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ORIGINAL ARTICLE

Changes in perceived parental self-efficacy after a Child-Centred Health Dialogue about preventing obesity

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Abstract

Aim: This randomised controlled trial evaluated changes in parental self-efficacy and children's weight, after a Child-Centred Health Dialogue about preventing obesity.

Methods: We randomly assigned 37 Child Health Centres in Skåne county Sweden to provide usual care or the dialogue intervention. They included centres from high and low socioeconomic areas. The outcomes were changes in parental self-efficacy and any moderating effect on their children's body mass index 1 year later.

Results: The baseline data were based on 1115 mothers and 869 fathers representing 1197 children (52% females) aged 4 years (3.9–4.2) with a standardised body mass index (zBMI) of 0.1 ± 0.9. The participation rates at follow-up, 1.1 ± 0.2 years after the intervention were 817 mothers and 508 fathers. Overall, parental self-efficacy had decreased by the 1-year follow-up. There was a significant intervention effect on maternal self-efficacy in promoting physical activity, however with unclear clinical relevance. Mothers' change in perceived self-efficacy in promoting a healthy diet seemed to moderate the intervention effect on zBMI change in children with zBMI > 0 with −0.01 (95% CI: −0.025 to −0.001; $p = 0.03$).

Conclusion: Our study suggested a possible link between increased maternal self-efficacy in promoting a healthy diet and a favourable development of zBMI.

KEYWORDS
child-centred, childhood obesity, family-based, parental self-efficacy, prevention

1 | INTRODUCTION

Childhood obesity is a global health burden that is likely to persist into adulthood and lead to the development of various co-morbidities.[1] It tends to have its roots in the preschool years and affects children's immediate health, educational achievements and quality of life. That is why there is an urgent need to prevent obesity and promote healthy lifestyle behaviours at early age.[1] Food intake and physical activity behaviours are seen as modifiable determinants of childhood obesity. Negative indications include a diet low in fruit and vegetable,[2] larger portion sizes than needed,[3] too many sugary drinks,[4] low levels of physical activity and a sedentary lifestyle[5] and a lack of regular and structured family routines.[6] Researchers suggest that the first years of life are a critical time, with regard to developing healthy eating and physical activity, and that parents play a crucial role in that process.[1,7]

Reviews have concluded that interventions to prevent obesity in children aged 0–5 years are likely to have optimal effects when

Abbreviations: zBMI, standardised body mass index.

they are started in early childhood. They need to promote sustainable changes in numerous healthy behaviours in the whole family by supporting both children and parents.[1,7] The strategies also need to be grounded in theory-based frameworks, to enable health professionals to understand the mechanisms and effects of existing approaches.[8,9] Parental self-efficacy has been suggested as one way to achieve successful family-based interventions that aim to prevent childhood obesity.[8,9] According to Bandura, self-efficacy refers to an individual's belief about their ability to influence events that affect their lifes.[10] Parental self-efficacy has been defined as their expectations of their ability to be a successful parent.[11] The theory is that changes in parental self-efficacy influences their behaviour, which is a key factor in optimising child development.[12] A literature review confirmed that the ability to promote healthy behaviours was related to higher levels of parental self-efficacy. However, it pointed to a lack of studies on the relationships between high parental self-efficacy and changes in children's weight.[13] Longitudinal studies are needed to determine whether increasing parental self-efficacy would prevent childhood obesity.[14]

This study was based on a cluster randomised control trial that assessed the effects of a theory-based, multi-component child-centred intervention for preventing childhood obesity in preschool children at 4 years of age. The intervention, which we refer to as a Child-centred Health Dialogue in this paper, was compared with the usual care provided by Swedish Child Health Services. A previous paper reported limited evidence that the intervention had a modest effect on change in the standardised body mass index (zBMI) of 4-year old children with overweight 12 months after the intervention. There was no effect on children with normal weight.[15] It is also important to study the interaction between change in parental self-efficacy and the child's zBMI. Studies have reported that higher parental self-efficacy was associated with more favourable child health outcomes[16–18] and that parental self-efficacy levels tended to decline in both mothers and fathers as children grew older.[16,18]

The aim of this study was two-fold. The first aim was to evaluate changes in parental self-efficacy for promoting a healthy diet and physical activity over a 12-month follow-up period.

