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Controlling feeding practices and maternal migrant background: An analysis of a multicultural sample

Abstract

Objective: Parental feeding practices shape children's relationships with food and eating. Feeding is embedded socioculturally in values and attitudes related to food and parenting. However, few studies have examined associations between parental feeding practices and migrant background.

Design: Cross-sectional study. Parental feeding practices (restriction, pressure to eat, and monitoring) were assessed using the Child Feeding Questionnaire. Differences were explored in four subsamples grouped by maternal place of birth: Sweden, Nordic/Western Europe, Eastern/Southern Europe, and countries outside Europe. Crude, partly, and fully adjusted linear regression models were created. Potential confounding variables included child's age, gender, and weight status, and mother's age, weight status, education, and concern about child overweight.

Setting: Malmö and Stockholm, Sweden.

Subjects: 1,325 mothers (representing 73 countries; mean age 36.5 years; 28.1% of non-Swedish background; 30.7% with overweight/obesity; 62.8 % with university education) of preschoolers (mean age 4.8 years; 50.8% boys; 18.6% with overweight/obesity).

Results: Non-Swedish-born mothers, whether European-born or non-European-born, were more likely to use restriction. Swedish-born mothers and Nordic/Western European-born mothers reported lower levels of pressure to eat, compared to mothers born in Eastern/Southern Europe, and mothers born outside Europe. Differences in monitoring were small. Among the potential confounding variables, child weight status and concern about child overweight were highly influential. Concern about child overweight accounted for some of the effect of maternal origin on restriction.

27   *Conclusion:* Non-European-born mothers were more concerned about children being

28   overweight and more likely to report controlling feeding practices. Future research should

29   examine acculturative and structural factors underlying differences in feeding.

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31   **Keywords:** feeding practices, migration, obesity, preschoolers

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43   Overweight and obesity in childhood may lead to multiple adverse consequences that can

44   impact a child's physical and psychosocial development [1]. The prevalence of overweight and

45   obesity among children and adolescents has increased by about 40% in most Western

46   countries between 1980 and 2013 [2]. At the same time, a steeper increase, of about 60%, has

47   been observed in emerging economies [2]. As a response to these rising rates, several studies

48   have addressed the etiology of childhood obesity, in order to inform early prevention

49   strategies [3]. When exploring the etiology of obesity much emphasis has been placed on the

50   impact of environmental and behavioral changes [3,4,5] that influence nutrition and physical

51   activity [6]. Young children are highly dependent on their parents for food provision, and

52   parental feeding practices may thus have a profound effect on children's eating behaviors and

53   weight status [7,8,9,10,11].

54

55   In Sweden, the prevalence of childhood obesity is about 4%, compared to about 8% in

56   Southern Europe; on the population level, childhood obesity is less pronounced in Sweden

57   compared to other Western and European countries [2]. Moreover, recent epidemiological

58   studies have found that childhood obesity is stabilizing and leveling off in Sweden although

59   the social gradient has become more evident [12,13,14]. Weight disparities between children of

60   Swedish background and children of first or second-generation migrant background persist: in

61   Sweden, children of Turkish, Iranian, and South American background have up to three times

62   higher odds of developing overweight or obesity [15,16].

63

64   Most research studies on obesity-related parental feeding practices focus on three constructs:

65   restriction, pressure to eat, and monitoring [17,18]. High levels of restriction, characterized by a

66   high degree of parental regulation of the types and amounts of food consumed by children,

67   have been associated with children's increased eating in the absence of hunger, higher food

68 responsiveness, and lower responsiveness to satiety cues [19,20,21,22,23]. High levels of pressure

69 to eat, a construct that describes pushing a child to eat without prioritizing his or her internal

70 satiety cues, have been related to fussiness, pickiness, and limited interest in food, along with

71 reduced appetite [22,24,25,26]. Restriction and pressure to eat have been associated with

72 children's weight status in numerous studies [27,28,29,30,31], though a few studies have not found

73 such associations [25,32,33]. Monitoring is a construct characterized by keeping track of a child's

74 food consumption. Although monitoring has been associated with lower food approach [22],

75 research on monitoring has been less extensive and less conclusive [34].

76

77 Previous research has identified several correlates of parental feeding practices, including

78 parents' perceptions of their children's weight status, and concerns about their children's being

79 overweight or having abnormal appetite [35,36,37,38,39]. Parental feeding practices are embedded

80 in broader sociocultural contexts, reflecting social norms and culturally-conditioned values and

81 attitudes [40,41]. Feeding practices are thus influenced by perceptions of desirable weight status

82 and body shape, which may vary substantially according to sociocultural norms [42] and

83 socioeconomic status [43]. Experiences associated with socioeconomic hardship, such as food

84 insecurity, poverty, and hunger, have also been linked to parental feeding practices [44].

