Chapter 7

General discussion
**Introduction**

The overall aim of this thesis was to find indications for the prevention of childhood overweight and obesity in the city of Zwolle, especially in the context of the home environment and parenting. In accordance with the ecological model by Davison and Birch (Figure 1) (1) the association between community (in this dissertation studied as neighbourhood) and overweight and its behavioural determinants were investigated (chapter 2, first ring of the model). In addition, communities comprise of families who play an important role in the lifestyle related behaviours of children. Therefore, in chapter 3 to 5, determinants in home environment were identified regarding sedentary behaviour, sleeping and dietary behaviour (vegetables and fruit consumption) (second ring). In chapter 6, the energy-balance related behaviours (third ring) were investigated longitudinally. In this general discussion, the main findings are discussed followed by a reflection of the findings in relation to this model and an integration of these findings. Subsequently the methodological strengths and limitations of this dissertation are discussed. The main findings of this thesis are translated into implications and recommendations for practice, policy, education and research.

![Ecological model of predictors of childhood overweight](image)

**Figure 1** Ecological model of predictors of childhood overweight. * Child risk factors (shown in upper case lettering) refer to child behaviours associated with the development of overweight. Characteristics of the child (shown in italic lettering) interact with child risk factors and contextual factors to influence the development of overweight (i.e. moderator variables) (1).
Main findings, reflection and integration

Neighbourhood and behaviour

First, some items in the outer ring of the model by Davidson and Birch (Figure 1) were studied and three neighbourhoods with a statistically significantly higher prevalence of childhood overweight than the other neighbourhoods in Zwolle were identified (chapter 2). The local environment is important for prevention of childhood overweight as it, together with biological predisposition, affects the energy imbalance. Therefore it is partly responsible for the increase in childhood overweight as is supported by the study findings in chapter 2 and illustrated by the multilevel model of Glass and McAtee (2). In this model (further explained in the introduction) it is showed that next to biological and child characteristics, aspects of the local environment such as cultural norms, area deprivation, psychosocial hazards, built environments, local food environments and commercial messaging play an important role (2, 3). The study findings in chapter 2 showed an association between the local environment in which a child lives and child’s unhealthy dietary intake, physical activity and sedentary behaviour. These findings are in line with the ecological model by Davison and Birch (Figure 1) that also illustrates the important influence of the local environment on lifestyle behaviours of children (1). Whether this association between childhood overweight and neighbourhood is explained by these lifestyle behaviours in combination with socio-demographic characteristics (socio-economic status in particular) could only be estimated approximately, because the behaviours and the neighbourhood were measured rather roughly and at one moment in the ChecKid study. Other aspects (such as, children’s physical and social environment or social cohesion) of the neighbourhood were not measured or taken into account in the analyses. Nevertheless, the study findings in chapter 2 gives clear indications for the importance of the neighbourhood as a determinant of obesity. This is in agreement with results from other studies in which is illustrated that children, adolescents and adults living in deprived neighbourhoods are more likely to be overweight than people living in less deprived neighbourhoods (4-6). Within the neighbourhoods, schools and families are important settings in the direct surroundings of (especially young) children, so this might be a good location for tailored prevention (6). This is supported by a recent study using multilevel analyses to determine how much each of the ecological contexts (community, school and home) contributes to childhood overweight. They concluded that children’s family level explained 71% of the variation in childhood overweight, school level explained 27% and community level, 2% (7). The school has a large reach; children spend a lot time at school and teachers can function as a role model. However, children spend more time within the home environment and parents have the largest impact on children, therefore this dissertation concentrated on the role of parents in relation to energy-balance related behaviours of their children. Parents also play a role in the association between the neighbourhood and children’s energy-balance related behaviours. For example, a perceived unsafe neighbourhood (high crime rate, high traffic load and poor sidewalk conditions) by parents is associated with
higher levels of childhood overweight (8, 9). Possibly, these parents stimulate their children less to play outside (10). In addition, parents determine the physical and social home environment of children and are role models regarding dietary behaviour and physical activity in children (11-13). These relations are illustrated by the model of Davison and Birch in Figure 1 (1).