The second was to study the moderating effect of change in parental self-efficacy on zBMI change in 4-year-old children with normal weight, with zBMI > 0 and 4-year-old children with overweight.

Key Notes

- There is a need for theory-based interventions that evaluate the relationships between changes in parental self-efficacy and changes in children's weight
- Our study suggests that an increase in maternal self-efficacy in promoting a healthy diet seems to improve the child's weight 1 year after the intervention.
- Interventions should focus on improving mothers', but also fathers' self-efficacy in promoting children's healthy behaviours to prevent childhood obesity.

2 | METHODS

2.1 | Study design and setting

This was a cluster randomised controlled trial that took place in Swedish child health centres and compared usual care and an intervention that aimed to see what impact parental self-efficacy could have on children's weight. The study followed the recommendation of the Consolidated Standards of Reporting Trials.[19] The trial took place in Skåne county, in southern Sweden, where 146 child health centres care for about 100,000 children aged 0–6 years.[20] In 2015, 9.9% of 4-year-olds in Skåne had overweight and 2.3% had obesity.[20]

2.2 | Participants

The Care Need Index[21] was used to divide 37 child health centres into 18 centres in areas with higher (<0.93) and 19 centres in an area with lower (≥0.93) socio-economic status (Figure 1). The centres were then randomly allocated to usual or the parental self-efficacy intervention on a 1:1 basis by the third author according to a computer-generated randomisation list.[15] Two centres with lower SES declined participation and finally there were 8/17 intervention centres and 9/18 control centres in the lower SES category (Figure 1). In the end, 6428 4-year-old children and their parents were eligible for the study. The power calculation was based on the primary outcome, which was the zBMI change.[15]

The inclusion criteria were children born between January 2013 and August 2014, who were invited to their 4-year health visit and who had parents who were able to read and write Swedish. Children who were not brought to their 4-year health visit were excluded. We also excluded 30 children, because a newly recruited nurse had not been trained in the intervention.[15]

2.3 | Usual care

Children and parents allocated to the usual care group received the 4-year health visit according to that national Child Health Programme. It included an unstructured health dialogue with the parents identifying any children with overweight and obesity. The visit was guided by the Swedish digital National Handbook for Child Health Services (www.rikshandboken-bhv.se). Nurses delivering usual care may have used the illustrations developed for the intervention, as they were published in the National Handbook in Spring 2016, before the start of this study. However, they were not been trained in how to use them.[15]