85

86 Despite the important socioeconomic and sociocultural dimensions of parental feeding

87 practices, most studies of parental feeding have been conducted among largely ethnically

88 homogeneous, middle-class Western populations [7]. Only a few studies (four in the USA and

89 one in Germany and the UK), all with rather small samples, have focused on differences in

90 controlling feeding practices among parents of different ethnic background; these studies found

91 that controlling feeding practices are used less frequently among white American [45,46,47,48] and

92 white European parents [49], compared to parents of minority ethnic background. Studies with

93 larger samples, including parents from migrant backgrounds, are needed in order to understand

94 associations between feeding practices and parental ethnic, cultural, and national backgrounds,

95 and thereby inform contemporary public health efforts in Europe.

96

97 The aim of the present study is to investigate associations between maternal country of birth

98 and feeding practices, in a large multi-cultural sample in Sweden. Specifically, the study

99 examines associations between maternal origin and self-reported restriction, pressure to eat,

100 and monitoring practices, and assesses the influence of child and maternal characteristics as

101 potentially relevant confounders. Based on research conducted in comparable European

102 settings, we hypothesize that mothers born outside Sweden are more likely to engage in

103 controlling feeding practices [49].

104

Methods

Setting, participants and data collection

107 The total sample included 1,325 mothers of children, age four to seven years old. Data were

108 collected through the Child Feeding Questionnaire (CFQ) [17] and a background questionnaire,

109 which included questions regarding socio-demographic and anthropometric characteristics of

110 children and mothers; all distributed questionnaires were in Swedish. Participants were

111 recruited through three groupings: a population-based sample in Malmö, a school-based sample

112 in Stockholm, and a clinically-based sample in Stockholm. In all three groupings, responses

113 were collected by mail. In Malmö, the Swedish Population Registry was used to recruit mothers;

114 876 out of the total of 3,007 mothers of 4-year-olds participated in the study (response rate

115 29%) [50]. In Stockholm, the school-based sample targeted five schools and 20 preschools from

116 areas with low, medium, and high prevalence of obesity (compared to rates in Stockholm

117 county); 432 out of 931 of parents participated (response rate 46%) [35,51]. In this study we used

118   only data provided by mothers (n=351 in total). We added a clinically-based sample in order to

119   identify differences between parents of overweight or obese children and parents of normal

120   weight children. This sample consisted of baseline data from mothers of 98 children with

121   obesity, aged four to six years. The children were referred by primary health care centers across

122   the county to an ongoing randomized controlled childhood obesity trial (NCTXXXX)[52]. The

123   response rate was 87.5%. The recruitment process and data collection procedures have been

124   described in detail elsewhere for the Malmö sample [50], and for the Stockholm samples [35,51,52].

125

126   *Parental feeding practices*

127   CFQ is an established, self-administered seven-factor questionnaire assessing parental feeding

128   practices, beliefs, and attitudes related to obesity proneness among children and adolescents

129   [17]. The Swedish version of CFQ has been validated using confirmatory factor analysis

130   (CFA), and an optimal fit was obtained after excluding two questions regarding parental

131   reward [50]. Restriction, pressure to eat, and monitoring are all CFQ factors. Restriction

132   (Cronbach alpha 0.81) was measured by 6 items:

133   (1) "I have to be sure that my child does not eat too many sweets (candy, ice-cream, cake or

134   pastries)",

135   (2) "I have to be sure that my child does not eat too many high-fat foods",

136   (3) "I have to be sure that my child does not eat too much of his/her favorite foods",

137   (4) "I intentionally keep some foods out of my child's reach",

138   (5) "If I did not guide or regulate my child's eating, he/she would eat too many junk foods",

139   (6) "If I did not guide or regulate my child's eating, he/she would eat too much of his/her

140   favorite foods".

141   The response options were scored: 1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree,

142   5=agree.

Pressure to eat (Cronbach alpha 0.69) was measured by 4 items:

(1) "My child should always eat all of the food on his/her plate",

(2) "I have to be especially careful to make sure my child eats enough",

(3) "If my child says "I am not hungry", I try to get him/her to eat anyway",

(4) "If I did not guide or regulate my child's eating, he/she would eat much less than he/she should".

The response options were scored: 1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree, 5=agree.

