Psychosocial health and the association with smoking and alcohol consumption among 9-13 year old primary school children, living in South-Limburg

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Summary

Introduction: The transition from childhood to adulthood is a crucial period. Children develop risk behaviors, of which smoking cigarettes and consuming alcohol. Therefore it is important to pay attention to children at the end of primary school. Children differ in the way they deal with the challenges with which they are confronted while growing up. Psychosocial problems can determine or interfere with successfully responding to the demanding situation young people are in. Boys face other psychosocial problems than girls. Also with respect to substance use, attention should be paid to gender differences. The Lalonde model states that there is a relationship between health and lifestyle. More specific, the Problem-Behavior Theory describes the role of person-environment interaction. Based on these frameworks, this study examined which psychosocial indicators of health (emotional problems, conduct problems, hyperactivity and peer problems, but also prosocial behavior) are associated with smoking and alcohol consumption among 9-13 year old primary school children.

Methods: Children who were in the final classes of primary school filled in a questionnaire concerning their health and lifestyle. The questionnaire consisted of questions about school, health, lifestyle and leisure time. For the aim of this study, only questions with respect to psychosocial health, smoking (ever, or during the past month) and alcohol consumption (ever, or during the past month) were used. Chi-square tests were conducted in order to see whether there were differences between boys and girls with respect to psychosocial health, smoking and alcohol consumption. After that, logistic regression analyses were carried out to assess whether there are associations between psychosocial indicators of health and substance use.

Results: Thirty-nine primary schools participated, referring to 1500 children in the age of 9-13. The analyses showed that the chance that children ever smoked is higher for older children, as well as for children with a higher score on the peer problems scale. The chance that children are currently smoking is lower for children with a higher score on the hyperactivity scale. In contrast, for children with an increased score on the emotional problems scale this chance is higher. Furthermore, the analyses showed that the chance that the children consumed alcohol (ever, or during the past month) is higher for girls, and lower for children who think that they are allowed to drink alcohol when their parents are at home. The chance that children drank alcohol during the past month was also lower for children who had an agreement with their parents about the age of alcohol consumption.

Conclusion: Due to the small number of children that (ever) smoked, it is not possible to draw reliable conclusions on this subject. With respect to consuming alcohol, the analyses showed that there were some associations but none of these concerned psychosocial problems.

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1. Introduction

During the transition from childhood to adulthood, young people deal with a variety of challenges, such as parent – child conflicts, risky behaviors and mood changes. Important is their struggle to comply with expectations from their environment with respect to school, work and relationships (Nasheeda, 2008). Being in good health helps adolescents to deal productively with the physical, cognitive and emotional changes they encounter (World Health Organization, 2004). The World Health Organization (WHO) describes health as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (World Health Organization, 2003). According to this definition, the Health Behaviour in School-aged Children (HBSC) study tried to gain insight into health, well-being, health behavior and social context of adolescents. The study stated that the health of boys and girls, aged 11, 13 and 15 and living in Europe can be considered as good or excellent. Most of them do not have multiple health complaints and they are satisfied with their lives (WHO, 2004). In general, the health of adolescents is good. However, their unhealthy lifestyle can have long term consequences on health (Rijksinstituut voor Volksgezondheid en Milieu, 2008). The unhealthy lifestyle of adolescents refers to the use of tobacco, alcohol and other substances, unprotected sexual activity, poor dietary habits, physical inactivity, and behaviors that contribute to unintentional injuries and violence (Peters, Kok, ten Dam, Buijs and Paulussen, 2009). The HBSC-study (WHO, 2004) found that the proportion of adolescents reporting that they had ever smoked rise substantially during the transition from childhood to adolescence: 15% for 11-years-olds, 40% for 13-year-olds, and 62% for 15-year-olds. On average, 29% of the adolescents smoked a cigarette during the past 30 days (Van der Wilk, 2009). Twenty-nine percent of the 15-year-olds report that they are drinking regularly. A substantial number of adolescents (66%) do not meet the current guidelines of physical activity, which recommends one hour or more of at least moderate intensity on five or more days a week. Furthermore, on average, only 30% of boys and 37% of girls report eating fruit daily, and less than 50% of all adolescents report eating vegetables daily (WHO, 2004). With respect to these behaviors, Dutch youngsters are like others in western societies. De Nooijer and de Vries (2006) state that a lot of the Dutch adolescents drink excessive amounts of alcohol, but they do not give a definition of excessive alcohol consumption. With respect to smoking, more than half of the Dutch adolescents have ever smoked and even 30% smoked a cigarette during the past 30 days (de Nooijer and de Vries, 2006; van der Wilk, 2009). Besides, they do not eat much fruit and vegetables, and

75% does not meet the recommendations for physical activity (De Nooijer and de Vries, 2006; Centraal Bureau voor de Statistiek, 2003).