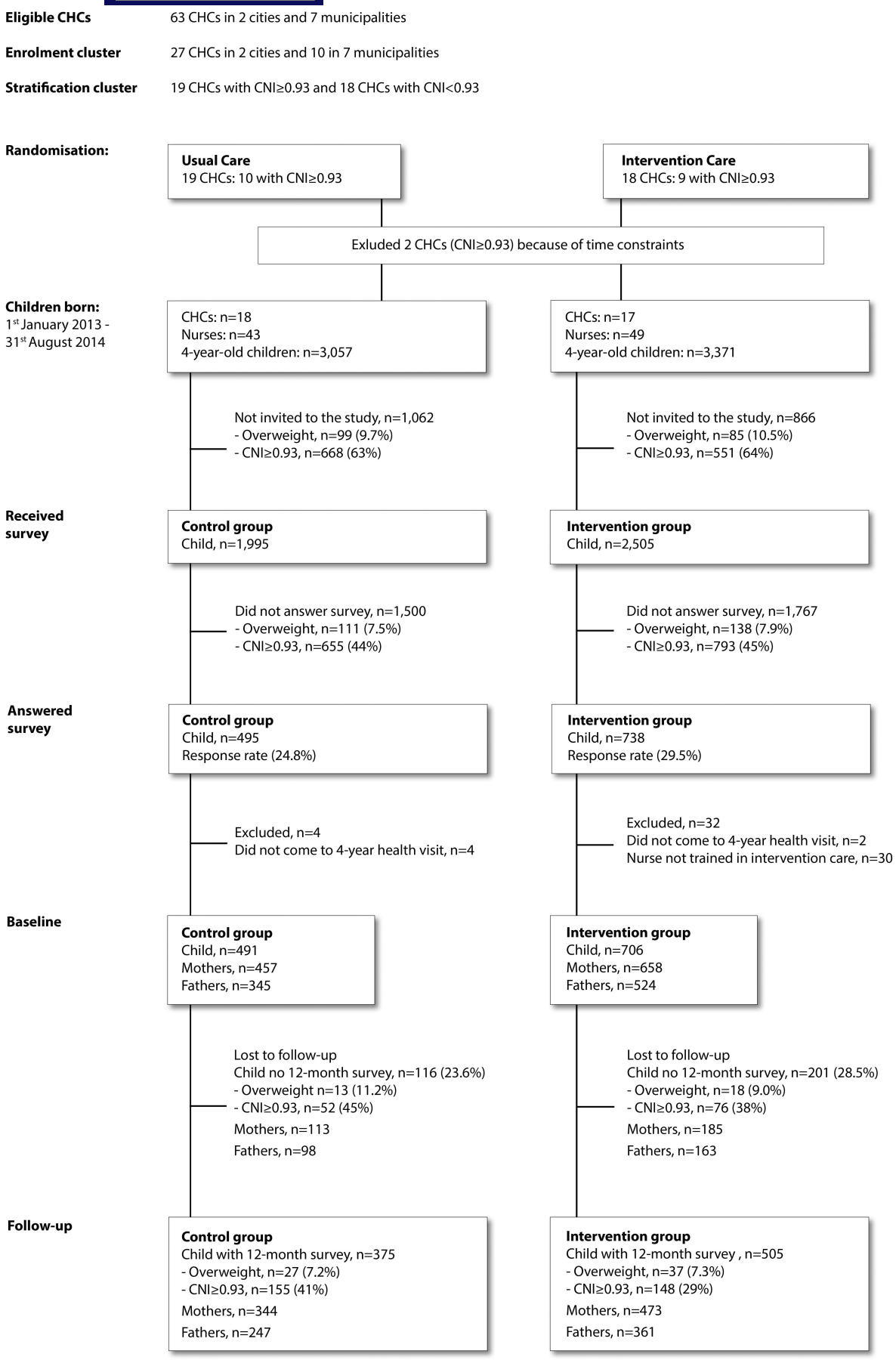

FIGURE 1 Flow diagram of the trial up to the 12-month follow-up

2.4 | Intervention care

Children and parents allocated to the intervention group all received the 10-min structured universal part of the Child-Centred Health Dialogue at the 4-year health visit. If the child was classified as overweight or obesity by the nurse, the parents were offered a further 45-min targeted intervention called family guidance. This took place 1–3 weeks after the 4-year health visit. The conceptual framework was based on the concepts of child-centred care and health literacy and used 8 interactive age-appropriate illustrations, which covered the most important modifiable lifestyle behaviours, and the BMI growth chart to clarify the child's natural growth pattern (Figure 2). The intervention used a solution-based approach that focused on the child's health, and not their weight issues, to build relationships with the children and parents. By identifying protective factors and resources to promote healthy lifestyle and tackle the child's weight, the nurse encouraged the children and their parents to become empowered and actively engage in the solutions. This enabled the nurse to strengthen the child and parents health literacy in everyday situations and increase the parents' self-efficacy when it came to promoting a healthy diet and physical activity. The aim was to decrease zBMI after the 4-year health visit in children with a positive zBMI at 4 years of age.[15] Children with obesity were also referred to specialised care outside the primary care setting.

Nurses in the intervention group were trained to perform the structured health dialogue with the child and the parents. The discussions in the usual care group were just with the parents. This training comprised a 1-day workshop in October to November 2016 and 4 tutorial sessions of 1 h, once every 2 months in 2017. The training, which has previously been described,[22] focused on how to promote child and family participation, discuss the child's BMI chart and support the parents so that they could adopt a healthy lifestyle.