Monitoring (Cronbach alpha 0.77) was measured by 3 items:

(1) "How much do you keep track of the sweets (candy, ice cream, cake, pies, pastries) that your child eats?",

(2) "How much do you keep track of the snack food (potato chips, Doritos, cheese puffs) that your child eats?",

(3) "How much do you keep track of the high-fat foods that your child eats?"

The response options were scored: 1=never, 2=rarely, 3=sometimes, 4=mostly, 5=always.

Another CFQ factor is concern about child weight; in this study, concern about child weight (Cronbach alpha 0.86) was examined as a potential confounder. It consists of 3 items: "How concerned are you about your child eating too much when you are not around her?", "How concerned are you about your child having to diet to maintain a desirable weight?" and "How concerned are you about your child becoming overweight?". The responses options are: 1=unconcerned, 2=a little concerned, 3=concerned, 4=fairly concerned, 5=very concerned.

168 Mean scores for each subscale were calculated; for each practice, higher scores represented

169 more frequent use.

170

171 *Background characteristics*

172 A socio-demographic and anthropometric questionnaire was designed using items from

173 established instruments. Data were collected on children's age (in years), gender (boy or girl),

174 height (in cm), and weight (in kg), and on mothers' age (in years), height (in cm), weight (in

175 kg) and level of education (more than 12 years or less than 12 years. Mother's country of birth

176 was self-reported in the background questionnaire based on a question "In which country were

177 you born?" with two answer options: I was born in: 1) Sweden, 2) another country, please

178 specify.

179

180 Body Mass Index (BMI) in kg/m^2 was calculated for both children and their mothers, and was

181 then used to establish the categories of overweight/obese and normal weight. Weight and height

182 were self-reported in the population-based non-clinical samples, and measured by trained health

183 care professionals in the clinical sample. Child weight categories were created using age and

184 gender specific international cut offs for BMI [53].

185

186 *Data analyses*

187 Descriptive statistics are presented as means or percentages for categorical variables. Taking

188 into consideration the large sample size (n=1,325) and implications of the central limit theorem

189 (CLT) for normality in larger sample sizes, parametric tests were chosen. One-way analysis of

190 variance (ANOVA) and chi-square (χ^2) analysis were performed in order to explore possible

191 differences in continuous and categorical variables across the groups established through

192 mother's place of birth. Once statistical significance was attained through the ANOVA, post

193 hoc analyses were performed using Bonferroni tests for multiple comparisons, in order to

194 identify differences in continuous variables between the groups based on mother's place of birth

195 (the results not shown). Multiple linear regression was carried out, with restriction, pressure to

196   eat, and monitoring as dependent variables and mother's place of birth as a primary exposure

197   variable, to test the crude (Model I), partly adjusted (for child weight, Model II, and for concern

198   about child weight, Model III) and fully adjusted model (Model IV). Unstandardized regression

199   coefficients were interpreted as the difference in scores between the reference group (Swedish-

200   born mothers) and each of the three categories (Nordic/Western European-born,

201   Eastern/Southern European-born, and non-European-born). The confounders included child's

202   age, gender, and weight status and mother's age, weight status, level of education, and concern

203   about child weight. All p-values <0.05 were regarded as statistically significant. All analyses

204   were performed using SPSS statistical software (version 22.0, IBM Inc., Chicago, USA).

205

206   ***Results***

207   **Study population**

208   Table 1 provides an overview of the 73 countries including Sweden represented in the sample.

209   Out of 1325 returned answers, 41 mothers did not indicate their country of origin, thus the total

210   sample comprises of 1284. Of the mothers, 923 were born in Sweden, 159 were born in a

211   European country other than Sweden, and 202 were born outside Europe. No country of origin,

212   except Sweden, was represented by more than 5% of the whole sample.

213

214   *Please insert Table 1 here.*

215

216   Mothers born in Europe were from 30 countries. The most represented European country was

217   Denmark (30 mothers), followed by Poland (21 mothers). Mothers who were not born in Europe

218   had origins in 42 countries. The Middle East and North Africa (MENA) region was most

219   represented, with 114 mothers from 12 countries, comprising 10 % of the valid cases; 59

220   mothers were born in Iraq, which was the most represented country outside Europe.

221

222 Based on socio-geographic similarities and comparable group size we created four subsamples:

223 mothers born in Sweden (n=923), mothers born in a Nordic country or in Western Europe

224 (including USA/Australia, due to socio-cultural similarities) (n=70), mothers born in Eastern

225 or Southern Europe (including Russia) (n=93), and mothers born in MENA, Asia, Latin

226 America, or Sub-Saharan Africa, which we grouped under the heading of non-European-born

227 (n=198).

