

Report on review of interventions focused on migration stressors, to improve life course health trajectories

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Table of Contents

1. Objective of Subtask 9.2.2	3
2. Review question	3
3. Eligibility criteria	3
3.1. Study design	3
3.2. Participants/population.....	3
3.3. Interventions	4
3.4. Comparator.....	4
3.5. Primary outcomes	4
3.6. Secondary outcomes	4
3.7. Context	5
4. Search strategy and databases	5
5. Flow chart	5
6. Data extraction	6
7. Risk of bias assessment.....	7
8. Results.....	7
Conclusion and next steps	14
9. References	14

1. Objective of Subtask 9.2.2

In the context of this systematic review, INSERM will 1/ synthesise and assess the effectiveness and the quality of evidence for interventions in the first 1000 days directed at socioeconomically disadvantaged families to improve energy balance-related behaviours or prevent overweight/obesity in children; 2/ describe features of effective interventions, and factors that lead to better engagement and retention; 3/ examine the mechanisms for intervention effects, including the use of behavioural theories, mediation and moderation analysis; 4/ examine the reach of the interventions and to identify the most effective approaches to recruitment.

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement and was registered on PROSPERO in February 2020 (registration no: CRD42020166483).

2. Review question

How effective are interventions implemented during the first 1000 days of life to improve energy balance-related behaviours or prevent overweight/obesity in children from socioeconomically disadvantaged families?

3. Eligibility criteria

3.1. Study design

The review included randomised controlled trials and quasi-experimental studies (with control groups).

3.2. Participants/population

Targeted participants are socioeconomically disadvantaged parents, during pregnancy and/or with a child aged less than 2 years. Only studies based in high income countries were included, as differences in education systems, modes of delivery of interventions, cultural and contextual differences could affect the generalisability of the findings.

Exclusion criteria:

- children aged 2 years or more at the start of the intervention;
- interventions targeting indigenous populations;
- interventions targeting children with a critical illness (including overweight or obesity) or disability influencing dietary intake, physical activity or sleep.

3.3. Interventions

Studies had to evaluate the effectiveness of an intervention delivered in the first 1000 days and directed at socioeconomically disadvantaged families in improving energy balance-related behaviours (diet, physical activity, sedentary behaviours, sleep), promoting healthy growth, body mass index (BMI) or other body composition outcomes or preventing the risk of overweight/obesity in children. Interventions targeting maternal smoking during pregnancy with the aim of improving such behavioural or anthropometric factors were also eligible. Interventions including those directed at individual behaviour change (e.g. individual counselling, audio-visual materials, support groups), and/or structural components (e.g. vouchers, food stamps, coupons to facilitate healthy behaviours) were eligible.

Exclusion criteria:

- interventions focused on eating disorders;
- interventions exclusively targeting breastfeeding;
- interventions exclusively targeting sleep.

3.4. Comparator

We included studies with experimental and quasi-experimental designs, which had to include a control group (i.e. a group of parents/infants who were not exposed to the intervention or who received 'usual care').

3.5. Primary outcomes

To be included, studies had to assess effectiveness of the intervention on one or more of the following outcomes, in children (outcome to be measured during childhood):

- Feeding practices (breastfeeding could however not be the only outcome assessed);
- Eating behaviours, dietary intake;
- Physical activity and movement measures (e.g. outdoor play time, tummy time);
- Sedentary behaviours (e.g. screen time, TV viewing, time spent restrained);
- Sleep (sleep should however not be the only outcome assessed);
- Anthropometric measures (e.g. weight, height, BMI, overweight, obesity, percent body fat, ponderal index, skin fold thickness).

3.6. Secondary outcomes

Other outcomes that might be mediators of behaviour change such as self-efficacy, social support and improvement in knowledge. Secondary outcomes include process evaluation indicators, engagement with and adherence to intervention components and retention. We will look for evidence of cost-effectiveness in all included studies.

3.7. Context

Interventional studies implemented in high income countries (as defined by the World Bank*), targeting socioeconomically disadvantaged families were included.