Although adolescents are relatively healthy and most of them seem to understand what an unhealthy lifestyle is, they have relatively unhealthy lifestyles as compared to other age groups (van Exel, de Graaf and Brouwer, 2006). They do not seem to be interested in their future health and due to that, they show a lot of risk behaviors. The term risk behavior can be used to link a number of potentially health-damaging behaviors (DiClemente, Hansen and Ponton, 1996). Some obvious examples are tobacco use, alcohol consumption, unprotected sexual intercourse, and poor eating or exercise habits. Many of the health risk behaviors are acquired during adolescence and continue during adulthood (Kelder, Perry, Klepp and Lytle, 1994; Kann et al., 1996; Rowland, 1996; Perry, 2000). They can be seen as the most serious threats to adolescent health and well-being (DiClemente, Hansen and Ponton, 1996). Once the risk behaviors are established, they often remain as major contributors to the health problems of adults. For this reason, adolescents are an important target group for health education and promotion programs. However, children at the end of primary school go through several changes and some of them already perform risk behaviors. Therefore, the primary school to secondary school transmission can be an important window for intervention (Nation et al., 2003; Schrijvers and Schuijt, 2001). In order to provide adolescents with the best developmental opportunities toward healthy adulthood, prevention and promotion programs should start before children are going to experiment with smoking a cigarette or consuming their first glass of alcohol (Greenberg et al., 2003; Leurs, Bessems, Schaalma & de Vries, 2007). If smoking and consuming alcohol does not start during the transition from child to adolescent, it is unlikely ever to occur (Tyas and Pederson, 1998). Several studies confirm that intervening before adolescence starts is effective in reducing risk behaviors, of which substance use (Botvin and Griffin, 2007; Botvin, Griffin, Paul and Macaulay, 2003; Hawkins, Catalano, Kosterman, Abbot and Hill, 1999; Wilson, Gottfredson and Najaka, 2001). Besides the fact that it is effective to intervene at an early age, it is also important to take into account the age on which children start their period of puberty. Although the age on which the process of puberty starts stabilized during the past years, boys and girls now experience puberty at younger ages than previous generations (McCauley, Salter, Kiragu and Senderowitz, 1995; Mul et al., 2001). Early maturation can be seen as a risk factor for the initiation of substance use in both males and females (DiClemente, Hansen and Ponton, 1996). This, in combination with the effectiveness of early intervention, underpins the importance of paying attention to primary school children before their period of adolescence starts. Within this context,

'adolescence' can be considered as the period between 10 and 19 years of age (World Health Organization, 2010a). For the purpose of this study, the term adolescents will be used for the age group of 13 and older, whereas primary school children refers to children in the age of 10 till 13.

1.1 Epidemiology

Most Dutch children drink their first glass of alcohol when they are between 11 and 13 years of age (Rijksinstituut voor Volksgezondheid en Milieu, 2010). Research showed that 50% of the twelve year olds already consumed alcohol, at least once in their life. This percentage increases very quickly to a lifetime prevalence of 85% among adolescents, aged 15 (RIVM, 2008). Children start consuming alcohol around the age of twelve, and they also report their first experience of drunkenness at this relatively young age (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). Furthermore, a relatively high proportion of weekly drinkers (boys 23%, girls 18%) and regular beer drinkers was found among Dutch 15-year-olds (WHO, 2004). This concerns alcohol use, and not excessive alcohol consumption. With respect to the latter, during 2003 and 2005 episodic excessive alcohol consumption, called 'binge drinking' (five or more glasses of alcohol a time), remained stable. The monthly prevalence of excessive alcohol consumption among adolescents in general is approximately 40% (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). There are no gender differences in binge drinking. Alcohol (mis)use often occurs within the context of other risk behaviors, for example together with smoking. While the prevalence of smoking among adults has declined during recent years, the prevalence among adolescents remains high (Conrad, Flay and Hill, 1992). The age of smoking initiation has dropped over the past decades, and the majority of smokers already start at a young age (Coogan et al., 1998). Children barely smoke in the final classes of primary school. Approximately 10% of the 11- and 12-year olds has ever smoked, whereas of the 12-16 year old adolescents 33% declared that they have smoked at least once (Monshouwer, van Dorsselaer, Gorter, Verdurmen and Vollebergh, 2004; Van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007; STIVORO, 2007). Research shows that from the age of 14, the number of children that smokes every day increases rapidly (RIVM, 2008). Although the health risks of smoking, both active and passive, are well documented, children do not seem to perceive the future health risks as relevant to their current smoking behavior (Peters, Hedley, Lam, Betson and Wong, 1997). According to these facts, and in addition that nicotine can cause addiction in a rapid manner especially among children, it is important to target primary school children

before they are going to experiment with cigarettes (Rijksinstituut voor Volksgezondheid en Milieu, 2003).