228

229 *Please insert Table 2 here.*

230

231 Table 2 shows the descriptive characteristics of the total sample and of the four subsamples.

232 Significant differences were found between the four subsamples for children's and mothers'

233 weight status and mothers' education level. Mothers born in Sweden had a higher education

234 level and lower levels of overweight and obesity in comparison with the mothers from the three

235 other subsamples. Swedish-born-mothers reported the lowest level of concern about child

236 overweight, the lowest level of restriction and pressure to eat, and the highest level of

237 monitoring practices, compared to mothers from the other three subsamples.

238

239 **Parental feeding practices**

240

241 *Restriction*

242

243 *Please insert Table 3 here.*

244

245   Table 3 shows multiple linear regression analyses. Maternal origin was found to explain 9% of

246   the variance in restriction for Model I, the crude model. In Model II (adjusted for child's weight

247   status), the explained variance increased to 17%. In model III (adjusted for maternal concern),

248   the explained variance increased to 25%. In the fully adjusted model, the explained variance

249   was 28%. This indicates that child weight and maternal concern seem to be more important

250   than mothers' characteristics, such as age, weight status, and education, in influencing feeding

251   practices. Among the studied variables, maternal concern about child overweight was highly

252   influential. The first two models show similar patterns with regard to the effect of mother's

253   country of birth (0.40, 0.70, 0.80 for the crude model and 0.37, 0.65 and 0.67 for the model

254   adjusted for child's weight status). However, adjusting for concern resulted in a different

255   pattern; this pattern remained consistent after adjusting for all other confounders (0.37, 0.47,

256   0.38 for the model adjusted for concern, and 0.35, 0.43 and 0.34 for the fully adjusted model).

257   This indicates that concern about child overweight accounts for some of the effect of maternal

258   origin on restriction. For example, the difference in maternal concern can explain 52% ((0.80 −

259   0.38) / 0.80 = 0.52) of the difference in restriction between Swedish and non-European mothers.

260

261   Moreover, in the fully adjusted model, weight status and the age of both the child and the mother

262   were important. Child's (b=0.27, 95% CI 0.11-0.42) and mother's (b=0.13, 95% CI 0.01-0.24)

263   weight status were positively associated, while child's (b=-0.16, 95% CI -0.22- -0.09) and

264   mother's age (b=-0.01, 95% CI -0.02 – -0.001) were both negatively associated with restriction.

265

266   ***Pressure to eat***

267

268   Maternal origin explained 3.6% of the variance in the use of pressure to eat (Table 3). The

269   explained variance increased to 6.5% when adjusting for child's weight status. Adjusting for

270   concern yielded the same explained variance of 6.5%. In a fully adjusted model, the variance

271   increased to 8.2%. In contrast, for pressure to eat, the effect of mother's country of birth showed

272   a consistent pattern, with Swedish- and Nordic/Western European-born mothers demonstrating

273   the lowest values and non-European-born mothers demonstrating the highest values. In all

274   models, no significant differences were observed between Swedish-born mothers and

275   Nordic/Western European-born mothers with regard to pressure to eat. Mothers born in

276   Eastern/Southern Europe had higher scores on pressure to eat, and non-European-born mothers

277   had the highest scores. As in the case of restrictive feeding practices, child weight status and

278   maternal concern about child overweight were most influential on pressure to eat. In the fully

279   adjusted model, child's weight status (b=-0.30, 95%CI -0.46- -0.13) was negatively associated

280   with pressure to eat, as was maternal concern about child weight (b=-0.14, 95% CI -0.22- -

281   0.06). Maternal age, education, and BMI only had weak associations with pressure to eat in

282   Model IV.

283

284   *Monitoring*

285

286   In comparison with restriction and pressure to eat, the explained variance in monitoring, was

287   much lower in all models; the explained variance reached 1.3% in the fully adjusted model

288   (Table 3). Non-European-born mothers scored significantly lower in monitoring compared to

289   Swedish-born mothers in all models. In Model II (adjusted for child's weight status), child

290   weight status was positively associated with use of monitoring (b=0.20, 95% CI 0.06-0.34). In

291   Model III (adjusted for maternal concern), concern was also positively associated with use of

292   monitoring (b=0.09, 95% CI 0.03-0.15); however, none of these two confounders were

293   significantly associated with monitoring in the fully adjusted model. Child's gender and

294   maternal education were not associated with monitoring.