Home environment and behaviour
In chapter 3, 4 and 5 the items in the inner rings of the model in Figure 1 were investigated by studying aspects of the home environment associated with specific energy-related behaviours (TV viewing and computer use, sleep duration, fruit and vegetables consumption). Behaviours were presented for the subgroups in which differences were most apparent. With regard to TV viewing, computer use and sleep duration most obvious differences were found between younger (4-8 year old) and older (9-13 year old) boys and girls. The prevalence for insufficient fruit and vegetables intake proved to be quite similar for younger and older boys and girls and differed between children with a different socio-economic background. Therefore analyses were presented separately for low, middle and high SES groups in chapter 5. The longitudinal association between different energy-balance related behaviours and overweight or an increase in BMI-sds was shown separately for low, middle and high SES groups in chapter 6. As expected, we identified some known risk behaviours for overweight, although some (small) differences were found between subgroups and cross-sectional and longitudinally data. In general, high levels of TV viewing and/or computer use (chapter 3), short sleep duration (chapter 4), insufficient vegetables consumption (chapter 5), skipping breakfast or low levels of sport participation (chapter 6) were associated with childhood overweight. Viewing more than 1,5 hours TV did not compromise the time devoted to playing outside or participation in sports (chapter 3). Moreover, viewing TV and computer use was strongly associated with sleeping fewer hours per night and the other way around (chapter 3 and chapter 4). The results in chapter 6 also showed that weight change is probably due to a combination of consistent unfavourable behaviours at both measurements and unfavourable changes in behaviours after baseline. Therefore, it should be taken into account that focussing on one energy-balanced related behaviour is probably insufficient. Interventions should focus on several behaviours simultaneously as is illustrated in chapter 6 and in other studies (14, 15). The results regarding fruit and vegetables consumption (chapter 5) showed that it might be more promising to promote vegetables consumption and focus less on fruit consumption in intervention programs. Fruit consumption might not necessarily be beneficial; it might be eaten on top of other less healthy foods instead of replacing other less healthy options (chapter 5). Moreover, fruit may be rich in sugars and calories, which is generally not the case for vegetables (16). Next to low SES families, middle SES families also seem to be important in the prevention of overweight as is illustrated by the study findings in chapter 5. In a recent study it is suggested that the relationship between
overweight and living in a deprived area might not be linear; children living in middle deprived areas were more often obese than children living in low or high deprived areas (17). The low SES group in the Netherlands is probably not as extreme as in the UK; it might even be more similar to the middle SES group than the low SES group. But these results indicate that prevention measures should not only target families with a low SES background, but also those with a middle SES background. Chapter 2 also showed other energy-balance related behaviours to be important in the prevention of childhood overweight (such as skipping breakfast, drinking sugared drinks and sport participation) then those that were further investigated in chapter 3, 4, and 5. The choices for the behaviours that were studied more closely in this dissertation were based on literature, on results of the ChecKid study that showed were improvements could be possible, and the practical feasibilities for the city of Zwolle. For example, in general children eat breakfast on a daily basis and had therefore, from a public health perspective, less priority. In addition, high intake of sugared drinks is associated with childhood overweight as shown in several other studies (14, 18, 19) and was associated with living in neighbourhoods with more overweight (chapter 2) but was not found to be associated with overweight in the ChecKid study. In addition, insufficient sport participation is associated with childhood overweight (20) and associated with living in neighbourhoods with more overweight (chapter 2) but was not found to be associated with overweight in the ChecKid study.

