	No information on mother's employment outside the home was reported
Distance from home to day care centre	Unclear risk	No information on distance from home to day care centre was reported
Costs of transportation from home to day care centre	Unclear risk	No information on costs of transportation from home to day care centre was reported
Quality of day care centre	Unclear risk	No information on the quality of standard day care centres was reported
Fees of day care centre	Unclear risk	No information on fees of the day care centre was reported

APPENDICES

Appendix I. Methods from protocol for use in future updates

<p>Types of interventions</p>	<p>If some, but not all, of a study's participants are eligible for our review, we will ask the study authors for disaggregated data. If we are unable to obtain the appropriate disaggregated data, we will include a study if a majority (at least 51%) of participants are eligible. If we are unable to determine the exact percentage of a study's participants who are eligible, we will include the study if participants are eligible on average (e.g. mean participant age is younger than five years)</p>
<p>Selection of studies</p>	<p>Two review authors will independently screen all titles and abstracts. Relevant articles will be collected and independently screened to determine which studies meet the review inclusion criteria. We will contact study authors if further information is required. Disagreements will be resolved through discussion and consultation with other review authors</p>
<p>Data extraction and management</p>	<p>Two review authors will independently extract the following data from all included studies. Disagreement will be resolved through discussion and consultation with other review authors</p> <p>General Year of study Country of study Study design (i.e. case control, cohort) Unit of analysis (e.g. individual- or cluster-randomised) Methods used to control for confounding factors Setting of study (i.e. urban or rural, specific region or city if provided)</p> <p>Participants Numbers of study participants and clusters randomly assigned to each included group Age Sex Inclusion and exclusion criteria</p> <p>For each intervention or comparison group of interest Dose of centre-based care Duration of centre-based care Frequency of centre-based care Co-interventions provided (if any) Quality of care provided (if measured)</p> <p>For each study, we will use the lists for identifying study design recommended by The Cochrane Collaboration and will report the characteristics of study design in a 'Characteristics of included studies' table (Higgins 2011; Section 4.6.1)</p>
<p>Assessment of risk of bias</p>	<p>Two review authors (TWB and FvU) will code each included study using the Cochrane tool for assessing risk of bias (Higgins 2011 8.5.a), including</p>

(Continued)

	<p>sequence generation; allocation concealment; blinding of study participants, personnel and outcome assessors; incomplete outcome data; selective outcome reporting; and other sources of bias. In addition to these, we will assess risk of bias due to confounding and outcome validity. We will assign each category a rating of 'low,' 'high' or 'unclear' risk of bias, based on criteria for judging risk of bias provided in the <i>Cochrane Handbook for Systematic Reviews of Interventions</i> and the 'Risk of bias' assessment tool (Higgins 2011; Section 8.5.c). A rating of 'low' shall indicate that evidence was sufficient to judge that study authors used appropriate methods to avoid bias; a rating of 'high' shall indicate that evidence was sufficient to judge that study authors did not use appropriate methods to avoid bias; and a rating of 'unclear' shall indicate that information was insufficient to permit judgement of the extent to which study authors used appropriate methods to avoid bias. Disagreements will be discussed and resolved with a third review author (EMW) and, if necessary, a fourth review author (BW).</p> <p>We will report assessments of confounders using additional tables that will identify which confounding factors were considered and controlled for in each study. Confounding factors that we will explicitly assess and report include child age, child sex, neighbourhood, socioeconomic status, water availability, water (drinking) quality, excreta disposal, number of children younger than five years of age in the household, malnutrition at baseline, mother's education, father's employment, mother's employment outside the home, distance from home to day care centre, costs of transportation to day care centre, fees at day care centre, quality of day care centre, child history of illness, other. We will assess each study, as above, and will provide a rating of 'low,' 'high' or 'unclear' in terms of control for each of these confounding variables. See also 'Sensitivity analysis.'</p>
Measures of treatment effect	<p>Studies often report outcomes using multiple definitions and outcome measures. We will give preference to data involving the least manipulation by study authors or inference by review authors, that is, we will extract raw values (e.g. means, standard deviations) rather than calculated effect sizes (e.g. Cohen's <i>d</i>). If outcomes are reported as final values and as changes from baseline, we will extract the final values</p> <p>For studies with multiple time points, we will include the latest time point. If possible, we will also conduct an analysis of the prespecified time points of up to 25 months and 25 months or longer.</p> <p>We will report outcomes with a 95% confidence interval. We will use random-effects models because studies may include different interventions and populations</p>
Dichotomous data	<p>We will calculate risk ratios (RRs) and 95% confidence intervals (CIs) for dichotomous outcomes. When risk ratios or rate ratios cannot be calculated (when total sample size is unknown), we will calculate odds ratios (ORs). If we cannot calculate RRs for all studies included in an</p>