295

296 **Discussion**

297 This study is the first to investigate differences in controlling feeding practices between

298 Swedish-born and non-Swedish-born-mothers. The study accounts for potential confounding

299 variables, including mother's education and weight status, child's gender and weight status and

300 mother's concern for child weight, while examining potential associations between mother's

301 region of origin – as defined through groupings by country of birth – and feeding practices. The

302 analysis found significant associations between mothers' migrant backgrounds and their

303 feeding practices. The analysis found that non-Swedish-born mothers, whether European-born

304 or non-European-born, were more likely to report using restriction. In contrast, Swedish-born-

305 mothers and Nordic/Western European-born mothers reported similar levels of pressure to eat;

306 these levels were lower in comparison with mothers born in Eastern/Southern Europe, and

307 mothers born outside Europe. Among the potential confounding variables, child weight status

308 and concern about child overweight were the most influential. Specifically, maternal concern

309 about child overweight accounts for some of the effect of maternal origin on restriction.

310

311 Compared to restriction and pressure to eat, the analyses showed much smaller differences

312 between the groups regarding monitoring. In all four groups, most mothers scored higher on

313 monitoring than on the other two practices, possibly reflecting the social desirability of

314 endorsing monitoring practices. This ceiling effect made it difficult to examine associations

315 between maternal background and monitoring, due to the limited variance of the results. Thus,

316 the remainder of the discussion will focus on the analysis of relationships between maternal

317 background, restriction, and pressure to eat.

318

319   The current study extends the growing body of research on parental feeding practices by linking

320   feeding practices and maternal migrant backgrounds. Only one other European study explored

321   feeding in a multi-cultural context [49]. The study, which involved British and German mothers

322   of children age 2-12 years, found that German participants of Afro-Caribbean origin used

323   restrictive feeding practices more often and monitoring less often than white German-born and

324   UK-born participants. These results are similar to findings from a US-based study which

325   showed that restrictive feeding was higher among Hispanic mothers of preschoolers, compared

326   to non-Hispanic white mothers [47]. Another US-based study with slightly older parents also

327   showed that Hispanic parents endorsed the highest levels of restriction and pressure to eat, while

328   non-Hispanic white parents endorsed the lowest levels [45]. However, while the aforementioned

329   studies focused on ethnicity as a variable, the present study is the first to examine associations

330   between migrant background and feeding practices.

331

332   There are three possible reasons why non-Swedish-born mothers report higher use of

333   controlling feeding practices. First, controlling feeding practices may reflect culturally

334   conditioned modes of parental communication with children. In a cross-cultural study that

335   compared US families of diverse ethnic backgrounds with Swedish families, clear differences

336   were observed in the dynamics of play between parents and infants, with US families showing

337   a much higher interaction tempo than Swedish families [54]. Interestingly, the researchers

338   observed that the US children were not overwhelmed by the higher tempo, and that the Swedish

339   children were not understimulated by the lower tempo. Similarly, the perception and reception

340   of feeding practices may be culturally conditioned, and it is important to note that most studies

341   where controlling feeding practices were found to be counter-productive were conducted

342   among white US families, with negative influences particularly pronounced for girls [19]. In

343   other studies, especially those conducted among Hispanic and African-American families, no

344   link was observed between the level of controlling feeding practices and weight gain in children

345   [46,55,56]. It is possible, then, that controlling feeding may not substantially disrupt children's

346   self-regulation of appetite in an environment where controlling feeding practices are more

347   common and have fewer negative connotations.

348

349   Another possible interpretation for the study's findings is that parents are more likely to employ

350   controlling feeding practices when facing stressful situations. Studies have shown links

351   between stress and feeding [57], and between stress and childhood obesity [58]. Furthermore, in

352   the related area of parental mental health, most studies have found associations between

353   parental depression or anxiety and feeding practices [57,59,60,61,62,63]. It is important to note that

354   behavioral changes caused by depression and stress may differ [64]. Symptoms may vary

355   considerably depending on the context and length of the depressive or stressful periods. Because

356   experiences of migration are associated with increased long-term stress [65,66] and structural

357   vulnerabilities, parents may be less attentive to children's needs and may engage in pressuring

358   or restrictive feeding practices as a result. The results of our recent analysis of associations

359   between sense of coherence (a concept linked to resilience to stress), parental feeding practices,

360   parental SES, and parental migrant origin support this suggested nexus between migration,

361   stress, and controlling feeding [67].