The identified determinants in the home environment can be summarized in four main topics that seem to be important in the prevention of childhood overweight. The first topic is the importance of the physical environment. Results in chapter 3 showed that having more than two TVs in the household was associated with more TV viewing. Additionally, a TV in the bedroom was associated with more TV viewing (chapter 3) and a short sleep duration (chapter 4). The second topic is the importance of having rules. Not having rules on TV viewing (when and how long) was associated with more TV viewing and a late bedtime was associated with shorter sleep duration in chapter 4. In addition, permission to take candy without asking was associated with short sleep duration (chapter 4) and not eating vegetables daily (chapter 5). The third topic is the importance of having structure and routine in the household. This is illustrated by the results in chapter 4 and 5; viewing TV during a meal and eating at least one day per week an ordered meal was associated with short sleep duration and not eating vegetables daily. Moreover, eating a home cooked meal less than six days per week was associated with not eating vegetables daily. The fourth and last topic is the importance of parents and children doing things together. The results in chapter 4 showed that not being active (going outside, sporting, cycling together) with their caregiver was associated with short sleep duration in children. In addition, cooking together for less than 5 days per week was associated with not eating vegetables daily in chapter 5.
These found associations between determinants in the home environment and energy-balance related behaviours give additional evidence for the importance of the home environment and involving parents in the prevention of childhood overweight. The determinants identified are of course not exhaustive; there will be other determinants in the home environment associated with these behaviours. The identified determinants should therefore not be seen as a complete overview of determinants. However, there seem to be indications for the fact that the physical environment, structure and routine in the household, clear rules and a high level of parents and children doing things together are important targets for intervention. The association between home environment and energy-balance related behaviours fit in well into the model of Davison and Birch as this model also shows the importance of parenting and the home environment (1). The results are also in line with other studies suggesting that structure and routine (by having rules and doing things on set times) and parental support and modelling of healthy behaviours, have an important influence on health behaviours and a healthy weight in children (21-25). It should be taken into account that the model by Davison and Birch is developed for children in the age of 0-4 years. The study population of the ChecKid study are 4-13 year old children. Therefore, in the theory of Davison and Birch, most habits of the ChecKid study population and their parents (including parenting practices) were already formed, making it more difficult to find associations. For example, parents do not need to monitor TV viewing if their child never or hardly watches TV. However, there could have been a rule on limited TV viewing when the child was younger that has survived into later childhood. Nevertheless, as the study results show, associations can still be demonstrated in children attending primary schools. Moreover, primary schools are practical locations to monitor a large group of children. Additionally, it is important to keep monitoring energy-balance related behaviours in different age groups as in every age transition parents are faced with new challenges. In every age transition the social and physical environment of children changes and therefore at different ages, different determinants play a role.

The study results could also be part of a bigger context of parenting style and parent-child interaction. Parenting styles have been associated with socialization and health related outcomes in children (26, 27). There are four types of parenting styles that can be distinguished: the uninvolved parenting style (with low levels of parental control and low levels of responsiveness to children’s needs), the indulgent parenting style (with low levels of parental control and high levels of responsiveness to children’s needs); the authoritarian parenting style (with high levels of parental control and low levels of responsiveness to children’s need) and authoritative parenting style (with high levels of parental control and high levels of responsiveness to children’s needs) (26, 27). The study findings in chapter 3, 4 and 5 show that having rules, an interaction between child and caregiver by doing things together and a structured household is associated with a healthier lifestyle (less TV viewing, longer sleep duration and more vegetables consumption). This is supported by other research concluding that the authoritative parent
style, further characterized by a clear and firm direction and also by warmth, flexibility and acceptance is associated with a healthier lifestyle of the child, such as less sedentary behaviour (22), higher fruit and vegetables consumption (23, 28) and a healthier weight (24, 29).

**Methodological considerations**

There are some methodological issues that should be taken into consideration when reading the study findings in this dissertation. Most issues are mentioned in **chapter 2 through 6**, some main issues will be discussed below.