2.5 | Measurements

Parental self-efficacy was measured separately for mothers and fathers with the Parental Self Efficacy for Promoting Healthy Physical Activity and Dietary Behaviours in Children Scale. The scale was developed and validated using exploratory and confirmatory factor analysis in Swedish mothers of 3-year-old children.[23] It measures parental self-efficacy in promoting healthy eating and physical activity behaviours and contains three factors. The first was parental self-efficacy for promoting a healthy diet and comprised 6 items with a maximum score of 60. These included how confident the parents were when it came to promoting healthy eating habits for their child. The second was parental self-efficacy for promoting healthy physical activity and comprised 3 items with maximum score of 30. These included how confident the parents were about engaging their child in physical play indoors and outdoors. The third was parental self-efficacy with regard to limiting an unhealthy dietary and sedentary behaviour. This comprised 5 items with a maximum score of 50. This study used the first two factors as they showed good internal consistency, with Cronbach's alpha (0.8 for both factors) and a high test–retest reliability (r = 0.8) in the validity study.[23] An 11-point Likert-type scale, from 0 to 10, was used to measure parental self-efficacy: 0–2 for a very low degree, 8–9 for a high degree and 10 for a very high degree. The internal reliability at baseline and the follow-up point were adequate for the mothers and fathers for the first and second factors we studied (Cronbach's alpha = 0.8).

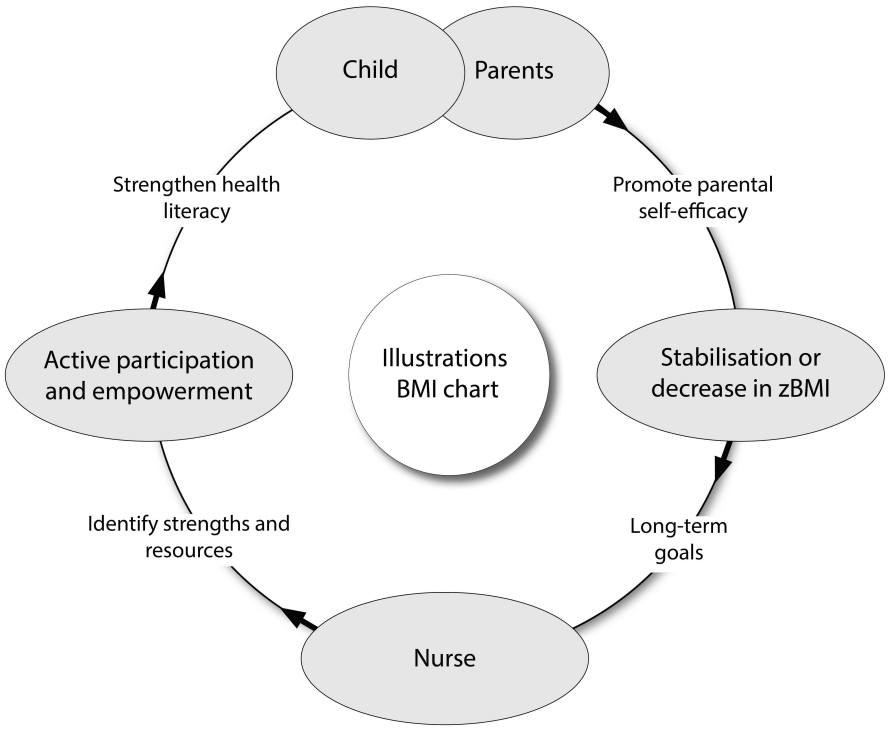

FIGURE 2 Child-Centred Health Dialogue – the conceptual framework

We measured the parental sociodemographic factors at baseline, with the self-report Healthy Lifestyle Questionnaire, and this was done separately for mothers and fathers. This survey was developed, but had not been validated as a public health survey, for the parents of 4-year-old children in Skåne.[24]

2.6 | Data collection

Between January 2017 and August 2018, nurses were instructed to send the parents of all children registered at their child health centre a letter before their 4-year health visit. The letter stated whether the child health centre was providing the intervention or usual care, asked for the informed consent, provided hard copies of the surveys and offered them the chance to complete digital version of the surveys if they preferred. At the 4-year health visit, which took place between January 2017 and November 2018, the nurse informed the child and parents about the study and passed on a copy of the survey if they had not kept theirs. Height, weight, gender and Care Need Index were collected for all children, even for children who were not invited to take part in the study and those who had not responded to the baseline survey. This opt-out procedure has previously been described.[15] Surveys were completed by the mother, the father or both of them. Those who provided the baseline data were subsequently contacted by the first author and asked to fill in a follow-up survey 12 months after the intervention. Reminders were posted after 6 weeks and all responses were collected between January 2018 and December 2020.