(Continued)

	<p>analysis but can calculate ORs for all studies, we will report ORs for all studies included in that analysis. RR and OR will not be combined in a meta-analysis. We will give preference to denominators in the following order: events per person-year, events per person with definite outcome known (or imputed, as described in 'Dealing with missing data'), events per person randomly assigned</p>
Continuous data	<p>We will use Hedges' (adjusted) g (a standardised mean difference) for each outcome for which continuous data are provided</p>
Unit of analysis issues	<p>Some data in this review may be derived from cluster-randomised trials, which randomly assign groups of people rather than individuals. For each cluster-randomised trial, we will first determine whether its data incorporate sufficient controls for clustering (such as robust standard errors or hierarchical linear models). If the data do not have proper controls, we will attempt to obtain an appropriate estimate of the intracluster correlation coefficient (ICC). If we cannot find an estimate in the report of the trial, we will request an estimate from the trial report authors. We will use the ICC estimate to control for clustering, according to procedures described in the <i>Cochrane Handbook for Systematic Reviews of Interventions</i> (Higgins 2011; Section 16.3.4)</p>
Dealing with missing data	<p>For all analyses, we will attempt to include all study participants, and we will contact study authors to request data, including those on all participants randomly assigned for all outcomes. When analyses are reported for completers and for control of dropout, we will extract the latter. If participant data are missing from a study, or if reasons for dropout are not included, we will contact study authors for additional information. For studies with dichotomous data, if no information can be gathered from authors, we will assume that participants in all groups for whom data are missing experienced negative outcomes. All missing data will be recorded on the data extraction sheet and reported in the 'Risk of bias' tables</p>
Assessment of heterogeneity	<p>Differences among included studies are discussed in terms of their participants, interventions, outcomes and methods. For each meta-analysis, we will visually inspect forest plots to see whether confidence intervals of individual studies have poor overlap, will conduct a Chi^2 test and will calculate the I^2 statistic. We will consider meta-analyses to have heterogeneity when the P value for Chi^2 is less than 0.10 and I^2 is greater than 25%</p> <p>Because of the likelihood of variability among participants and co-interventions across different sites, this review may include studies that are clinically heterogeneous. If studies are determined to be too clinically heterogeneous, we will not conduct a primary meta-analysis but will discuss results narratively, including detailed descriptions of the interventions of all included studies</p>

(Continued)

Assessment of reporting bias	For each meta-analysis that includes 10 or more studies, we will draw a funnel plot and look for asymmetry to assess the possibility of small-study or reporting bias (see 'Sensitivity analysis')
Data synthesis	<p>The primary meta-analysis will include centre-based day care versus non-centre-based child care (e.g. home care by a parent). We will conduct subgroup analysis as detailed below in 'Subgroup analysis and investigation of heterogeneity.'</p> <p>As recommended in the <i>Cochrane Handbook for Systematic Reviews of Interventions</i>, we will analyse and present results of randomised and non-randomised study designs separately (Higgins 2011; section 13.6.2.2) and will use forest plots to report individual study results for studies with similar design features. We will use Review Manager (RevMan) Version 5.1 (Review Manager 2012) to conduct all meta-analyses. Risk ratios (RRs) and 95% confidence intervals will be calculated for dichotomous outcomes and combined using Mantel-Haenszel methods. Mantel-Haenszel methods will be used because we expect included studies to be few and sample sizes small. When risk ratios or rate ratios cannot be calculated (when total sample size is unknown), we will calculate odds ratios (ORs). If studies report dichotomous data in multiple formats that cannot be combined in RevMan, we will use Comprehensive Meta-Analysis Version 2 software (Borenstein 2005) to calculate log risk ratios and standard errors for the data, and will enter these log risk ratios and standard errors into RevMan. If we cannot calculate RRs for all studies included in an analysis but can calculate ORs for all studies, we will report ORs for all studies included in that analysis. RRs and ORs will not be combined in a meta-analysis</p>
Subgroup analysis and investigation of heterogeneity	We will conduct the following subgroup analyses: <ul style="list-style-type: none">• Age: younger than 3 years versus 3 to 5 years• Setting: urban versus rural (as identified by study authors)• Co-intervention: centre-based day care alone versus no intervention; centre-based day care with a co-intervention (e.g. nutritional intervention) versus the same co-intervention without centre-based day care• Household income: high-income versus low-income households