362

363   Possible regional differences in concern about child weight offer a further explanation of

364   differences in parental feeding practices. Our results suggest that variations in controlling

365   feeding practices are partly explained by differences in the weight status of children and, even

366   more so, by maternal concern about child overweight; notably, in the case of restriction,

367   maternal concern overrides the effect of maternal origin. In our study, higher proportions of

368   non-Swedish-born mothers reported concern over child weight. These results are in line with a

369 2013 study that analyzed data from eight European countries, and found that about half of

370 parents in Southern Europe were concerned about their children's potential for unhealthy

371 weight, in comparison with one third of parents in Northern and Central Europe [42]. Of note,

372 large proportions of parents, especially in Southern Europe, were concerned about their

373 children's potential for both underweight and overweight. The authors argue that "having both

374 concerns may imply the presence of a more universal uneasiness, of which weight concerns

375 may be just one part" [42]. Such regional differences may reflect both specific anxieties about

376 eating, weight, and the body, and anxieties born of economic inequality and uncertainty [68]. As

377 the mothers of non-Swedish origin who participated in our study were able to complete the

378 questionnaire in Swedish – suggesting they had gone through some acculturative processes – it

379 is also possible that increased maternal concern about child overweight was accentuated by

380 integrating into Swedish society, where emphasis is placed on lean weight status and

381 appearance [69].

382

383 The present study has several strengths and limitations. The study has a larger sample (n=1,325)

384 than previous studies that examined associations between parental national origin and

385 controlling feeding practices. The large sample and the diversity of participants' birthplaces (a

386 total of 72 apart from those born in Sweden), in combination with the use of a population

387 registry, make the study particularly robust. Since detailed Swedish registers are widely

388 accessible, the final sample was found to reflect demographic aspects measured on the regional

389 level, with the exception of level of education [70]. The study's main limitation was the use of

390 self-reports to determine BMI in the population-based and school samples. Cultural values

391 affect the reporting of weight and height [71,72], such that overestimation and underestimation

392 are possible, especially for those children who have developed obesity [73,74]. Another limitation

393 is lack of information about father's country of birth, as there might be some differences

394   between families with one parent of non-Swedish background and families with two parents of

395   non-Swedish background. An additional limitation may have been posed by language: the

396   questionnaires were in Swedish only, which may have affected the quality of responses

397   provided by participants who were not fluent in Swedish, and may have influenced the sample

398   as well. Furthermore, the use of a cross-sectional design did not allow us to analyze if the

399   mothers of foreign origin have changed their feeding practices after moving to Sweden as a

400   result of being influenced by the new culture. Finally, the interpretation of the results was

401   limited by the parameters set for comparison; in the analysis, the participants' countries of

402   origin were grouped based on their geographic location (European and non-European) in most

403   cases, and socio-cultural similarities in a few cases. The extent to which place of birth correlates

404   with food and feeding practices can vary considerably between individuals, as well as between

405   and within migrant groups, and it is likely that some non-Swedish-born participants were

406   acculturated to aspects of the mainstream Swedish lifestyle, including dietary practices [75]. As

407   recent critiques have shown, acculturation is a multidimensional process that reflects migration

408   type (e.g. economic versus asylum seeking migration), the structures and values of the receiving

409   society, the ethnic identification, values and practices of migrant groups, and the varying

410   degrees of social inclusion and exclusion migrants encounter [76]. Since acculturation is a non-

411   linear process, the study did not assume a participant's extent of acculturation based on

412   demographic variables (e.g. years of residence in Sweden), and the analysis, therefore, did not

413   aim to provide a subgrouping of non-Swedish-born participants based on extent of

414   acculturation.

415

416   **Future research**

417   The findings suggest that additional research is needed to elucidate the reasons underlying the

418   use of pressuring and restrictive practices by mothers of migrant backgrounds. Although recent

419 research has identified parental resilience to stress [67] and parental SES [45] as associated with

420 feeding practices, it is also possible that child feeding practices are embedded in broader food-

421 related practices [11]. Feeding practices are related to the preservation of cultural, communal,

422 and familial identities in the context of migration [77,78], and it is still unknown how migration

423 influences child weight status and parental concern about child overweight. Differences within

424 the relatively large groups of European-born and non-European-born mothers need to be

425 explored further. Similarly, analysis by migration type (e.g. economic migration versus asylum

426 seeking) would allow for a more nuanced understanding of associations between diverging

427 processes of migration – upon the trauma and stress they involve – and parental feeding

428 practices. Finally, future research should examine associations between parental migration and

429 additional feeding practices – particularly encouragement and role modeling [79].