2.7 | Statistical analysis

We used an intention-to-treat approach to analyse the mean differences in parental self-efficacy and this was done separately for the mothers and fathers. Linear mixed regression models were used to adjust for clustering and parental self-efficacy at baseline in the primary analyses and for the Care Need Index score and gender in the secondary analyses. When it came to the parental self-efficacy scale, we removed all items for a specific factor if one or more items were missing. Unknown values were not inputted. We examined the potential moderating effect of the intervention effect of parental self-efficacy in mothers and fathers. To do this we studied the interaction between the intervention, the changes in parental self-efficacy and the zBMI change. This was done separately for children with normal weight, with zBMI > 0 and children with overweight. Children with obesity were excluded as they received the intervention plus care from the obesity team outside the primary care setting. Children with normal weight, with zBMI < 0 and children with underweight were excluded as they were not advised to decrease their zBMI. We used a linear mixed regression model, including a group times change in parental self-efficacy interaction term. Interactions with a significance level of $p < 0.05$ were further explored with a sub-group analysis. SPSS Statistics, version 27 (IBM Corp) was used for all the statistical analyses.

3 | RESULTS

3.1 | Inclusion and baseline characteristics

Figure 1 describes the inclusion criteria and participants. The nurses did not send questionnaires to all the families whose children were registered at the child health centres, particularly if there were time constraints and they felt the parents would not read and write Swedish well enough to take part. Figure 1 shows the prevalence of overweight. It also shows the proportion of families from areas with a lower socio-economic status, those who were not invited to take part and those who had not answered the questionnaire (Figure 1).

More children in the control group came from areas with a lower socioeconomic status and more mothers and fathers were of non-Swedish origin than the intervention group (Table 1). However, a larger proportion of fathers in the control group had a university degree. Most of the mothers and fathers who took part were the children's biological parents, but 9 of children in the control group and 6 of the intervention group were represented by the partner of a biological parent. They are still referred to as mothers and fathers as they were performing that role (data not shown).

The final sample, 12 months after the intervention, comprised 505 children in the intervention group, with 473 mothers and 361 fathers, and 375 children in the control group, with 344 mothers and 247 fathers. The mean time difference between the baseline 4-year health visit and the 12-month follow-up survey was 1.1 ± 0.2 years in both groups. The drop-out rates at 12 months were 28.5% in the intervention group and 23.6% in the control group. Their children had a comparable prevalence of overweight, but a slightly larger proportion in the control group, than intervention group came from areas with a lower socioeconomic status (45% vs. 38%; Figure 1).

3.2 | Changes in perceived parental self-efficacy

Table 2 shows the mean baseline scores for parental self-efficacy for the mothers and fathers and the mean change at 12 months. It also shows the proportions of mothers and fathers with high degrees of parental self-efficacy at baseline and whether these had increased or decreased at 12 months.

Parental self-efficacy was significantly higher in mothers than in fathers in both groups and at baseline and 12 months when it came to promoting a healthy diet and physical activity. Overall, parental self-efficacy in these areas had decreased after 12 months and the proportions of mothers and fathers that had increased parental self-efficacy at 12 months were comparable in both the intervention and control groups. Among mothers in the intervention group, 38% increased self-efficacy in promoting a healthy diet and 35% in promoting physical activity compared to 36% and 30% in the control group. Among fathers in the intervention group, 41% increased self-efficacy in promoting a healthy diet and 41% in promoting physical activity compared to 41% and 34% in the control group (Table 2).