Appendix 2. Search strategies

Cochrane Central Register of Controlled Trials (CENTRAL) (2014, Issue 4)-281 records-searched on 24 April 2014

Searched in trials:

1. child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies in abstract
2. daycare or day-care or “day care” or creche or nursery or (early NEAR/2 intervention) or (child* NEAR/2 center*) or (child* NEAR/2 centre*) or “childcare center*” or “childcare centre*” in title
3. #1 and #2

MEDLINE (Ovid)-10,885 records-last searched 24 April 2014

We used the following search strategy in MEDLINE and adapted it for other databases using appropriate controlled vocabulary and syntax. This strategy includes a filter for identifying trials in low- and middle-income countries developed by the Norwegian Satellite of the Cochrane Effective Practice and Organisation of Care Review Group ([The Cochrane Collaboration 2012](#)).

- 1 child day care centers/
- 2 Schools, Nursery/
- 3 “Early Intervention (Education)”/
- 4 ((early adj2 education\$) or ECCE).tw.
- 5 (creche\$ or nurser\$ or kindergarten\$ or kinder-garten\$ or preschool\$ or pre-primary or preprimary or playgroup\$ or play-group\$ or pre-school\$ or (child\$ adj3 centre\$) or (child\$ adj3 center\$)).tw.
- 6 or/1-5
- 7 child care/ or child care.tw.
- 8 (centre\$ or center\$ or facilit\$ or “out of home” or polic\$ or program\$ or scheme\$).tw.
- 9 7 and 8
- 10 exp child/
- 11 exp Infant/
- 12 (infant\$ or baby or babies or toddler\$ or child\$ or boy\$ or girl\$ or kid\$ or pre-kindergarten\$ or prekindergarten\$ or preschool\$ or pre-school\$).tw.
- 13 or/10-12
- 14 Day Care/
- 15 (daycare\$ or day-care\$ or daycentre\$ or daycenter\$ or (centre-based adj3 care\$) or (center-based adj3 care\$) or (day\$ adj3 (centre\$ or center\$))).tw.
- 16 14 or 15
- 17 13 and 16
- 18 6 or 9 or 17
- 19 Developing Countries.sh,kf.
- 20 (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,kf,ti,ab,cp.
- 21 (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d’Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or

Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjhikistan or Tadjikistan or Tadjhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,kf,ti,ab,cp.

22 ((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.

23 ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.

24 (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.

25 (low adj3 middle adj3 countr*).ti,ab.

26 (lmic or lmics or third world or lami countr*).ti,ab.

27 transitional countr*.ti,ab.

28 or/19-27

29 18 and 28

EMBASE (Ovid)-13,110 records-last searched 24 April 2014

1. child day care centers/

2. Schools, Nursery/

3. "Early Intervention (Education)"/

4. ((early adj2 education\$) or ECCE).tw.

5. (creche\$ or nurser\$ or kindergarten\$ or kinder-garten\$ or preschool\$ or pre-primary or preprimary or playgroup\$ or play-group\$ or pre-school\$ or (child\$ adj3 centre\$) or (child\$ adj3 center\$)).tw.

6. or/1-5

7. child care/ or child care.tw.

8. (centre\$ or center\$ or facilit\$ or "out of home" or polic\$ or program\$ or scheme\$).tw.

9. 7 and 8

10. exp child/

11. exp Infant/

12. (infant\$ or baby or babies or toddler\$ or child\$ or boy\$ or girl\$ or kid\$ or pre-kindergarten\$ or prekindergarten\$ or preschool\$ or pre-school\$).tw.

13. or/10-12

14. Day Care/

15. daycare\$ or day-care\$ or daycentre\$ or daycenter\$ or (centre-based adj3 care\$) or (center-based adj3 care\$) or (day\$ adj3 (centre\$ or center\$)).tw.

16. 14 or 15

17. 13 and 16

18. 6 or 9 or 17

19. Developing Countr\$.ab,ti.

20. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,ti,ab,cp.