*These countries are the following: Andorra, Antigua, Barbuda, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Oman, Palau, Panama, Poland, Portugal, Puerto Rico, Qatar, Saint Kitts and Nevis, San Marino, Saudi Arabia, Seychelles, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Trinidad, Tobago, United Arab Emirates, United Kingdom, United States, Uruguay.

4. Search strategy and databases

The search was limited to the past 30 years (1990 to 26th January 2020, inclusive). The following databases were searched:

- PubMed/MEDLINE (general medicine);
- EMBASE (general medicine);
- CINAHL (nursing & allied health);
- PsycINFO (psychology and related behavioural and social sciences);
- Scopus (multidisciplinary).

The link to the strategy is the following:

https://www.crd.york.ac.uk/PROSPEROFILES/166483_STRATEGY_20200124.pdf.

Snowballing: Reference lists of included articles, relevant systematic reviews were also screened.

Potential papers identified this way were also subject to the review screening process to determine their eligibility.

5. Flow chart

The summary of the search strategy and articles identified in the systematic review are provided in Figure 1.

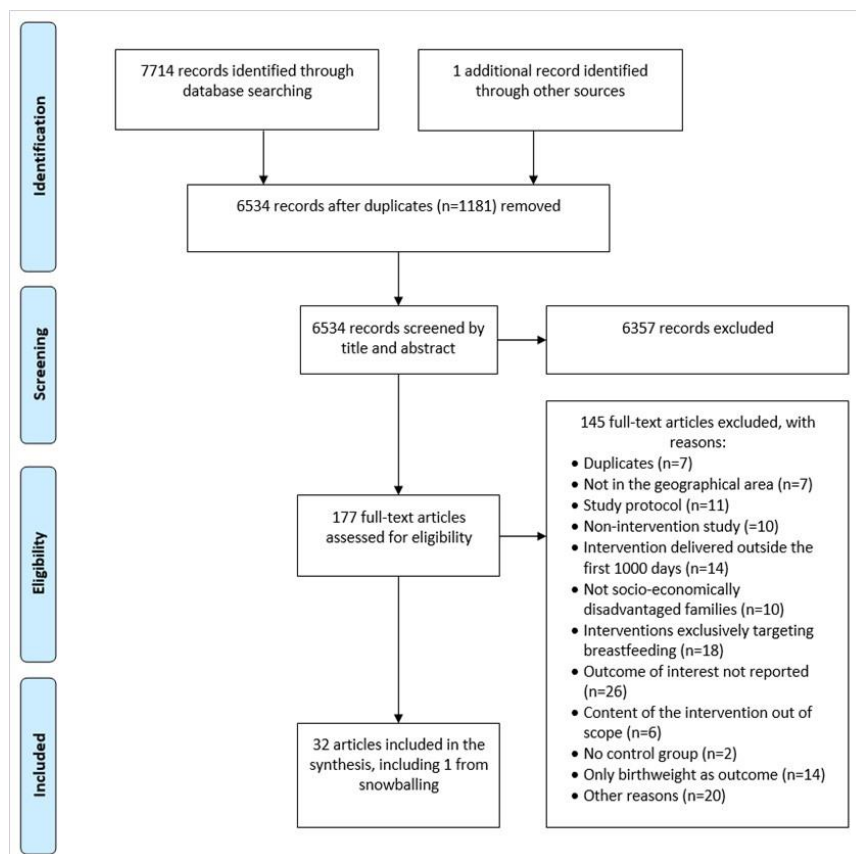


Figure 1: PRISMA Flow Diagram for Study Screening and Selection

6. Data extraction

A data extraction template was developed that included study characteristics; recruitment; participant characteristics; intervention design and setting; outcome measures and results; and study conclusions. All published papers and supplementary material related to the study (e.g. protocol papers, reference to websites, long term follow up studies) were referred to when extracting data. One research assistant (FH) extracted the data from all 32 articles and one researcher (SL) is currently cross-checking the accuracy of data extraction (20 articles done so far out of the 32 included ones). Differences in data extraction and interpretation for all 32 articles will be resolved through discussion.