TABLE 1 Characteristics of the study sample at baseline

	n	Control group	*n*	Intervention group
Children				
Age (years)	491	4.1 ±0.1	706	4.0 ±0.1
Female	491	261 (53.2)	706	359 (50.8)
CNI > 0.93[a]	491	207 (42.2)	706	224 (31.7)
Born in Sweden	476	457 (96.0)	683	657 (96.2)
zBMI at baseline[b]	490	0.06 ± 0.94	706	0.11 ± 0.89
Underweight grade II and III		17 (3.5)		16 (2.3)
Underweight grade I		38 (7.8)		58 (8.2)
Normal weight		394 (80.2)		574 (81.3)
Overweight		36 (7.3)		51 (7.2)
Obesity		5 (1.0)		7 (1.0)
Mothers				
Age (years)	457	36.5 ± 4.4	658	36.2 ± 4.4
BMI (kg/m[b])	448	24.1 ± 3.9	649	24.1 ± 4.1
University degree	327	248 (75.8)	474	363 (76.6)
Foreign background	332	75 (22.5)	477	79 (16.5)
Fathers				
Age (years)	345	39.1 ± 5.8	524	38.4 ± 5.5
BMI (kg/m[b])	341	25.7 ± 3.1	521	25.7 ± 3.6
University degree	268	178 (66.4)	417	244 (58.5)
Foreign background	270	63 (23.3)	418	67 (16.0)

Note: Data are presented as Mean ± SD values or *n* (%).
[a]CNI ≥ 0.93 is related to lower socio-economic status.
[b]BMI categorised using IOTF-definitions.

The mean differences in change in parental self-efficacy for promoting a healthy diet and promoting physical activity were adjusted for clustering, the baseline data, the Care Need Index score and gender. This showed that the mean differences for mothers were 0.37 (95% CI: −0.37 to 1.10; $p = 0.33$) for diet and 0.51 (95% CI: 0.01 to 1.01; $p = 0.046$) for physical activity (Table 2). The respective data for fathers were −0.12 (95% CI: −1.21 to 0.96; $p = 0.82$) and 0.07 (95% CI: −0.60 to 0.73; $p = 0.84$).

3.3 | Parental self-efficacy as a moderator between the intervention and zBMI change

The intervention had no effect on the zBMI change in children with normal weight, with a positive zBMI, or those with overweight at baseline (Table 3). Overall, the changes in parental self-efficacy did not seem to systematically alter the intervention effect. However, a noticeable exception was that the mothers' change in perceived self-efficacy in promoting a healthy diet seemed to moderate the effect that the intervention had on the zBMI changes in children with normal weight, with a positive zBMI and those with overweight. The interaction coefficient of beta was −0.01 (95% CI: −0.025 to −0.001; $p = 0.03$). This means that size of the intervention effect on the zBMI change would be expected to increase by 0.01 standard deviations for each unit increase in maternal self-efficacy (Table S1).

Mothers with increased parental self-efficacy in promoting a healthy diet, showed a mean difference in zBMI change in children with a normal weight, with zBMI > 0 of −0.11 (95% CI; −0.25 to 0.02; $p = 0.10$) when adjusted for clustering, baseline data, the Care Need Index score and gender. Children with overweight at baseline showed a mean difference of −0.50 (95% CI: −1.16 to 0.15; $p = 0.12$) when the data were adjusted for clustering, baseline data, Care Need Index scores and gender. In the intervention group, children with normal weight, with zBMI > 0 and children with overweight at baseline had a lower zBMI 12 months after the intervention (Table 3). In the control group, among mothers with increased parental self-efficacy, children increased the mean zBMI. In mothers with unchanged and decreased parental self-efficacy in promoting a healthy diet these tendencies were not observed (Table 3).

4 | DISCUSSION

This cluster randomised controlled trial focused on 4-year-old children in high and low socioeconomic groups. It took place in 35 Swedish child health centres and compared usual care and an intervention that aimed to see what impact parental self-efficacy could

TABLE 2 Perceived parental self-efficacy regarding diet and physical activity at baseline and mean change 12 months after the intervention