21. (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Camerons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya

or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldavia or Moldovan or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhiestan or Tadjikistan or Tadjhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,ti,ab,cp.

22. ((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.

23. ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.

24. (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.

25. (low adj3 middle adj3 countr*).ti,ab.

26. (lmic or lmics or third world or lami countr*).ti,ab.

27. transitional countr*.ti,ab.

28. or/11-19

29. 18 and 28

PsycINFO (Ovid)-2963 records-last searched 24 April 2014

1. ((early adj2 education\$) or ECCE).tw.

2. (creche\$ or nurser\$ or kindergarten\$ or kinder-garten\$ or preschool\$ or pre-primary or preprimary or playgroup\$ or play-group\$ or pre-school\$ or (child\$ adj3 centre\$) or (child\$ adj3 center\$)).tw.

3. or/1-2

4. child care/ or child care.tw.

5. (centre\$ or center\$ or facilit\$ or "out of home" or polic\$ or program\$ or scheme\$).tw.

6. 4 and 5

7. (infant\$ or baby or babies or toddler\$ or child\$ or boy\$ or girl\$ or kid\$ or pre-kindergarten\$ or prekindergarten\$ or preschool\$ or pre-school\$).tw.

8. daycare\$ or day-care\$ or daycentre\$ or daycenter\$ or (centre-based adj3 care\$) or (center-based adj3 care\$) or (day\$ adj3 (centre\$ or center\$)).tw.

9. 7 and 8

10. 3 or 6 or 9

11. Developing Countr\$.ab,ti.

12. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,ti,ab,cp.

13. (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East

or Moldova or Moldavia or Moldovan or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjikistan or Tadjikistan or Tadjik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,ti,ab,cp.

14. ((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.

15. ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.

16. (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.

17. (low adj3 middle adj3 countr*).ti,ab.

18. (lmic or lmics or third world or lami countr*).ti,ab.

19. transitional countr*.ti,ab.

20. or/11-19

21. 10 and 20

ERIC-1041 records-last searched 24 April 2014

(<http://eric.ed.gov/>)

1. Title:child* or Title:infant* or Title:boys or Title:girls or Title:toddler* or Title:pre-kindergarten or Title:prekindergarten or Title:“pre kindergarten” or Title:baby or Title:babies

2. Title:daycare or Title:day-care or (Title:day and Title:care) or Title:creche or Title:nursery or (Title:early and Title:NEAR/2 and Title:intervention) or (Title:child* and Title:NEAR/2 and Title:center*) or (Title:child* and Title:NEAR/2 and Title:centre*) or Title:“childcare center*” or Title:“childcare centre*”

3. #1 and #2

Social Sciences Citation Index (Web of Science)-2673 records-last searched 24 April 2014

1. Title= child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies

2. Title= daycare or day-care or “day care” or creche or nursery or (early NEAR/2 intervention) or (child* NEAR/2 center*) or (child* NEAR/2 centre*) or “childcare center*” or “childcare centre*”

3. #1 and #2

SCOPUS-3723 records-last searched 24 April 2014

(www.scopus.com/)

1. TITTLE(daycare or day-care or “day care” or creche OR nurser* or “early intervention*” or “child care center*” or “child care centre*” or “childcare center*” or “childcare centre*”)

2. TITTLE(child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies)

3. #1 and #2

LILACS-738 records-last searched 25 April 2014

(<http://lilacs.bvsalud.org/en/>)

1. child or children or infant or boys or girls or kid or kids or toddler or toddlers or pre-kindergarten or prekindergarten or baby or babies or mother or mothers or maternal or family or families, in abstract words

2. daycare or day-care or creche or nursery or nurseries or preschool, in abstract words

3. #1 and #2

ZETOC-957 records-last searched 24 April 2014

(<http://zetoc.mimas.ac.uk/>)

1. Daycare

2. Day-care

3. “Day care”

4. “Early Intervention”

5. #1 or #2 or #3 or #4

Conference Proceedings Citations Index-Social Sciences & Humanities (Web of Science)-132 records-last searched 24 April 2014

1. Title= child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies
2. Title= daycare or day-care or “day care” or creche or nursery or (early NEAR/2 intervention) or (child* NEAR/2 center*) or (child* NEAR/2 centre*) or “childcare center*” or “childcare centre*”
3. #1 and #2