7. Risk of bias assessment

The internal validity of studies is being assessed according to the version 2 of the Cochrane risk-of-bias tool for randomized trials (RoB 2). RoB 2 is structured into a fixed set of domains of bias which are:

- (1) bias arising from the randomization process;
- (2) bias due to deviations from intended interventions;
- (3) bias due to missing outcome data;
- (4) bias in measurement of the outcome;
- (5) bias in selection of the reported result.

Within each domain, and for a specific outcome, a series of questions ('signalling questions' with the following possible answers: 1/Yes; 2/Probably yes; 3/ Probably no; 4/No; 5/No information) aim to elicit information about features of the trial that are relevant to risk of bias. A proposed judgement about the risk of bias arising from each domain is generated by an algorithm, which can be 'Low' or 'High' risk of bias, or can express 'Some concerns'. An overall risk-of-bias judgement is then synthesized based on ratings of the five components:

- Low risk of bias: the study is judged to be at low risk of bias for all domains for this result;
- Some concerns: the study is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain;
- High risk of bias: the study is judged to be at high risk of bias in at least one domain for this result.

FH and SL are independently assessing internal validity, and any discrepancies are being resolved through discussion (20 articles judged for risk of bias out of the 32, work in progress).

8. Results

A total of 6534 unique citations were identified through the search process and screened on the basis of title and abstract, and of these, 177 full-text articles were assessed for eligibility (Figure 1). **Thirty-two primary articles** published between January 1990 and January 2020 met the eligibility criteria and one additional article was identified through citation searching from the primary studies. Among these articles, there were **25 distinct interventions**, the characteristics of which are detailed in Table 1.

Table I. Interventions' characteristics: setting, design, focus, sample, delivery agent, and outcomes (work in progress)

Setting/Study/Country/ Target group(reference)	Focus/ Outcome measures(X)								Design	N	Age at start/end	Delivery agent (recipient)	Follow-up	Outcome	Ethnic or racial minority group
	BF	PFP	Diet	PA	SB	Anthro	SL	TB							
HOME BASED															
Johnson et al. (1993), U.K, <i>First time low-income mothers (1)</i>		X	X						RCT	262	Birth/ 12m	Trained community mothers ^{SR} (one-on-one care)	12m, 7y	+PFP, +Diet,	
Kitzman et al. (1997), U.S.A, <i>African American low income unmarried women (2)</i>	X						X	X	RCT	1139	Preg/ 24m	Trained nurses (one-on- one care)	28ga, 6m, 12m, 24m	+BF, -Anthro	92% African American
Alvarado et al. (1999), Chile, <i>Low income mothers (3)</i>	X						X		Quasi- exp.	400	Preg/ 12m	Trained health workers ^{SR} (one-on-one care + group sessions)	Every month until 1y	+BF, +Anthro	
Black et al. (2001), U.S.A, <i>Low-income black adolescent mother living with their mothers (4)</i>								X	RCT	121	4-6wks/ 12m	Trained mentors ^{SR} (one-on-one care)	3m, 12m	+PFP	African American
Horodyski et al. (2005), U.S.A, <i>Low income families (5)</i>		X	X					x	Quasi- exp.	135	1-3y/ +- 6m	Paraprofessional instructors (one-on-one care + group sessions)	6m	-PFP, -Diet	84% Caucasian
Wiggins et al. (2005), U.K, <i>Disadvantaged inner city mothers (6)</i>	X							X	RCT	731	10wks/ +12m	Support health visitor, Community groups (one-on-one care+ group sessions for CGS)	12m, 18m	-BF, -PFP	42% Black or ethnic minority groups
Watt et al. (2009), U. K, <i>Low income mothers (7)</i>	X	X	X				X	X	RCT	312	3mo/ 12m	Trained community mothers ^{SR} (one-on-one care)	12m, 18m, 4y	-BF, -PFP, +Diet, -Anthro	50% ethnic minority groups