1.1.1 Adolescents in South-Limburg

In 2005, the Municipal Health Service of South Limburg examined the (risk) behavior and lifestyle of adolescents living in the province Limburg (GGD Noord- en Midden Limburg and GGD Zuid Limburg, 2009). In total, 9428 boys and 9731 girls in the age of 12 through 18 completed a questionnaire. The questionnaire contained questions concerning several health-related topics, such as smoking, alcohol- and drug use, physical activity, nutrition and unsafe sex. The results of the questionnaire show that the trends that occur in the Netherlands are similar for adolescents living in Limburg. Most boys and girls are satisfied with their health. However, 17% of the 19159 respondents still rate their health as fair or poor. Comparing the results of the research conducted in 2005 with the results of 2001 and 1996, the adolescents showed improvements with respect to the most important health-related behaviors, except for alcohol consumption and unprotected sexual activity. The percentage of smokers and drug users decreased during the past five years. However, in 2005 still 14.7% of the boys and 17.1% of the girls smoked. With respect to these (risk) behaviors, most (risk) behaviors were more present in class 4 than in class 2 of secondary school, as expected. For example, of the younger adolescents 10% smokes, whereas this percentage consists 23% for the 14 till 18 year olds.

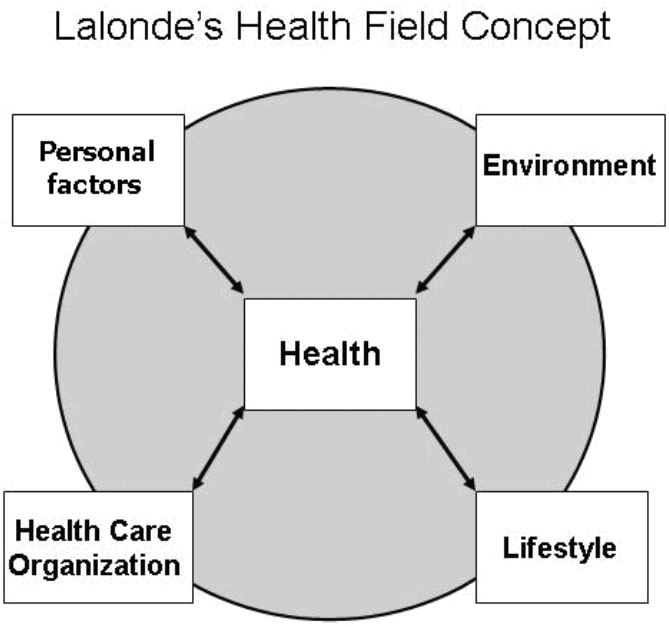
1.2 Theoretical framework

As mentioned, the World Health Organization (WHO) describes health as ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’ (WHO, 2003). This definition is supported by the Lalonde model (1974). The model indicates several factors that are of influence on health. These include personal factors, environmental factors, lifestyle factors, as well as health care. The health status of people, and also of children, can be seen as the outcome of a process that includes several causes.

By paying attention to four health-related factors, insight can be obtained about health promoting and health threatening factors. The first factor concerns personal factors, including demographic characteristics such as age, gender, ethnicity, and for example also heredity and the education level of the parents (Baltissen et al., 2006). The second factor, environment, refers to influences that take place outside an individual and of which individuals have little or no control. A distinction can be made between physical environment and social

environment. Physical environments that are important for children include for example a safe and clean playground, and a safe road and/or pathway to their primary school. The influence of the social environment on health can be seen in for example life-events that children experience (e.g. divorce or parental sickness) and social contacts (Baltissen et al., 2006). The third factor is health care organization. With respect to health care, there is an interaction between health and the quality, availability and accessibility of care facilities. This factor also contains the policy of care institutions (Baltissen et al., 2006). The final factor contains lifestyle. Lifestyle refers to behavior with which children are able to influence their health. Unhealthy diet and physical inactivity may, for example, have a negative impact on health. By means of changing their lifestyle, children can reduce their risk on several diseases (Baltissen et al., 2006). The Lalonde model states that prevention of diseases is very important for improving health and health perception. Particular attention can be paid to lifestyle factors and the environment (Baltissen et al., 2006).

Figure 2: Lalonde model



Although personal factors, environment and health care organizations are all of influence on health, this study will concentrate on the relationship between health and lifestyle. Many preventive interventions focus at promoting a healthy lifestyle, because the way people live and the behavior they show are most changeable. With respect to the guidelines of the RIVM, high rates of smoking and alcohol consumption among adolescents refer to an unhealthy lifestyle (Schrijvers and Schoemaker, 2008). More unfavorable trends in unhealthy risk

