Ethnic inequalities in early overweight: determinants and consequences

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SUMMARY

Overweight is a major public health issue that is often occurring during childhood. Approximately 14% of the 2-21 year children are overweight or obese. Although the current obesity epidemic in children seems to be levelling off, children from ethnic minority groups do not seem to benefit from this trend. In the Netherlands, children from Turkish and Moroccan origin have the largest prevalence of overweight. From a preventive point of view, a better understanding of the early determinants of overweight, particularly if these are ethnic specific, is important in order to explain and address these ethnic inequalities.

The aim of the present thesis, as described in Chapter 1, was divided in two parts. The first aim was to describe determinants that are associated with childhood overweight and that might explain ethnic inequalities in overweight among Dutch, African descent, Turkish, and Moroccan ethnic groups living in the Netherlands, and (in one study) among white, blacks, and Hispanics living in the USA. In that part we discussed three important determinants of childhood overweight: early life factors, (infant) diet, and maternal perception of her child’s weight. In part two we investigated whether or not ethnic inequalities in cardiometabolic risk factors (such as blood pressure (BP), glucose, and cholesterol levels) already exist at the age of 5-6 years.

To address this goal the following questions were formulated:
1. Regarding the determinants of ethnic differences in early overweight (part one):
   a) What is the role of early life factors, more specifically prenatal, birth outcome and postnatal factors, on increased risk of overweight in ethnic minority populations at the age of 2 years?
   b) (Infant) diet:
      • What is the influence of infant feeding pattern on ethnic differences in early growth in the first 6 months in weight, length and weight-for-length?
      • What is the role of parental BMI, immigration status and maternal perception of child’s weight on ethnic differences in diet in 3-year-olds?
   c) What is the influence of socio-economic status, parental BMI and immigrant status on maternal perception of their 5-6 year old child’s body weight?
2. Regarding the consequences of ethnic differences in early overweight (part two):
   a) What are the cardiometabolic consequences of early overweight in the different ethnic groups at the age of 5-6 years? This question focuses on differences in BP, lipid profile and glucose level, and the explanatory role of body mass index (BMI) and waist circumference (WC).
   a) Are there ethnic-specific associations between different adiposity measures (BMI, fat mass index (FMI) and waist-to-height ratio (WHtR)) and BP at the age of 5-6 years?

The studies in this thesis were performed within the ABCD study (Amsterdam, the Netherlands) and (for one sub-study) within Project Viva (Boston, MA, USA). Both are prospective birth cohort studies using data collected via self-reported questionnaires, child health care registration and hands-on measurements.
In **Chapter 2**, ethnic inequalities in overweight at the age of 2 years were explored, as well as to what extent the inequalities could be explained by prenatal, birth outcome and postnatal factors. Compared with ethnic Dutch 2-year-olds, the odds for overweight in Turkish and Moroccan children is 2-3 times higher. Children from African descent and those in the ‘other’ group did not have higher odds for overweight. Infant weight gain during the first 6 months of life, and to a lesser extent maternal pre-pregnancy BMI, played a large role in explaining the higher overweight prevalence among Turkish and Moroccan children.

**Chapter 3** focuses on infant feeding pattern and growth. It is shown that Turkish, Moroccan and African descent infant growth is faster (both in weight and in body length) during the first 6 months of life compared to ethnic Dutch infants. In addition, Moroccan infants showed more growth in weight-for-length, which might put them at higher risk for overweight and obesity later in life. Although we could confirm the protective effect of breastfeeding on growth, infant feeding practices did not explain the faster growth in Turkish and Moroccan infants. Only the weight increase in the African descent infants was partly explained by the shorter duration of breastfeeding and the early introduction of complementary food. Although both Turkish and Moroccan mothers tend to breastfeed their children longer than ethnic Dutch mothers, especially Moroccan mothers introduce additional formula feeding at an earlier stage.