	Control group			Intervention group				
	n	Mean ± SD *n* (%)	Mean change	*n*	Mean ± SD *n* (%)	Mean change	Mean difference (95% CI)[a]	*p*[a]
Mothers								
PSE promoting diet[b]	348	53.2 ± 6.0	−1.0 ± 5.6	472	52.2 ± 7.2	−0.01 ± 6.0	0.37 (−0.37–1.10)	0.33
High PSE diet (48–60)	348	286 (82)	+1%	472	383 (81)	−1%		
Very high (60)		67 (19)	−5%		86 (18)	−3%		
Increased PSE diet	336	121 (36)	4.3 ± 3.2[d]	461	177 (38)	5.4 ± 5.3[d]		
Decreased PSE diet	336	161 (48)	−5.3 ± 4.3[e]	461	207 (45)	−4.7 ± 3.2[e]		
PSE promoting PA[c]	351	24.5 ± 4.7	−0.9 ± 4.2	478	24.2 ± 4.7	−0.1 ± 4.0	0.51 (0.01–1.01)	0.046
High PSE PA (24–30)	351	228 (65)	−7%	478	290 (62)	–		
Very high (30)		82 (23)	−8%		99 (21)	−4%		
Increased PSE PA	334	101 (30)	3.8 ± 2.7[d]	464	161 (35)	3.9 ± 3.0[d]		
Decreased PSE PA	334	168 (50)	−4.0 ± 2.8[e]	464	194 (42)	−3.5 ± 2.4[e]		
Fathers								
PSE promoting diet[b]	269	48.8 ± 8.2	−0.4 ± 7.5	377	48.3 ± 8.8	−0.3 ± 7.4	−0.12 (−1.21–0.96)	0.82
High PSE diet (48–60)	269	169 (63)	−9%	377	233 (62)	−2%		
Very high (60)		28 (10)	−2%		28 (7)	−2%		
Increased PSE diet	242	98 (41)	6.2 ± 4.8[d]	385	141 (41)	6.1 ± 5.6[d]		
Decreased PSE diet	242	127 (53)	−5.6 ± 5.5[e]	385	164 (47)	−5.8 ± 4.8[e]		
PSE promoting PA[c]	272	23.1 ± 4.9	−0.4 ± 4.5	381	22.5 ± 4.8	0.03 ± 4.6	0.07 (−0.60–0.73)	0.84
High PSE PA (24–30)	272	143 (53)	−5%	381	171 (45)	3%		
Very high (30)		40 (15)	–		41(11)	–		
Increased PSE PA	243	83 (34)	4.2 ± 3.1[d]	351	144 (41)	4.3 ± 3.1		
Decreased PSE PA	243	115 (47)	−3.9 ± 2.8[e]	351	158 (45)	−3.8 ± 2.7[e]		

Abbreviations: PA, physical activity; PSE, parental self-efficacy.

[a]Linear Mixed Model: adjusted for cluster, baseline, CNI and gender.

[b]Max 60 points.

[c]Max 30 points.

[d]Mean change (SD) in parents who increased PSE.

[e]Mean change (SD) in parents who decreased PSE.

have on children's weight. A key finding was a significant intervention effect on parental self-efficacy when it came to mothers promoting physical activity, but the clinical relevance of this finding was unclear.[25] The mothers' mean baseline scores for parental self-efficacy in promoting a healthy diet and physical activity in our study were in the same range as three Swedish studies that used the same survey.[14,25,26] The fathers' mean scores were significantly lower than the mothers' in both the control and intervention groups when it came to promoting a healthy diet and physical activity. However, comparisons are difficult, because other studies have lacked data on fathers' perceived parental self-efficacy. In addition, fathers have been much less likely than mothers to take part in family-based interventions to tackle child obesity.[27]

Evidence has shown that higher levels of parental self-efficacy are linked to healthy behaviour in children, such as an adequate intake of fruit and vegetables and higher levels of physical activity.[14,17,26] It has been suggested that improving parental self-efficacy is an essential mechanism for encouraging behaviour change in preschool children.[9,28] Despite this, only a few studies have examined the longitudinal effects on parental self-efficacy and the methods used to measure this have varied considerably.[13,25,29,30] In our study, most parents showed a decline in parental self-efficacy over time, as described in other studies.[16,18] Among mothers only 38% increased self-efficacy in promoting a healthy diet and 35% in promoting physical activity, while among fathers 41% increased self-efficacy in both promoting a healthy diet and physical activity at follow-up, 1.1 years after the intervention. Possible explanations for the lack of a clinically meaningful intervention effect on parental self-efficacy may be that the follow-up period was too long in relation to the limited nature of the intervention or because of the already high levels of parental self-efficacy at baseline which made improvements harder to achieve.[25]

Some studies have described a relationship between higher parental self-efficacy and lower child weight,[13,17,29]; but the evidence is sparse.[9,26] In our study, changes in the mothers' parental self-efficacy