**Study population**
The majority of the schools in the city of Zwolle participated in the ChecKid study with an equal distribution across the different neighbourhoods of Zwolle. Moreover, a relatively high number of parents and children participated in the study, with an equal spread across different age groups and gender among the participating children. However, there was a relative low representation of children with a low SES background compared to children with a high SES background in the study. Although, Zwolle has, compared to other cities, a relative small number of low SES families (30), it seems that there was a low underrepresentation in the ChecKid study. Children whose parents did not return the questionnaire (but were physically measured) were more often overweight, than children whose parents did return the questionnaire. Moreover, it appears that overweight children were less likely to get permission from their parents by informed consent to participate in the study. This is illustrated by a comparison with the municipal health services’ monitoring system: the municipal health services measured most children of grade 2 and 7 in the period September 2006 until June 2007 and found 12% of children to be overweight and another 3,4% to be obese, compared to respectively 8,4% and 1,7% of grade 2 and 7 children in the ChecKid study. Therefore, the percentage of overweight and obesity among children in Zwolle might in reality be higher than in appears in the ChecKid study. However, this selective non-response does not necessarily affect the differences and associations found in the presented results in this dissertation. The ChecKid study population is a relatively homogeneous group; there are few people with a non-western background, a high population of middle and high SES families and as illustrated by most of the study findings, relatively many children who show favourable lifestyle behaviours. This homogeneity in the study makes it harder to find associations.

As mentioned earlier, most habits of parents and children are already formed before they attend primary school at the age of 4. Therefore, it might be harder to find associations. However, this study shows that also in the age of 4-13, parenting plays an important role. In addition, monitoring in different age groups is important as in every age group different determinants might play a role in the prevalence of energy-balance related behaviours.
**Data collection**

Questionnaires were used to measure behaviours and environmental determinants. Measuring behaviour with a questionnaire can cause measurement errors. Partly because of social desirability or difficulties to recall the actual behaviour of the child in the past month. In addition, the energy-balance related behaviours and most of the determinants were dichotomised, which leads to a loss of sensitivity of the data. Therefore, the found associations might be stronger in reality. Nevertheless, dichotomising the data makes it easier to translate the results to implications for practice. Strength of the data collection was that height, weight and waist circumference in children were measured by trained students. These data could directly be linked to data on lifestyle behaviours and determinants in the environment. In addition, all children were measured within only three weeks in the same period in 2006 and 2009, thus there is no influence of different seasons.

**Study design**

The data used for chapter 6 were longitudinal; children were measured in 2006 and in 2009. In chapter 2 through 5 however, cross-sectional data were used. Therefore caution is required when drawing conclusions from these chapters about causality (10). An unfavourable behaviour might influence weight, but a higher weight might also evoke unfavourable behaviour. In addition, statements on the influence of parents are difficult to make. Parents might influence their child’s behaviour or the behaviour of the child might lead to another parental approach. It is been speculated that this influence is bi-directional as is also illustrated in de model of Davison and Birch (Figure 1) (1). Although there is evidence that general parenting at an early age has an impact on energy-balance related behaviours at a later moment (29). However, the cross-sectional data is useful to find the prevalence of a certain outcome for a population and subgroups and to investigate associations between risk factors and an outcome of interest (10). Moreover, the ChecKid study is a large study and found associations were adjusted for many potential confounders, which allows cautious statements about the possible direction of causality. In addition, the longitudinal results indicate that an unfavourable lifestyle behaviour or unfavourable change in lifestyle behaviour is associated with a BMI increase.