behaviors are expected in the future (De Nooijer and de Vries, 2006). These behaviors can have long-term consequences. Smoking and consuming alcohol by adolescents are associated with significant health problems during adolescence and also with increased risk factors for health problems during adulthood (United States Department of Health and Human Services, 1994). Examples are lung cancer, heart and vascular disease, and brain damage (Ministerie van Volksgezondheid, Welzijn en Sport, 2009; RIVM, 2008). Often, it is a combination of factors that determines whether people smoke or drink alcohol. Factors that have been implicated to be of influence on the initiation, development and maintenance of risk behaviors can be divided into several categories, of which for example individual factors, social factors and societal factors. The individual factors that influence smoking and alcohol consumption include, for example, knowledge, intentions, attitudes, health-related behavior and personality characteristics (Geckova, van Dijk, van Ittersum-Gritter, Groothoff and Post, 2002; U.S. Department of Health and Human Services, 1994; RIVM, 2008). The influential social factors concern smoking and/or alcohol consumption of parents, siblings, peers and other people in the surroundings of the children. Attention should also be paid to family characteristics, social support, socio-economic status and school-related variables (e.g. educational level) (RIVM, 2008; Stolle, Sack and Thomasius, 2009; Tyas and Pederson, 1998). Final, there are several societal factors that are related to smoking cigarettes and consuming alcohol. These include legal restrictions on smoking and alcohol use, advertisement, and risk behaviors of adolescents' role models (Geckova, van Dijk, van Ittersum-Gritter, Groothoff and Post, 2002; Stolle, Sack and Thomasius, 2009; RIVM, 2008). In order to prevent smoking cigarettes and consuming alcohol, it is important to pay attention to factors that are of influence on the initiation of these risk behaviors among primary school children. The focus of this study is on psychosocial risk factors.

1.3 Psychosocial risk factors

The beginning of adolescence, the time when children are at the end of primary school, is marked by puberty and can also be seen as a period of ‘storm and stress’ (Nasheeda, 2008). During this period children go through physical, cognitive and emotional changes. These changes affect adolescent’s self image, mood and interaction with parents and peers (Berk, 2007). Children differ in the way they deal with the challenges with which they are confronted while growing up. Psychosocial problems can determine or interfere with successfully responding to the demanding situation young people are in. Psychosocial refers to the connection between the mental functioning of a child, and his or her functioning in

interaction with the environment (Mathijssen, 2008). Many children face psychosocial problems, such as behavioral-, emotional-, and/or educational problems. The environment (family, school and peers) plays an important role in these problems (Reijneveld, Brugman, Verhulst and Verloove-Vanhorick, 2004; Brugman, Reijneveld, Verhulst and Verloove-Vanhorick, 2001). A number of theories reflect the complexity of the interaction between adolescents and their social world. Research showed that psychosocial problems in childhood are related to adulthood smoking and alcohol consumption (Tyas and Pederson, 1998; Tucker et al., 2006). However, the association between psychosocial problems and substance use could develop in two ways; either unhealthy behavior, such as smoking cigarettes and consuming alcohol, results from the psychosocial state of adolescents or substance use is a predictor of psychosocial problems (Crone, Reijneveld, 2007). The Problem-Behavior Theory states that all behavior is the result of person-environment interaction (Jessor and Jessor, 1977). Conclusive evidence on the causal direction between the psychosocial state of adolescents and substance use is not yet available (Crone, Reijneveld, 2007). Due to the fact that the current study concerns secondary analysis based on cross-sectional data it is not possible, nor the aim to explore the causal relation. By means of explorative research, this study will examine whether psychosocial problems among primary school children are related to substance use at this young age.

Smoking and alcohol consumption usually start as a result of the interaction between several psychosocial factors (U.S. Department of Health and Human Services, 1994). These psychosocial risk factors can be divided into socio-demographic-, environmental-, behavioral- and personal factors. Personal and behavioral factors directly affect an individual's choice to smoke or drink alcohol, whereas environmental and socio-demographic factors indirectly affect the accessibility and acceptability of substances like alcohol and tobacco (U.S. Department of Health and Human Services, 1994). This study will concentrate on the personal and behavioral psychosocial risk factors because they have an immediate influence. Personal psychosocial factors that influence the chance that children start smoking or consuming alcohol include a lower self-image and lower self-esteem than peers, a lack of self-efficacy in the ability to refuse cigarettes and alcohol and a positive attitude towards smoking and alcohol consumption (Cloninger, Sigvardsson and Bohman, 1988; RIVM, 2008; Tyas and Pederson, 1998; U.S. Department of Health and Human Services, 1994). Behavioral psychosocial factors that are associated with a greater risk for substance use initiation concern attention and externalizing problems, of which aggression, hyperactivity and conduct problems (Chilcoat and Brealau, 1999; DiClemente, Hansen and Ponton, 1996; Ernst et al.,