After the period of infant feeding, poor diet during childhood becomes an important risk factor for the development of (later) overweight and health in general. In **Chapter 4** we turned our attention to ethnic populations living in the USA (Boston); non-Hispanic white, non-Hispanic black and Hispanic 3-year-old children. The aim was to investigate ethnic differences in diet and its association with maternal BMI, immigrant status and maternal perception of child’s weight. Ethnic groups have different dietary cultures, and social background, which may lead to both higher and lower quality diets and habits. It was found that, compared with their white peers, black and Hispanic 3-year-olds appear to eat a lower quality diet. Being born outside of the USA as a mother was associated with more healthful intake of some nutrients, and fast food intake tended to be lower among their offspring. Recognition of overweight by parents is of critical importance in the early identification of childhood overweight and successful intervention strategies. In **Chapter 5** we determined the ethnic variation in maternal underestimation of the weight status of their 5-6 year old children. We found a relatively high percentage of underestimation, irrespective of the ethnic background. The highest percentage of underestimation occurred among the Turkish and Moroccan mothers. A lower educational level, being a young mother and being born in a foreign country are likely to play an important role in underestimation. Furthermore, when the parents live in an obesogenic environment with a high prevalence of overweight/obesity it could be that ‘overweight is the benchmark for normal weight’.

In part two we focused on the consequences for cardiometabolic risk for ethnic inequalities in overweight. In Western countries, overall cardiometabolic risk factors differ between ethnicities. However, it is unknown whether these differences already exist at a young age and if differences in body size play a role. In **Chapter 6** we found ethnic differences in
cardiometabolic risk profile at the age of 5-6 years. Favourable HDL levels were found in African descent children, whereas Turkish children showed the most adverse profile with higher blood pressure, glucose and triglyceride levels. Their Moroccan peers have relatively less cardiometabolic risk, despite their high BMI and WC. The higher BMI and WC in Turkish children partly explained the more adverse cardiometabolic risk profile. The association between BMI and other body size measurements with blood pressure was found to be different between ethnic groups. In Chapter 7 we found higher increase in blood pressure with increasing BMI in Turkish children. We suggested that, because the prevalence of overweight is much higher in Turkish children, Turkish children might be more prone to develop hypertension, even at the same levels of overweight. Finally, Chapter 8 addresses the main findings of the studies, including some of the methodological limitations. The results are discussed in the light of their relevance for public health practice and some recommendations are made for future research. The studies described in this thesis have led to the following main conclusions:

Firstly, ethnic inequalities in overweight were already seen at young age, irrespective of socio-economic status, with Turkish and Moroccan children having the highest prevalence of overweight. Approximately 70% of the Turkish and Moroccan children with overweight at the age of 2 years are also overweight at 5-6 years of age (ethnic Dutch: 31.9%). This implies that overweight at age 2 years has a strong predictive value for staying overweight (tracking) in specifically non-Dutch children, and that the critical period for preventing ethnic inequalities in childhood overweight is during the first 2 years of life. The key determinant identified in this thesis is: rapid growth in the first 6 months of life. Youth health care professionals should be aware of this critical time period for intervention.

Secondly, the higher prevalence of rapid growth in Turkish and Moroccan infants was not explained by infant feeding pattern. The composition and amount of feeding or feeding habits might differ between groups, resulting in more energy intake. Further research is needed among Turkish and Moroccan infants to help define targets for prevention against early rapid growth in these groups.

Thirdly, parental involvement is of critical importance for effective treatment and prevention of early overweight. Accordingly, health care professionals should take into account parental cultural background, which includes eating habits and parental perceptions of their children’s health status.

Finally, the higher prevalence of overweight among Turkish and Moroccan children, and the adverse cardiometabolic profile in Turkish children, might lead to increased health problems in adult life. Prevention of overweight at young age (0-2 years) in general, but especially in Turkish and Moroccan children, might offer enormous health benefits.