**Recommendations**

The study results can be transferred into implications for different areas; practice, policy, education and research. First the implications for practice, with special focus on parenting and a favourable home environment are described, followed by the recommendations for local public health policy. Subsequently, the recommendations for higher vocational education are being described and finally the recommendations for future research are described.
Recommendations for practice

The findings in this dissertation show that especially sedentary behaviours seem to be a serious problem and increases (especially computer use) when children get older (chapter 3 and 6). The increase in computer use is also a social development and has increased considerably in popularity (31). For example, for education and homework, the computer is increasingly being used. Therefore, trying to reduce the time children spent using the computer is a difficult task and it is probably more promising to reduce sedentary time. This could be achieved by, for example, giving thought to how to make computer use more active in itself as high levels of TV viewing and computer use could probably not be compensated with high levels of physical activity (chapter 3). For example, active video gaming could help to increase energy expenditure from sedentary or passive video gaming (but should not be treated as a replacement of physical activity) (32). Moreover, parents and professionals should ensure that screen time is not at the expense of sleep duration (chapter 3 and 4). In addition, they should take care that fruit consumption should be consumed instead of energy of energy dense foods (such as snacks) and not on top of these foods in the context of weight control strategies (chapter 5). Parents are recommended to offer daily vegetables to children (chapter 5) and stimulate their children to participate in sports and eat breakfast daily, also when they get older (chapter 6).

Parents play an important role in the direct surrounding of children and therefore they are being advised to create a favourable home environment for children. Practical advises regarding the home environment are not allowing a TV in the child’s bedroom and to limit the amount of TVs in the household (chapter 3 and 4). In addition, not to view TV during a meal (chapter 4), to limit ordered meals, but to eat a home cooked meal every day of the week instead (chapter 4 and 5). Moreover, parents are advised to have rules on TV viewing, eating candy and bedtime (chapter 3, 4 and 5), to interact with their children by being active (cycling, sporting, or being outside in forest or park) together with their child (chapter 4) and to involve children in the cooking process (chapter 5). Professionals should not only advise parents on what their children can or cannot do, but they should support parents in making home environmental changes by changing the availability, structure and routine, setting up rules and providing guidelines on how to comply these rules and how to be (more) active with their children. Of the four parenting styles (uninvolved, indulgent, authoritarian and the authoritative parenting style), an authoritative parenting style seems to be the most favourable for a healthy development and socialization of children (27, 29). This parenting style is characterised by a clear and firm direction and also by warmth, flexibility and acceptance. To achieve or maintain the skills and parenting practices that are related to this kind of parenting style, professionals should support parents, for example through the centre for youth and family (in Dutch: centrum voor jeugd en gezin). In addition, intervention programs can also help to support parents when further help is necessary. Triple P lifestyle is a program that focuses on
positive parenting and could be promising in helping parents to adopt a healthy lifestyle (33). Another example may be using the internet to give parents tailored advice which is accessible, does not take a lot of time and is in line with parent’s perceptions. With this web-based intervention, modules or sample movies with parenting dilemma’s regarding daily lifestyle related situations could be offered. In addition, it could function as an interactive meeting-place for parents and professionals where experiences and advices regarding parenting skills could be exchanged.

Professionals should also pay attention to specific neighbourhoods where not only the overweight prevalence is higher, but also the prevalence of unhealthy behaviours (chapter 2). Especially in these neighbourhoods they should pay more attention to a favourable and healthy environment of children. Also to children who are not (yet) overweight. A lot of children in these neighbourhoods (overweight and normal weight) have unhealthy energy-balance related behaviours (chapter 2).

**Recommendations for local public health**

The findings in this dissertation can be used for the further development of the ‘Healthy city’ approach. As is described in more detail in the general introduction, the ‘Healthy city’ approach is a community-based EPODE-like program in which several organisations for health, welfare, sport and education in Zwolle work together to promote a healthy lifestyle, to create healthy environments and with that to prevent childhood overweight and obesity. This approach focuses on two deprived neighbourhoods. In chapter 2 of this dissertation these selected neighbourhoods are confirmed. As is mentioned earlier, interventions should focus on multiple behaviours and not just on one behaviour. Nevertheless, prioritising is important because from a practical point of view, not all can be done at once. In addition, there is often a limited budget and personnel capacity or other organizational constraints. Especially in this time of cutbacks and further decentralization of responsibility from national to local level in the Netherlands. Therefore, the results from this dissertation can help to set priorities which risk behaviours should be focused on. Reducing the time spend on TV viewing and computer use (chapter 3 and 6), increase sleeping time (chapter 4), increase vegetables consumption rather than fruits (chapter 5) and an increase in sport participation seems to be promising in the prevention of overweight. The home environment is important in the promotion of a healthy lifestyle, but a broader context of the local environment should be taken into account when developing interventions as is illustrated by the multilevel model by Glass and McAtee (2). Next to the home environment, cultural norms, area deprivation, psychosocial hazards, built environments, local food environments and commercial messaging play an important role. Political commitment within the municipal is important as well as involvement of other stakeholders and public and private parties.