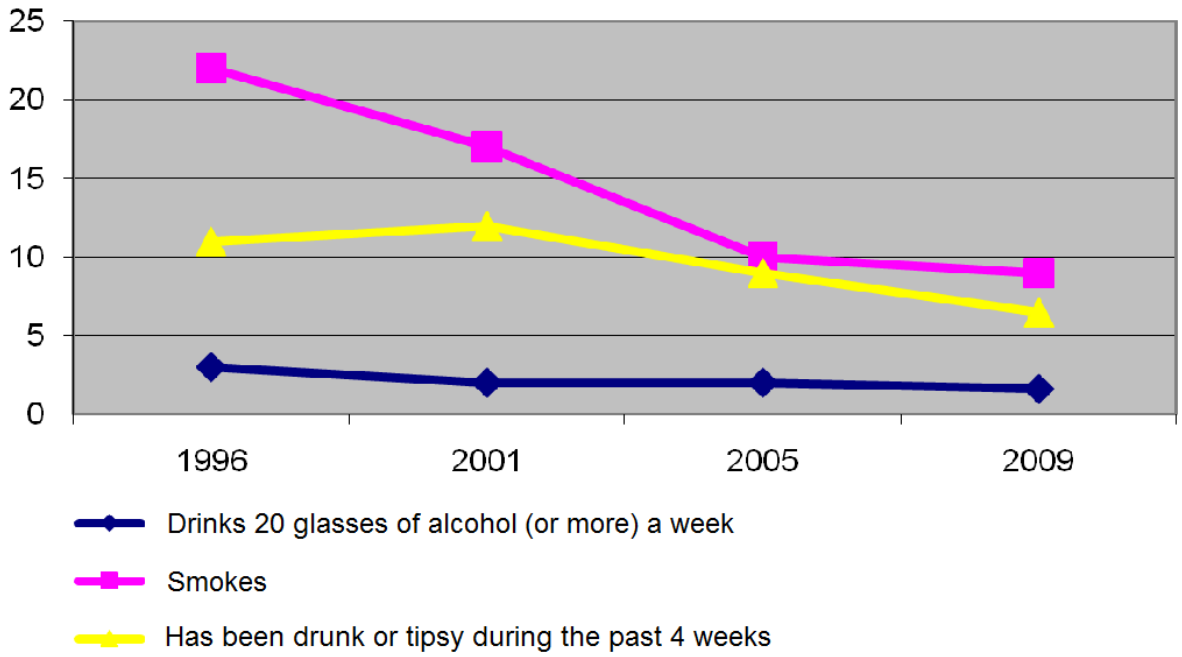
2006; Martin et al., 2002; Stolle, Sack and Thomasius, 2009; Tapert, Baratta, Abrantes and Brown, 2002).

Since psychosocial factors can be the initial influences in the causal chain that leads to substance-related health consequences, primary prevention efforts to reduce smoking and alcohol prevalence must take these influences into account (U.S. Department of Health and Human Services, 1994).

1.4 Problem statement

Like previous years, the Municipal Health Service of South Limburg examined in 2009 the substance use of adolescents living in Limburg. Compared with the study conducted in 2005, smoking and alcohol consumption among adolescents (class 2 of secondary school) living in Limburg has slightly decreased during the last four years (figure 1).

Figure 1: Prevalence rates of smoking and alcohol consumption among adolescents (class 2 of secondary school) living in Limburg



However, it is still important to focus on these behaviors. Among the addictive behaviors, smoking cigarettes is most likely to become established during adolescence. Children who begin to smoke at an earlier age are more likely to develop long-term nicotine addiction than later starters (U.S. Department of Health and Human Services, 1994). With respect to alcohol, the consumption of alcohol among adolescents did not decrease or increase during many previous years. Research in 2009, however, showed that the prevalence rates among children

in second class of secondary school dropped from 2% till 1.6%. The decrease in alcohol consumption, as well as in smoking, indicates a progress that needs to be remained in the following years.

In order to develop suitable interventions for preventing the onset of unhealthy risk behavior and/or to promote a healthy lifestyle among primary school children, it is important to examine the health and lifestyle of primary school children at this moment. By describing psychosocial health, this study will concentrate on five types of problems that children could have encountered during the past six months. Emotional problems refer to internalizing disorders, of which mood swings, depression and psychosomatic symptoms. Conduct problems concern symptoms of externalizing disorders, varying from more aggressive behavior (fighting) to lying and stealing. Hyperactivity-inattention problems include symptoms related to attention disorders, like a lack of concentration, restlessness and impulsiveness. Peer problems describe particularly the incapacity of children to start social relationships with peers and final, the children could have encountered problems with respect to the development of social behavior (Hermanns, Ory and Schrijvers, 2005; WHO, 2004). The developments that are coupled to the age of children, frequently show a sex-specific progress. Boys and girls often perceive other psychosocial problems; internalizing problems occur more often among girls and externalizing problems occur more often among boys (Junger, Mesman and Meeus, 2003; ter Bogt, van Dorselaer and Vollebergh, 2003; Van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007; Verhulst et al., 1997; Vollebergh et al., 2006). The increase of smoking and alcohol consumption with age is no longer typical for boys. However, boys do have their first experience with substances earlier than girls (van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007; Monshouwer et al., 2004). These facts shows that for psychosocial health, as well as for smoking and alcohol consumption, there are some gender-differences. For this reason, the possible differences between boys and girls will be explored in the current study.

By taking the psychosocial health, smoking and alcohol consumption of the primary school children into account, the Municipal Health Service is able to decide which risk behaviors are of high priority and therefore may be targeted for prevention. However, in order to have an influence on these behaviors, knowledge about factors that are of influence on the behaviors are acquired. Although there are numerous factors that are of influence, research on the etiology of risk behaviors also paid attention to processes that are both social and psychological in origin. The following research question will try to examine whether psycho-

social factors should be targeted for prevention and promotion programs among primary school children in order to influence smoking and alcohol consumption:

'Which indicators of psychosocial health are related to smoking behavior and alcohol consumption among 9-13 year old primary school children, living in South-Limburg?'