430

Conclusion

432 Differences in controlling feeding practices between Swedish-born and non-Swedish-born

433 mothers were identified in a large sample of mothers of diverse countries of birth. Swedish-

434 born and Nordic/Western European-born mothers were less likely to report using pressuring or

435 restrictive feeding practices– practices that may promote unhealthy eating behaviors among

436 children. Child weight and maternal concern about child overweight were important

437 confounding variables, especially for restriction. The study highlights the importance of

438 national and migration background in influencing parental feeding practices. Future research

439 should examine the processes that underlie differences between Swedish-born and non-

440 Swedish-born mothers' feeding practices. This could inform the development of inclusive

441 interventions for promoting healthy feeding and eating practices in diverse societies, with

442 sensitivity to the values and experiences of migrant parents, and an understanding of the

443 hardships and structural barriers they encounter throughout the migration process.

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615 **Tables**

616 Table 1. Mother's reported country of origin, grouped by socio-geographic similarities.
617

Swedish, total	923	Non-European, total	198
Nordic, other than Sweden, total	53	Middle East and North Africa, total	114
1. Denmark	30	1. Iraq	59
2. Finland	18	2. Iran	17
3. Norway	3	3. Jordan	2
4. Iceland	2	4. Kuwait	1
		5. Lebanon	20
Western Europe, total	13	6. Morocco	1
1. Belgium	2	7. Libya	2
2. Great Britain	2	8. Palestinian Territories / Palestine	1
3. France	2	9. Sudan	1
4. The Netherlands	1	10. Syria	3
5. Austria	1	11. Turkey	6
6. Germany	5	12. United Arab Emirates	1
Eastern Europe and the Balkans, total	87	East, South and Southeast Asia, total	50
1. Estonia	3	1. Afghanistan	10
2. Kosovo	8	2. Bangladesh	1
3. Croatia	3	3. Cambodia	2
4. Lithuania	3	4. China	7
5. FYROM / Macedonia	7	5. Japan	3
6. Moldova	1	6. South Korea	6
7. Montenegro	1	7. Pakistan	4
8. Poland	21	8. The Philippines	3
9. Romania	5	9. Sri Lanka	2
10. Russia	4	10. Taiwan	1
11. Serbia	6	11. Thailand	5
12. Slovakia	1	12. Vietnam	6
13. Czech Republic	3		
14. Ukraine	2	Sub-Saharan Africa, total	15
15. The former Yugoslavia	1	1. Congo	2
16. Bosnia	17	2. Eritrea	1
17. Bulgaria	1	3. Ethiopia	3
		4. Gambia	1
Southern Europe, total	6	5. Ghana	1
1. Greece	1	6. Ivory Coast	1
2. Italy	4	7. Somalia	4
3. Spain	1	8. Tanzania	1
		9. Uganda	1
		Central and South America, total	19
		1. Argentina	2
		2. Bolivia	1
		3. Brazil	1
		4. Chile	10
		5. Ecuador	2
		6. Guatemala	1
		7. Honduras	2
		Other, total	4
		1. Australia [a]	1
		2. USA [a]	3

618 [a] Included in the "Nordic/Western European" group due to socio-cultural similarities with Sweden.

619   Table 2. Descriptive statistics of the study population.

	Total population (N=1325)	Sweden (N=923)	Nordic country/ Western Europe (N=70)	Eastern and Southern Europe (N=93)	Non-European country (N=198)	p-value
	Mean or %	Mean or %	Mean or %	Mean or %	Mean or %	
Child's gender						0.563 [a]
Boy	50.8	50.1	47.1	48.4	54.9	
Girl	49.2	49.9	52.9	51.6	45.1	
Child's age in years	4.80	4.85	4.76	4.60	4.63	**<0.001 [b]**
Child's weight status						**<0.001 [a]**
No overweight or obese	81.4	85.3	81.8	78.3	68.9	
Overweight or obese	18.6	14.7	18.2	21.7	31.1	
Mother's age in years	36.5	37.0	36.5	33.6	35.2	**<0.001 [b]**
Mother's weight status						**<0.0001 [a]**
No overweight or obese	69.3	72.1	67.2	69.6	55.3	
Overweight or obese	30.7	27.9	32.8	30.4	44.7	
Mother's education						**<0.001 [a]**
12 years or fewer	37.2	29.8	32.9	60.2	63.6	
More than 12 years	62.8	70.2	67.1	39.8	36.4	
CFQ Concern	1.48	1.30	1.33	1.79	2.25	**<0.001 [b]**
CFQ Restriction	2.63	2.44	2.86	3.13	3.25	**<0.001 [b]**
CFQ Pressure to eat	2.81	2.70	2.73	3.11	3.24	**<0.001 [b]**
CFQ Monitoring	3.86	3.91	3.89	3.80	3.63	**0.001 [b]**

620   P-value: significance level of 0.05. [a] Chi-square (χ^2) for categorical variables [b] One-way ANOVA for continuous
621   variables
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627   Table 3. Crude and adjusted unstandardized regression effects (with 95% CI) when predicting
628   feeding practices from various child and mother characteristics.