It is important to monitor behaviours and to evaluate the developed integrated approach next to the implementation of the approach. This information is important when prioritising
activities and strengthening the effectiveness of the integrated approach. With this, existing interventions can be improved and new interventions can be initiated. In addition, the results of monitoring can be used to see progress, motivate the involved stakeholders, parents and children.

The municipality can contribute to the promotion of a healthy lifestyle of children living in their municipality by stimulating an integrated approach and to embed this sustainably in municipal policy. An integrated approach seems, so far, to be the most promising approach in tackling overweight (34). Key components of the integrated approach are political commitment, public-private partnership, scientific evaluation and monitoring, link between prevention and health care and social marketing. The municipality could have an important coordinating role (together with the municipal health services) in further shaping these pillars. The municipality could together with public-private partners contribute to making the healthy choice easier by changing the physical environment. In addition, they could contribute in making the healthy choice more attractive and more in line with the needs and wishes of the targeted group. For example, ensuring that there are sufficient facilities where children can be physically active in the direct surrounding, such as playing facilities, sport facilities and parks. These facilities should be appealing and challenging for children to compete with TV viewing and computer use. In addition, they should also be safe and hygienic. Moreover, ensuring that neighbourhoods are attractive for walking and cycling (clean and safe); and supermarkets could present their vegetables in an attractive and affordable way. Previous research shows that children living in neighbourhoods with facilities such as stores selling moderately priced fresh products and playgrounds, parks and other recreational facilities, have a healthier diet, engage in more physical activities and are less likely to be overweight or obese (35). Moreover, an increase in facilities, such as parks, physical fitness facilities, sport clubs, swimming pools, is associated with a decrease in overweight and an increase of achieving five or more bouts per week of moderate-vigorous physical activity (36). The municipality could also have a coordinating role in monitoring and evaluating the integrated approach as well as using social marketing techniques to make healthy behaviour more appealing. Important in the social marketing techniques is that the health promotion message is brought in an attractive way and in such a way that it matches the targeted group. This could be from another perspective than health, but that at the same time takes a healthy lifestyle into account.
In the prevention of childhood overweight pedagogical workers should be more involved. They could play an important role in parental support regarding children’s lifestyle. Most pedagogical workers lack in health related knowledge, but they do have skills that can be very valuable in the promotion of healthy lifestyle behaviour. For example, they possess skills to discuss sensitive subjects with parents and are trained to support parents in parenting issues. Moreover, they see many parents and children and could therefore serve as a signal function. Youth health care workers working at the centre for youth and family can refer parents to a pedagogical worker or collaborate more with pedagogical workers.

Recommendations for professional education
Pedagogical workers can play a valuable role in the prevention of overweight. Therefore, educating pedagogical workers in health related knowledge would be very useful. In Zwolle, Windesheim University of applied sciences, an education-program for future pedagogical workers is a good starting place for this. Currently, training is being developed in collaboration with researchers and teachers within the education-program for pedagogical workers. The first aims are to involve students in practice oriented research on the possible role of pedagogical workers within health related issues and how parents can be supported in creating a favourable home environment. In addition, an aim of the training is to teach students about health prevention and health related conversational skills.