2. Methods

This chapter describes the methodology of the present study. First the design of the study will be presented, followed by a description of the research population. After that, the questionnaire and an explanation of the measurement instruments that are used for the different topics of the questionnaire will be presented. Final, a description of the statistical analyses will be given.

2.1 Study design

The design of this study was cross-sectional. For collecting the data the primary school children were measured at a single point in time. This kind of research can be conducted in a short period of time and can study a large number of participants at little cost or effort. For this study, a cross-sectional design was sufficient because it is efficient at identifying whether there are associations between certain factors. When associations are present, a disadvantage of cross-sectional research is that it cannot explain causal relations between outcome measures, and that the results of this kind of research cannot show long-term effects (Bouter, van Dongen and Zielhuis, 2005). Due to the fact that the data was already available, this study concerned secondary analyses.

2.2 Research population

In order to examine the health and lifestyle of children aged 9 through 13, fifty randomly selected primary schools in the region South-Limburg were asked to participate. Eventually 39 primary schools participated, referring to 1500 children who actually filled in the questionnaire (78% response rate of the primary schools).

2.2.1 Recruitment of participants

The Municipal Health Service of South Limburg tries to gain insight in the health of young adolescents who are in the final classes of primary school. For examining the health, lifestyle and (risk) behavior of children 9-13 years old, primary schools in the region South-Limburg of the Netherlands were approached during June and July 2009. The schools received a letter which contained information about the purpose of the study. When the Municipal Health Service did not receive a reply after sending the letter, the schools were contacted by telephone. The primary schools that approved to cooperate had to fill in a consent form. The parents of the children also received a letter. This letter contained information about the study and also referred to the website of the Municipal Health Services of South Limburg. Parents

were able to take a look at the questions of the questionnaire on this website, as well as at a printed version at the school of their child. Parents were able to object to the participation of their child. The contact person of the primary school received the questionnaires from the Municipal Health Services of South Limburg. After that, the school children filled in the questionnaire in November 2009. This took them approximately one hour. The findings from the questionnaire will be used to advice schools and municipalities about e.g. the school- or local health policy, prevention campaigns and the policy that needs to be addressed with respect to youth.

2.3 Measurement instrument

Data for this study was obtained by means of a written questionnaire. Several demographic variables were asked, of which age, gender and the child's country of birth. Furthermore, the questionnaire contained the following topics: school, health, lifestyle and leisure time. With regard to school issues, questions were asked concerning bullying, feeling safe, playing truant, and other problems that adolescents could possibly encounter during primary school. With respect to health, the psychosocial, physical, and perceived health were examined. Regarding lifestyle, the children answered questions with respect to smoking, alcohol consumption, nutrition and physical activity. Final, questions were asked about leisure time activities. All questions were based on indicators of the Local and National Health Monitor for Youth, which is part of the regular monitoring activities of the Municipal Health Service of South Limburg. The Local and National Health Monitor for Youth has been developed by several organizations (RIVM, GGD Nederland, ActiZ, GGD'en, Zorgorganisaties). These organizations are commissioned by the Ministry of Health, Welfare and Sport and guarantee the uniformity, reliability and completeness of the questions that are included in the Monitor (RIVM, 2005).

Whereas this study tried to investigate whether psychosocial indicators of health were associated with smoking and alcohol consumption, only the questions that were based on these topics are discussed in detail. Due to the fact that this study concerned secondary analyses, the way in which these topic were measured could not be altered for the sake of this study.

2.3.1 The Strengths and Difficulties Questionnaire

The questions concerning the psychosocial health of the primary school children were assessed by means of the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a

behavioral screening questionnaire that can be used for children, ranging from 3-16 years old (Muris, Meesters and van den Berg, 2003; Van Widenfelt, Goedhart, Treffers and Goodman, 2003; Youthinmind, 2001). The questionnaire contains 25 items; some are stated positively, others negatively. The items are formulated by means of propositions, which are related to the past six months (example 'I try to be nice to other people. I care about their feelings' with answering options not true, somewhat true and certainly true). These propositions are divided among five scales: emotional symptoms, conduct problems, hyperactivity, peer relationship problems, and pro-social behavior (see appendix). The five scales consist of five items. In order to take these items into the analyses and to point out that a higher score on a specific SDQ-scale indicates more psychosocial problems, some items were recoded by means of item reflection. A score for a specific scale can be obtained by adding up the items belonging to this scale. Besides a scale-specific score, a total difficulties score can be calculated. In order to generate this score, the scores of the 25 items will be added up. By using cut off points the total difficulties score, as well as children's score on a specific scale, can be divided into three categories; normal, borderline and abnormal. The cut off points are based on guidelines of the SDQ, and used in several studies (Youthinmind, 2001; Mathai, Anderson and Bourne, 2004; Muris, Meesters and van den Berg, 2003; Muris, Meesters, Eijkelenboom and Vincken, 2004). Within this study, the cut off points are only used for describing and interpreting the psychosocial health of the primary school children, and not for analyzing the association between (indicators of) psychosocial health and smoking or alcohol consumption. With respect to this association, the whole scale has been used. The cut off points can be seen in table 2.1.