TABLE 3 zBMI-change at follow-up in children with normal weight and zBMI > 0 and children with overweight in relation to mothers' perceived self-efficacy in promoting healthy diet

	n	Control group	*n*	Intervention group	Mean difference (95% CI)	p^a	p^b
Children with							
Normal weight (zBMI>0)	174	−0.004 ±0.40	244	−0.02 ±0.38	0.01 (−0.08 to 0.10)	0.71	0.82
Overweight	28	−0.02 ±0.49	35	−0.22 ±0.40	−0.22 (−0.50 to 0.06)	0.10	0.11
Mothers with increased PSE diet							
Normal weight (zBMI > 0)	60	0.07 ±0.40	83	−0.06 ±0.40	−0.11 (−0.25 to 0.02)	0.08	0.10
Overweight	10	0.18 ±0.49	11	−0.29 ±0.41	−0.50 (−1.16 to 0.15)	0.07	0.12
Mothers with unchanged PSE diet							
Normal weight (zBMI > 0)	24	−0.12 ±0.50	37	0.05 ±0.41	0.01 (−0.09 to 0.26)	0.21	0.24
Overweight	5	−0.09 ±0.62	9	−0.11 ±0.40	−0.12 (−0.93 to 0.68)	0.74	0.74
Mothers with decreased PSE diet							
Normal weight (zBMI > 0)	73	−0.04 ±0.37	104	−0.01 ±0.35	0.01 (−0.12 to 0.13)	0.38	0.34
Overweight	11	−0.17 ±0.42	10	−0.14 ±0.40	0.05 (−0.50 to 0.61)	0.91	0.83

Data are presented as Mean ± SD values or *n* (%).

Abbreviation: PSE, parental self-efficacy.

[a]Linear Mixed Model 1 adjusted for cluster and baseline.

[b]Linear Mixed Model 2 also adjusted for CNI and gender.

in promoting a healthy diet seemed to alter the intervention effect on zBMI change. The moderating effect on zBMI change was 0.01, which suggested a stronger intervention effect on zBMI change in mothers with increased parental self-efficacy in promoting a healthy diet at 12 months. Even though subgroup analyses with low numbers of children should be interpreted with caution, our findings support the recommendation to measure self-efficacy before an intervention. This will help to identify parents with the potential to increase their self-efficacy and influence their child's weight.[8]

4.1 | Strengths and limitations

A strength of the study is that we measured parental self-efficacy in both mothers and fathers. We used a formally validated instrument, well anchored in Bandura's self-efficacy theory.[10,23] Another strength is that the children's gender and whether children lived in an area with high or low socio-economic status were available for all the children eligible to take part in this study.[15] This allowed us to examine effects on zBMI, while adjusting for those two confounding factors. The limitations were low response rate on the baseline survey, which means that the responders did not necessarily represent the eligible population. For example, the parents who responded to the survey were better educated than the general Swedish population aged 25–64.[31] Other limitations were the high drop-out rate and the sample size that was not adjusted for clustering effects when power was calculated. Yet, another limitation was that information on which parent was present at the 4-year health visit, and to what extent illustrations and the BMI-growth chart were used, were lacking. Due to the clinical setting, the control group benefitted from parts of the intervention. This contamination effect was considered low as only nurses from the centres seeing the intervention group were trained in the conceptual framework of promoting parental self-efficacy. As only parents who could read and write Swedish were invited to the study, there was limited generalisability. The proportion of children who lived in area with lower economic status was lower in our study sample. So was the prevalence of overweight compared to those children who were not invited to the study and those who did not respond to the survey.

In conclusion, our study, which is one of the few studies that has examined longitudinal effects on parental self-efficacy, found an overall decline of reported parental self-efficacy in promoting healthy behaviours in most parents and a possible link between an increased maternal self-efficacy in promoting a healthy diet and a favourable development of zBMI. In this way, the Child-Centred Health Dialogue is a response to the need for targeted strategies that focus on parental support and increase parental efficacy in promoting children's health.[13] Future interventions should consider ways to improve parental self-efficacy in both mothers and fathers as a strategy to prevent obesity in preschool children.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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