**Report on review of interventions focused on migration stressors,
to improve life course health trajectories**
Version 1.0 (January 2021)



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	BF	PPF	Diet	PA	SB	Anthro	SL	TB							
Kemp et al. (2011), Australia, <i>At risk mothers, living in a socioeconomically disadvantaged area (8)</i>	X	Delay solids				X		X	RCT	208	Preg/ 24m	Trained nurses (one-on- one care)	1m, 6m, 12m, 18m, 24m	+BF, -PPF, -Anthro	Country of birth Australia, int: 50%, cont: 52%; Overseas (31 diff. countries), int: 50%, cont: 48%
Wen et al. (2012) Australia, <i>First time low-income mothers (9)</i>	X	X Delay solids	X	X	X	X		X	RCT	667	Preg/ 24m	Trained nurses (one-on-one care)	6m, 12m, 24m, 3y, 5y, 5y	+BF, -PPF, +Diet, -PA, +SB, +Anthro	Country of birth Australia, int: 63%, cont : 66%
Edwards et al. (2013), U.S.A, <i>Young pregnant low income women (10)</i>	X	Delay solids							RCT	248	Preg/ 3m	Doulas ^{SR} (one-on-one care)	Birth and 4m	+BF, +PPF	African American
Medjoubi et al. (2014), Netherlands, <i>First time high risk pregnant women (11)</i>	X					X		X	RCT	460	Preg/ 24m	Specialised voorzorg nurses (one-on-one care)	16, 28, 32 wks ga, 2m, 6m	+BF, -Anthro	Dutch, int:49%, cont:48%; Others, int:51%, cont:52%
Kenyon et al. (2016), U.K, <i>Nulliparous mothers with social risks (12)</i>	X			X		X			RCT	1324	Preg/ 6wk	Specifically trained Pregnancy Outreach Workers (one-on-one care)	6wks, 8- 12wks, 4m, 12m	-BF, +Motor skills, -Anthro	Country/Region of birth Britain: 47%, Other European: 3.9%, Asia: 31%, Africa: 7%, Caribbean: 5%, Middle east: 3%, Other: 7%
O'Sullivan et al. (2017), Ireland, <i>Socio-economically disadvantaged communities (13) ○</i>			X					X	RCT	233	Preg/ 5y	Mentors (one-on-one care + group sessions)	12m, 18m, 24m, 36m	+Diet	
Hans et al. (2018), U.S.A, <i>Young, low income families (14)</i>	X					X		X	RCT	312	Preg/ 3m	Doulas and home visitors ^{SR} (one-on-one care)	37wks ga, 3wks, 3m	+BF, -Anthro	>80% Hispanic and African American
Lutenbacher et al. (2018), U.S.A, <i>Low income Hispanic women (15)</i>	X	Delay solids +						X	RCT	188	Preg/ 6m	Outreach workers ^{SR} (one-on-one care)	35wks ga, 2wks, 2m, 6m	+BF, +PPF	100% Hispanic American

Report on review of interventions focused on migration stressors,
to improve life course health trajectories
Version 1.0 (January 2021)