Table 2.1: Cut off points of the psychosocial scales

	Normal	Borderline	Abnormal
Emotional symptoms scale	0-5	6	7-10
Conduct problems scale	0-3	4	5-10
Hyperactivity scale	0-5	6	7-10
Peer problems scale	0-3	4-5	6-10
Pro-social scale	6-10	5	0-4
Total difficulties score	0-15	16-19	20-40

Several countries, of which the Netherlands, examined the self-report version of the SDQ among children and adolescents (Goodman, Meltzer and Bailey, 1998; Goodman and Scott, 1999; Klasen et al., 2000; Marzocchi et al., 2004; Mathai, Anderson and Bourne, 2004;

Muris, Meesters and van den Berg, 2003; Obel et al., 2004; Ronning, Handegaart, Sourander and Morch, 2004). These studies demonstrate that the SDQ can measure psychological problems among youth in a relatively short, but reliable and valid way and that the questionnaire can be seen as an efficient and economic screenings instrument for examining psychosocial problems (emotional problems, conduct problems, hyperactivity, peer problems, and prosocial behavior) in large scale population studies (WHO, 2004). The Strengths and Difficulties Questionnaire correlates highly with the Child Behavior Checklist (CBCL), but the SDQ is significantly better than the CBCL at detecting inattention and hyperactivity, and at least as good at detecting internalizing and externalizing problems (Goodman and Scot, 1999; Klasen et al., 2000). By comparing the SDQ and the Rutter questionnaires with each other, Goodman (1997) suggests that the SDQ functions as well as the Rutter questionnaires while the SDQ showed a better coverage of inattention, peer relationships and prosocial behavior. The SDQ can be seen as more appropriate than other instruments given that in addition to assessing behavioral and emotional problems, it assesses the social impairment and family burden of the child's symptoms (Mathai, Anderson and Bourne, 2004). Besides, it is useful to choose the SDQ when a brief not too time-consuming questionnaire is needed (Muris, Meesters and van den Berg, 2003). Despite the fact that the SDQ scales only consist of 5 items, the brevity of the SDQ does not reduce its validity and also the reliability of the SDQ scales appeared to be reasonable (Klasen et al., 2000; Muris, Meesters and van den Berg, 2003).

2.3.2 Questions with respect to smoking

With respect to smoking, the primary school children were asked whether they had ever smoked (yes or no), and how often they smoked at the moment they filled in the questionnaire. For the latter, the answering options were ‘I do not smoke’, ‘I smoke, but less than once a week’, ‘I smoke, at least once a week, but not every day’ and ‘I smoke every day’. For taking the current smoking status of the primary children into the analyses, the variable was dichotomized. The Municipal Health Service of South Limburg chose these questions because they are included in the Local and National Health Monitor for Youth. Besides, the questions were also used in the questionnaire ‘Gezondheid en geluk van scholieren’ of the Trimbos-instituut (2000/2001).

2.3.3 Questions with respect to alcohol consumption

Regarding alcohol consumption, the children had to answer at how many occasions they drank alcohol during their life, as well as during the last four weeks (ranging from 0-11 times). By means of these questions, two dichotomous variables were conducted: lifetime alcohol consumption and alcohol consumption during the past month. The participants were also asked to report whether their parents allow them to consume one, or more alcoholic drinks (with answering options certainly not, probably not, sometimes, probably yes, certainly yes). In order to take the two questions, referring to whether parents allow their children to consume alcoholic drinks, into the analyses the questions were recoded into one variable. This variable examined whether or not children think they are allowed to drink alcohol when their parents are at home. Furthermore, the subjects had to answer whether they have an appointment with their parents to not drink alcohol till a certain age, and to write down the age on which they agreed. For analyzing the association between (indicators of) psychosocial health and alcohol consumption, only two variables where used; whether or not children had an agreement with their parents about the age of alcohol consumption, and whether or not children think they are allowed to drink alcohol when their parents are at home. With respect to analyzing the association between (indicators of) psychosocial health and alcohol consumption, the dependent variables (both dichotomous) were lifetime alcohol consumption and alcohol consumption of the primary school children during the past four weeks.

As mentioned, the variables with respect to alcohol consumption were based on indicators of the Local and National Health Monitor for Youth.