Global Health Library (Ovid)-9324 records-last searched 24 April 2014

1. ((early adj2 education\$) or ECCE).tw.
2. (creche\$ or nurser\$ or kindergarten\$ or kinder-garten\$ or preschool\$ or pre-primary or preprimary or playgroup\$ or play-group\$ or pre-school\$ or (child\$ adj3 centre\$) or (child\$ adj3 center\$)).tw.
3. or/1-2
4. child care/ or child care.tw.
5. (centre\$ or center\$ or facilit\$ or “out of home” or polic\$ or program\$ or scheme\$).tw.
6. 4 and 5
7. (infant\$ or baby or babies or toddler\$ or child\$ or boy\$ or girl\$ or kid\$ or pre-kindergarten\$ or prekindergarten\$ or preschool\$ or pre-school\$).tw.
8. daycare\$ or day-care\$ or daycentre\$ or daycenter\$ or (centre-based adj3 care\$) or (center-based adj3 care\$) or (day\$ adj3 (centre\$ or center\$))).tw.
9. 7 and 8
10. 3 or 6 or 9
11. Developing Countr\$.ab,ti.
12. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,ti,ab,cp.
13. (Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Camerons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d’Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kirgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjikistan or Tadjikistan or Tadjik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,ti,ab,cp.
14. ((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (count* or nation? or population? or world)).ti,ab.
15. ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.
16. (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.

17. (low adj3 middle adj3 countr*).ti,ab.
18. (lmic or lmic3 or third world or lami countr*).ti,ab.
19. transitional countr*.ti,ab.
20. or/11-19
21. 10 and 20

British Library for Development Studies-165 records-last searched 25 April 2014

(<http://blids.ids.ac.uk>)

- Search 1: Early childhood AND Child care
 Search 2: Early childhood AND Child development
 Search 3: Preschool AND Child development
 Search 4: Preschool AND Child care

World Bank (JOLIS)-16 records-last searched 25 April 2014

(<http://external.worldbankimflib.org/external.htm>)

1. child or infant or boys or girls or toddlers or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies, in keywords anywhere
2. daycare or day-care or “day care” or creche or nursery or “early intervention” or “childcare center*” or “childcare centre*” in titles.
3. #1 and #2

Pan American Health Organization (PAHO)-13 records-last searched 25 April 2014

(www.paho.org/usa/)

1. child or children or infant or boys or girls or kid or kids or toddler or toddlers or pre-kindergarten or prekindergarten or baby or babies or mother or mothers or maternal or family or families in abstract words
2. daycare or day-care or creche or nursery or nurseries or preschool in abstract words
3. #1 and #2

WHO Library & Information Networks for Knowledge Database (WHOLIS)-358 records-last searched 25 April 2014

(www.who.int/library/databases/en/)

1. child or children or infant or boys or girls or kid or kids or toddler or toddlers or pre-kindergarten or prekindergarten or baby or babies or mother or mothers or maternal or family or families, in abstract words
2. daycare or day-care or creche or nursery or nurseries or preschool, in abstract words
3. #1 and #2

POPLINE-1559 records-last searched 24 April 2014

(www.popline.org/)

1. Title (daycare or day-care or “day care” or creche or nurser* or “early intervention*” or “child care center*” or “child care centre*” or “childcare center*” or “childcare centre*”)
2. Title (child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies)
3. #1 AND #2

African Index Medicus (WHO Afrolib)-41 records-last searched 25 April 2014

(<http://afrolib.afro.who.int/cgi-bin/wxis.exe/iah/?IsisScript=iah/iah.xic&lang=I&base=afrolib>)

1. KEYWORD(child or children or infant or boys or girls or kid or kids or toddler or toddlers or pre-kindergarten or prekindergarten or baby or babies or mother or mothers or maternal or family or families)
2. KEYWORD(daycare or day-care or creche or nursery or nurseries or preschool)

Western Pacific Region Index Medicus (WPRIM)-918 records-last searched 25 April 2014

(<http://wprim.org>)

- Search 1: daycare OR day-care OR creche OR nursery OR nurseries OR preschool [Key Word]
 Search 2: day AND care [Key Word]
 Search 3: early AND intervention [Key Word]
 Search 4: child AND development AND center [Key Word]
 Search 5: child AND development AND centre [Key Word]
 Search 6: childcare AND centre [Key Word]
 Search 7: childcare AND center [Key Word]