Setting/Study/Country/ Target group(reference)	Focus/ Outcome measures(X)								Design	N	Age at start/end	Delivery agent (recipient)	Follow-up	Outcome	Ethnic or racial minority group
	BF	PFP	Diet	PA	SB	Anthro	SL	TB							
		Delay other liquid													
Ordway et al. (2018), U.S.A, <i>First time mothers from socio- economically disadvantaged communities</i> (16) ○						X	X	RCT	237	Preg/ 24m	Pediatric nurse and social worker (one-on- one care)	Birth, 12m, 24m	+Anthro	>90% Hispanic and African American	
Reifsnider et al. (2018), U.S.A, <i>Low income obese pregnant Mexican-American women</i> (17)	X	X Delay solids	X			X		RCT	174	Preg/ 24m	Promotoras, Lactation consultant ^a (one-on- one care)	36ga wks, 1wk, 1m, 6m, 12m, 18m, 24m, 36m	-BF, +PFP, -Diet, -Anthro,	100% Hispanic American	
Goldfeld et al. (2019), Australia, <i>Families having psychosocial or socioeconomic risk factors</i> (18)	X	X Delay solids	X				X	RCT	722	Preg/ 24m	Nurse and social care practitioner (one-on- one care)	6wk, 6m, 12m, 18m, 24m	-BF, -PFP, +Diet, +Sleep		
PRIMARY HEALTH CARE AND COMMUNITY															
Bonuck et al. (2014), U.S.A, <i>Low income WIC attendees</i> (19)		X	X			X		RCT	299	12m/ 24m	WIC staff (group sessions)	12m, 15m, 18m, 21m, 24m	+PFP, +Diet, -Anthro	Father born in US: 48% Mother born in US: 56%	
Gross et al. (2016), U.S.A, <i>Low-income Hipanic/Latino families</i> (20)	X	X	X	X			X	RCT	533	Preg /3y	Registered dietitians (one-on-one care + group sessions)	3m, 10m	+BF, +PFP, +Diet, +PA	100% Hispanic/Latino American	
Shoham et al. (1990), West bank, <i>Low income mothers</i> (21)	X	X Delay solids						RCT	525		Instructor (group sessions)	4m	+BF, +PFP		
Machuca et al. (2016), U.S.A, <i>Low income minorities</i> (22)	X					X	X	Obs comp group design	187	1m/ 18m	Paediatricians and dietitians (group sessions)	2y	-BF, +Anthro	Hispanic American: 63,6%	

**Report on review of interventions focused on migration stressors,
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Version 1.0 (January 2021)



Setting/Study/Country/ Target group(reference)	Focus/ Outcome measures(X)								Design	N	Age at start/end	Delivery agent (recipient)	Follow-up	Outcome	Ethnic or racial minority group	
	BF	PPF	Diet	PA	SB	Anthro	SL	TB								
VIDEO, ONLINE, SOCIAL MEDIA																
Scheinmann et al. (2010), U.S.A, <i>Latina low income women</i> (23)	X	Delay solids							X	Quasi- exp.	439	<5m old/ +6m	Free video	3m, 6m	-BF, +PPF	100% Hispanic American
Fiks et al. (2017), U.S.A, <i>Low income mothers</i> (24)		X		X		X	X	X	RCT	111	Preg /9m	Psychologist (Facebook group)	Birth, 2m, 4m, 6m, 9m	+PPF, -PA, -Anthro, -Sleep	Hispanic American: 2% African American: 88% White: 6% Other: 7%	
Phelan et al. (2019), U.S.A, <i>Low income mothers and child</i> (25)			X	X	X	X		X	RCT	333	Btw 6wks and 12m/ +12m	Website, WIC counsellors for website, and study staff for monthly group meetings	6m, 12m	+Diet, -PA, -SB, +Anthro	>80% Hispanic American	

BF: breastfeeding; **PPF:** parental feeding practices other than BF; **PA:** physical activity; **SB:** sedentary behaviour; **Anthro:** anthropometrics; **SL :** sleep; **TB:** theoretical basis of the intervention reported. **Outcomes:** +: significant effect; -: no significant effect.; O: structural component (e.g. vouchers); \otimes = peers or lay support; \square = Intervention focus.

Interventions characteristics are synthesised in Table 2. More than 80% of these interventions used an RCT study design. Interventions were mostly conducted in the USA (56%), Europe (24%) and Australia (12%). All targeted socioeconomically disadvantaged families. One third of interventions focused on young or first-time mothers. About one quarter of the interventions (24%) specifically targeted ethnic or racial minorities (4 Hispanic and 2 African American women, all conducted in the USA). In 56% of interventions, ethnic or racial minorities composed the majority of the study samples.