Model/Predictor	Restriction	Pressure to Eat	Monitoring
Model I	*Adj. R^2 = 0.092*	*Adj. R^2 = 0.036*	*Adj. R^2 = 0.003*
Nordic/Western European [a]	0.40 (0.15; 0.64)*	-0.03 (-0.28; 0.21)	0.03 (-0.2; 0.26)
Eastern/Southern European [a]	0.70 (0.47; 0.93)**	0.40 (0.18; 0.63)**	-0.03 (-0.24; 0.18)
Non-European[a]	0.80 (0.62; 0.97)**	0.50 (0.33; 0.67)**	-0.20 (-0.36; -0.04)*
Model II	*Adj. R^2 = 0.166*	*Adj. R^2 =0 .065*	*Adj. R^2 = 0.009*
Nordic/Western European [a]	0.37 (0.13; 0.61)*	-0.02 (-0.26; 0.22)	0.02 (-0.21; 0.25)
Eastern/Southern European [a]	0.66 (0.43; 0.87)**	0.43 (0.21; 0.65)**	-0.04 (-0.25; 0.17)
Non-European[a]	0.67 (0.50; 0.84)**	0.58 (0.41; 0.75)**	-0.23 (-0.4; -0.07)*
Child's overweight/obesity [b]	0.72 (0.57; 0.86)**	-0.44 (-0.58; -0.29)**	0.20 (0.06; 0.34)*
Model III	*Adj. R^2 = 0.250*	*Adj. R^2 = 0.065*	*Adj. R^2 = 0.009*
Nordic/Western European[a]	0.37 (0.15; 0.60)*	-0.02 (-0.27; 0.22)	0.02 (-0.21; 0.25)
Eastern/Southern European[a]	0.47 (0.26; 0.68)**	0.50 (0.27; 0.72)**	-0.07 (-0.28; 0.14)
Non-European[a]	0.38 (0.22; 0.55)**	0.68 (0.50; 0.85)**	-0.28 (-0.44; -0.11)*
CFQ Concern	0.48 (0.42; 0.54)**	-0.20 (-0.27; -0.13)**	0.09 (0.03; 0.15)*
Model IV	*Adj. R^2 = 0.280*	*Adj. R^2 = 0.082*	*Adj. R^2 = 0.013*
Nordic/Western European[a]	0.35 (0.13; 0.57)*	-0.02 (-0.26; 0.22)	0.02 (-0.21; 0.24)
Eastern/Southern European[a]	0.43 (0.22; 0.64)**	0.40 (0.17; 0.63)*	-0.09 (-0.31; 0.12)
Non-European[a]	0.34 (0.17; 0.50)**	0.61 (0.43; 0.79)**	-0.28 (-0.46; -0.11)*
Child girl[c]	0.02 (-0.08; 0.12)	0.03 (-0.08; 0.14)	0.08 (-0.02; 0.18)
Child's age	-0.16 (-0.22; -0.09)**	-0.04 (-0.12; 0.03)	-0.03 (-0.1; 0.03)
Child's overweight/obesity [b]	0.27 (0.11; 0.42)*	-0.30 (-0.46; -0.13)**	0.14 (-0.02; 0.3)
Mother's age	-0.01 (-0.02; -0.001)*	-0.01 (-0.03; -0.002)*	-0.01 (-0.02; 0.001)
Mother's overweight/obesity [b]	0.13 (0.01; 0.24)*	-0.01 (-0.13; 0.11)	0.01 (-0.1; 0.13)
Mother's education ≥ 12 years [d]	0.09 (-0.02; 0.21)	-0.10 (-0.22; 0.02)	0.03 (-0.08; 0.15)
CFQ Concern	0.42 (0.35; 0.50)**	-0.14 (-0.22; -0.06)**	0.06 (-0.02; 0.13)

[a] Compared with Swedish mothers, [b] compared with normal weight, [c] compared with male child, [d] compared with < 12 years,
* $p < .05$, **$p < .001$

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