Index Medicus for South-East Asia Region (IMSEAR)-209 records-last searched 11 May 2014

(<http://imsear.hellis.org>)

- KEYWORD(daycare or 'day care' or childcare or 'child care' or nursery or creche or 'child development centre' or 'child development center')

Open Grey-361 records-last searched 24 April 2014

(www.opengrey.eu/)

(child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies) AND (daycare or day-care or “day care” or creche or nursery or (early NEAR/2 intervention) or (child* NEAR/2 center*) or (child* NEAR/2 centre*) or “childcare center*” or “childcare centre”)

PQTD Open-415 records-last searched 24 April 2014

(<http://pqdtopen.proquest.com/search.html>)

1. Ti(daycare or day-care or “day care” or creche or nurser* or “early intervention*” or “child care center*” or “child care centre*” or “childcare center*” or “childcare centre”)
2. Ti(child* or infant* or boys or girls or toddler* or pre-kindergarten or prekindergarten or “pre kindergarten” or baby or babies)
3. #1 and #2

Clinical Trials.gov-1934 records-last searched 24 April 2014

(<https://clinicaltrials.gov/>)

(daycare or day-care or “day care” or creche or nurser* or “early intervention*” or “child care center*” or “child care centre*” or “childcare center*” or “childcare centre”) AND (child* or infant* or boys or girls or toddler* or baby or babies)

International Clinical Trials Registry Platform (limited to Clinical Trials in Children)-18 records-last searched 24 April 2014

(<http://apps.who.int/trialsearch/>)

Title (daycare or day-care or “day care” or creche or nursery or (early NEAR/2 intervention) or (child* NEAR/2 center*) or (child* NEAR/2 centre*) or “childcare center*” or “childcare centre”)

Appendix 3. Excluded studies

Study	Design	Country	Number	Age range	Study duration (months)	Intervention	Specified co-interventions (intervention group only)	Outcome (s) measured
Asoegwu 2013	Prospective longitudinal cohort	Nigeria	152	6-24 months	12	Centre-based day care	Unclear	Child infectious disease: prevalence of otitis media
Attanasio 2004	Longitudinal cohort	Colombia	4557	0-6 years	24	Centre-based day care (Hogares Comunitarios)	Feeding	Health: weight-for-age, height-for-age Family and parental outcomes: maternal employment, maternal hours worked

(Continued)

Attanasio 2009	Longitudinal cohort	Colombia	Unclear	0-7 years	54	Centre-based day care (Hogares Comunitarios)	Feeding	Child health: height-for-age
Attanasio 2012	Longitudinal cohort	Colombia	Unclear	0-6 years	54	Centre-based day care (Hogares Comunitarios)	Feeding	Child health: height-for-age
Behrman 2004	Longitudinal cohort	Bolivia	1026	6-72 months	24	Centre-based day care (Proyecto Integral de Desarrollo Infantil)	Feeding, education, health care	Child health: weight-for-age, height-for-age Child psychosocial development
Bénéfice 1994	Prospective longitudinal cohort	Senegal	69	42-66 months	12	Centre-based day care	Education, feeding	Child development: motor performance
Berlinski 2008	Longitudinal cohort	Uruguay	23,042/2299	Unclear	2001-2005 data	Preschool	Unclear	Child educational outcomes: maximum years enrolled in school, maximum grade attained
Berlinski 2009	Econometric	Argentina	Over 100,000	3-5 years	1991-2001 data	Preschool	Education	Child academic achievement: mathematics test scores, Spanish language test scores
Berlinski 2011	Econometric	Argentina	10,990-11,984	4-5 years	Data pooled from 1995-2001	Preschool	Education	Family and parental outcomes:

(Continued)

								maternal employment, full-time maternal employment, maternal hours worked
Corrêa 1999	Prospective longitudinal cohort	Brazil	44	6-78 months	12	Feeding programme at centre-based day care	Feeding	Child health: height-for-age, weight-for-height
Curi 2006	Econometric	Brazil	Unclear	0-72 months	Data from the Survey of Living Standards, conducted by IBGE, between March 1996 and March 1997	Creche and centre-based day care	Unclear	Child academic achievement: completion of education from primary to gymnasium, high school and university
Fonseca 1996	Case control	Brazil	1300	0-23 months	Unclear	Centre-based day care	None specified	Child infectious diseases: prevalence of pneumonia
Hernández 1999	Prospective longitudinal cohort	Mexico	300	0-4 months	12	Centre-based day care	None specified	Child infectious diseases: incidence of acute respiratory infection
Hillis 1992	Prospective longitudinal cohort	Colombia	489	Younger than 60 months	5	Centre-based day care	Feeding	Child health: incidence of diarrhoea
Hillis 1994	Prospective longitudinal cohort	Colombia	461	Younger than 60 months	5	Centre-based day care	Feeding	Child health:

(Continued)

	dinal cohort			months		care		growth velocity
Instituto Nacional de Salud Publica 2012	Prospective longitudinal cohort (pipeline)	Mexico	2843	12-57 months	Variable (longer than 1 month)	Centre-based day care	Unclear	Family and parental outcomes: mothers' labour force participation and time use (and that of primary caregivers), overall household income, maternal mental health Child health: prevalence of illness (diversity of diet) Child development: communication skills and personal-social behaviour
Kagitcibasi 2001	Prospective factorial cohort	Turkey	255/217	36-60 months	54	Intervention 1: educational, centre-based day care. Intervention 2: custodial day care	Intervention 1: education. Intervention 2: none specified.	Child development: cognitive ability and social development.
Lordelo 2007	Prospective longitudinal cohort	Brazil	37	13-37 months	26	Centre-based day care	Feeding	Child development: cognitive ability.

(Continued)

Martinez 2012	Cluster-randomised controlled trial	Mozambique	76 communities	36-59 months	24	Centre-based day care	Teacher and parental training	Child development: cognitive ability, language development. Child psychosocial development: socioemotional development. Child health. Child educational achievement: primary school enrolment, sibling school enrolment
Pérez-Escamilla 1995	Prospective longitudinal cohort comparing children initiating day care at various ages	Colombia	301	3-5 to 6.1 years	6.5	Centre-based day care	Education, health care, feeding, (1 intervention group also had home visits)	Child health: anthropometry. Child development: cognitive development.
Rao 2012a	Prospective longitudinal cohort	Cambodia	1312 (120/548/292)	Younger than 60 months	7	Intervention 1: state preschool Intervention 2: community preschool Intervention 3: home-based groups	Education	Child development: cognitive development (as assessed by the Cambodian Development Assessment Test)

(Continued)

Rao 2012b	Prospective longitudinal cohort (comparison based on previous day care/ preschool attendance)	China	205	3-7 years	12	Preschool programmes (kindergarten, preprimary, Grade 1 'sitting in')	Education	Child academic achievement: school preparedness, literacy and mathematics attainment at first grade
Sarkar 2013	Prospective longitudinal cohort	India	3320	1-5 years	60	Centre-based day care	Feeding	Child health: z-scores for height-for-age (HAZ), weight-for-age (WAZ) and body-mass-index-for-age (BMIZ)
Seguel 2013	Prospective longitudinal cohort	Chile	427	3-48 months	48	Centre-based day care (National Preschool Association (JUNJI))	Unclear	Child development
Sempértegui 1995	Prospective longitudinal cohort	Ecuador	230	12-42 months	9	Centre-based day care	Feeding	Child health: incidence of diarrhoea
Urzua 2010	Econometric	Chile	6500	0-5 years	Data pooled from 2001 to 2006	Centre-based day care	Unclear	Child development: cognitive and socioemotional development
Vargas Catalán 1994	Prospective longitudinal cohort	Chile	193	12-18 months	6.5	Centre-based day care	None specified	Child health: incidence of

(Continued)

									lower respi- ratory infec- tion
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CONTRIBUTIONS OF AUTHORS

All review authors contributed to drafting the protocol.

DECLARATIONS OF INTEREST

Taylor W Brown-none known.

Felix C van Urk-none known.

Rebecca Waller-none known.

Evan Mayo-Wilson-none known.

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- Centre for Outcomes Research and Effectiveness, Research Department of Clinical, Educational and Health Psychology, University College London, UK.

Salary

- Centre for Evidence-Based Intervention, Department of Social Policy and Intervention, University of Oxford, UK.

Salary, graduate stipends

- National Collaborating Centre for Mental Health (NCCMH), UK.

Salary

External sources

- No sources of support supplied

NOTES

The review authors are publishing another related review: Van Urk FC, Brown TW, Waller R, Mayo-Wilson E. Centre-based day care for children younger than five years of age in high-income countries. Cochrane Database of Systematic Reviews, in press.