Sixty percent of the interventions were delivered during pregnancy and postnatally, while 40% were delivered only after birth. Settings in which the interventions were implemented were mostly the home (60%) or the home and the community (12%); the other settings were online/video/social media (12%), the community (8%), and at a primary health care centre (8%). One third of the interventions was delivered by peers or through lay support, 24% by a nurse, 24% by a paraprofessional, 12% through videos/websites/social media, and 8% by trained volunteers. One-on-one support and group sessions were implemented in 56% and 12% of the interventions, respectively, whereas the combination of both supports concerned 20% of them. Interventions were mostly focused on diet and/or parental feeding practices (80%), but 20% also included one or several components involving physical activity or sedentary behaviour. Only 2 (8%) also involved sleep. Seventy-two percent of interventions were theory-based. All interventions included a social support, and only 2 (8%) also included a structural component.

Among the 24 studies that measured effectiveness on parental feeding practices or the child diet, 20 found some positive impact of the intervention; 3 out of 5 interventions showed effectiveness on the child physical activity (or motor skills) or sedentary behaviour; among the 2 interventions that measured impact on sleep, 1 was effective. Only 1/3 of the 15 interventions that assessed effectiveness on any anthropometric measurement found some impact. Sustainability of intervention effectiveness was assessed based on additional follow-up(s) for 5 (20%) of them (26-32), i.e. the “Community mothers programme” (1), the “Infant Feeding Peer Support Trial” (7), the “Healthy Beginnings Trial” (9), the “Starting Early Program (StEP)” (20), and the “ELSIPS Trial” (12).

Table 2. Summary of interventions characteristics (n=25) (work in progress)

Study characteristics	Number (%)
Study design	
RCT or cluster RCT	21 (84%)
Quasi-experimental	3 (12%)
Comparison group design	1 (4%)
Country where the study was conducted	
U.S. A	14 (56%)

Study characteristics	Number (%)
U. K	4 (16%)
Australia	3 (12%)
Ireland	1 (4%)
Netherlands	1 (4%)
West bank territories	1 (4%)
Chile	1 (4%)
Target population	
Low income families	12 (48%)
First time low income mothers	5 (20%)
Hispanic low income families	4 (16%)
Young low income mothers	2 (8%)
African American low income mothers	1 (4%)
Black low income adolescent mothers	1 (4%)
Delivery agent	
Peers/lay support	8 (32%)
Nurses	6 (24%)
Paraprofessionals	4 (16%)
Video, website, social media	3 (12%)
Trained volunteers	2 (8%)
Dietitian/nutritionist	2 (8%)
Covering period	
Pregnancy + Post-natal	15 (60%)
Post-natal only	10 (40%)
Support type	
One-on-one care	14 (56%)
Group sessions	3 (12%)
Both	5 (20%)
Online, website, social media	3 (12%)
Setting	
Home visiting	15 (60%)
Home visiting + Community	3 (12%)
Community	2 (8%)
Primary health care	2 (8%)
Online, website, social media	3 (12%)
Intervention focus	
Feeding practives or diet	20 (80%)
Feeding practives or diet + physical activity (or motor skills) or sedentary behaviour	5 (20%)
Theory-based intervention	18 (72%)
Including a structural component	2 (8%)
Including follow-up	5 (20%)

Conclusion and next steps

Data extraction from the 32 selected articles (corresponding to 25 distinct interventions and further follow-ups for 5 of them) was completed by FH, and 20 of them were cross-checked by SL. Tables 1 and 2 show some preliminary descriptive insights into the characteristics of the 25 interventions included in this systematic review. After the remaining 12 articles are cross-checked by SL, analysis and synthesis of interventions' characteristics and effectiveness will be finalised, so as their risk of bias assessment (work in progress). We will look forward to describing features of effective interventions, and factors that led to better engagement and retention; to examining the mechanisms for intervention effects, including the use of behavioural theories, mediation and moderation analysis; and to examining the reach of the selected interventions.

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