Recommendations for research
The studied associations and the found determinants should be studied further in (other) longitudinal research to confirm a causal relationship. Moreover they should be studied in other cities with a different composition of the population (for example, with different ethnicities and/or a higher population of low SES) to find out how generalizable the found results are. Subsequently, if the found associations are confirmed, then intervention studies are needed aimed at changing the home environment and improve parenting skills. These interventions studies should measure multiple components within the process. The study should measure if the intervention has an effect on the home environment. Moreover, if the changing home environment has an effect on lifestyle behaviour and if the changed behaviour has an effect on weight status and with that, health. Coordination and refinement in questionnaires is required for these studies as there are now many different questionnaires in circulation that measure lifestyle behaviour. This hampers comparison between studies.

The different layers of the model by Davison and Birch (Figure 1) should be investigated further to get more information on how these different layers interact with each other. Additionally, how the different factors within a layer are related with each other. Objectively measured neighbourhood scans can be used to get more information on the physical environment in the neighbourhood and the association with energy-balance related behaviours and on the
interactions between the neighbourhood and the home environment. Moreover, research on the interaction between home environment and parental practices of both father and mother could be helpful in understanding the influence of the home environment on energy-balance related behaviours and childhood overweight. In addition, research on how the neighbourhood (or community) and the family setting (parenting styles and characteristics) are associated or interact with each other.

More insight would be helpful in how lifestyle behaviours of children, especially of young children, can be measured with questionnaires completed by parents. It remains questionable to what extent parents give socially desirable answers and whether parents are aware of their children’s behaviour, especially when children are not at home, but for example at school or childcare. Therefore, children’s questionnaires could be used to compare the parental and children’s answers. Nevertheless, to create a valid and reliable questionnaire for younger children requires a creative solution. In addition, observations could be helpful to investigate what really happens within the families and with this, avoid possible socially desirable answers.

To develop and evaluate strategies and tailored interventions, qualitative research among parents and/or children is necessary to, especially in low SES groups investigate reasons, motivations and barriers for behaviour and determinants. This information can also help to reach and target these groups better. In addition, this information can be used to find out how parents can be best supported in creating a favourable home environment.

**General conclusion**

The results of this dissertation give clear indications for the important role of the neighbourhood as a determinant of obesity and it can be concluded that the neighbourhood is an important setting for a targeted approach to prevent overweight. Deprived neighbourhoods have high prevalence rates of childhood overweight but also high prevalence of unhealthy behaviours. Within the neighbourhoods, schools and families are important settings in the direct surroundings of (especially young) children, so this might be a good location where tailored prevention can take place. Children spend most time within the home environment and parents have the greatest influence on children, therefore this dissertation concentrated on the role of parents in relation to energy-balance related behaviours of their children.

In general from this dissertation it can be concluded that, long duration of TV viewing and computer use, short sleep duration, insufficient vegetables consumption, skipping breakfast or low levels of sport participation were associated with childhood overweight. However, focussing on one energy-balanced related behaviour is insufficient, interventions should focus on several behaviours simultaneously.
Chapter 7

What is innovative about this dissertation is the focus on modifiable drivers of these energy-balance related behaviours in the home environment. The findings show that there are four main themes that seems to be important when creating a favourable home environment. These main themes are a physical home environment, having rules, structure and routine in the household and by parents and children doing things together. Parents are therefore an important focus for interventions and should be supported by professionals and in policy in creating or maintaining this kind of home environment.

Steps to be taken next are to integrate the information from this dissertation into practice, policy and professional education. Close monitoring and evaluation of the process and effectiveness of the ‘Healthy city’ approach will take us a step closer toward evidence based obesity prevention.

This dissertation provides suggestions that prevention programs should go beyond the area of health education. This thesis shows potentially important targets within the home environment that plays a role in the development of children’s lifestyle behaviour and childhood overweight. Professionals should not only advise on the definition of healthy behaviour, but they should support parents in making home environmental changes by changing the availability, setting up rules and providing guidelines on how to comply and monitor these rules and how to be (more) active with their children.
Reference list