2.4 Statistical analyses

The data was analyzed by using the statistical program SPSS 15.0 for Windows. Descriptive statistics were used to obtain a general overview of the demographic features of the participants (e.g. age, gender and country of birth), their psychosocial health, and their smoking- and alcohol behavior. Before analyzing the psychosocial health of the primary school children, the subscales were screened on their reliability. After that, chi-square tests were conducted in order to see whether there was a difference between boys and girls with respect to (indicators of) psychosocial health, smoking and alcohol consumption. The McNemar test was used for examining whether there was a significant difference between the five indicators of psychosocial health. Separate analyses were carried out for boys and girls. The McNemar test is applicable when nominal data is available. It determines whether two dichotomous variables significantly differ among the research population (Field, 2009). To

assess whether there is a relationship of psychosocial indicators with smoking and alcohol consumption among primary school children regression analyses were conducted, thereby controlling for the socio-demographic characteristics age and gender. The predictors included personal characteristics, and for alcohol consumption also environmental characteristics. The personal characteristics include age and gender, as well as the five subscales of psychosocial health (emotional symptoms, conduct problems, hyperactivity, peer relationship problems, and pro-social behavior). The environmental characteristics contain the questions 'Agreement with parents about the age of alcohol consumption', and 'Child thinks he/she is allowed to drink alcohol when their parents are at home'. Results were considered significant at a value of $p < .05$. With respect to the analyses of this study, there has not been controlled for the age of the primary school children, with the exception of the analyses that examined the association between (indicators of) psychosocial health and smoking or alcohol consumption.

3. Results

This chapter gives an overview of the results. First, baseline characteristics of the participants will be described. Second, an overview of indicators that refer to psychosocial health, smoking and alcohol consumption of the primary school children will be given, followed by describing which indicators of psychosocial health are associated with smoking and alcohol consumption among primary school children, aged 9 through 13 years old.

3.1 Participants

At the end of 2009, 39 primary schools in the region of South-Limburg agreed to participate with examining the health, lifestyle and (risk) behavior of children aged 9-13 years old. Fifteen hundred children filled in the questionnaire and were included in this study. Although there were missing values, no participants were excluded from the analyses. For each variable, the missing values are not taken along in the analyses (listwise deletion, maximum missing values ≤ 72; 4.8%).

The distribution of boys and girls in the research population was almost equal; 740 boys and 753 girls filled in the questionnaire (see table 3.1). The division of these children among class 7 and class 8 of primary school was almost fifty-fifty. The age of the children ranged between 9 and 13 (M= 10.8, SD= 0.74). With respect to nationality, the majority of the research population was Dutch (95%). Other nationalities were represented by less than 1% of the research population. Concerning the household composition of the primary school children, 75.9% of the children lived with both their father and mother, 6.6% lived with co-parents and 10.6% indicated to be part of a single parent family. Most children indicated that one or both parents are working (71.2%). The remaining participants reported that (one or both) parents were taking care of the household (16.7%), were looking for a job (5.3%), were dealing with a prolonged illness, were retired or studying (3.5%), or the job of parents was not applicable (e.g. one of the parents has died) (2.8%).

Table 3.1: Sample characteristics

Feature	Number of participants	
	N	%
Gender		
- Male	740	49.6
- Female	753	50.4
Class in primary school		
- Class 7	746	49.8
- Class 8	752	50.2
Age		
- 9	12	0.8
- 10	523	35.1
- 11	707	47.4
- 12	232	15.6
- 13	16	1.1
	M= 10.87 SD= 0.74	
Country of birth		
- Netherlands	1420	95.0
- Netherlands Antilles	2	0.1
- Aruba	1	0.1
- Turkey	5	0.3
- Morocco	1	0.1
- Belgium	8	0.5
- Germany	14	0.9
- Else	44	2.9
Household composition		
- Father and mother	1133	75.9
- Father/mother with partner	98	6.6
- Co-parents (with partner)	87	5.8
- Single parent family	158	10.6
- Foster-parents / Adoptive parents	2	0.1
- Child lives in boarding-school	2	0.1
- Else	12	0.8
Job of the parents		
- One or both parents are working	1068	71.2
- One or both parents are taking care of the household	250	16.7
- One or both parents are looking for a job	80	5.3
- One or both parents are dealing with a prolonged illness, are retired, or are still studying	53	3.5
- Not applicable (e.g. he/she has died)	42	2.8
- Unknown	7	0.5

3.2 Psychosocial health

The psychosocial health of the primary school children is measured by means of the Strengths and Difficulties Questionnaire (SDQ). As can be seen in table 3.2, the reliability of all five subscales is sufficient ($\alpha > 0.70$).

Table 3.2: Reliability of the SDQ subscales

	Cronbach's alpha
Emotional symptoms scale	0.715
Conduct problems scale	0.781
Hyperactivity scale	0.811
Peer problems scale	0.786
Pro-social scale	0.815

Table 3.3 gives an overview of indicators that refer to the psychosocial health of the children, aged 9-13 years old. As can be seen, most primary school children score normal ($\geq$ 74.9%). Looking at boys and girls separately, the results show that there are significant gender differences on the emotional problems scale, the conduct problems scale and the pro-social scale, regardless of whether children score normal, borderline or abnormal. Concerning the emotional problems scale, there are more boys with a normal score and more girls with a borderline score. The conduct problem scale and the prosocial scale show the opposite; there are more girls with a normal score and more boys with a borderline score. With regard to the hyperactivity scale, significant differences between boys and girls can be seen only for children with a normal or abnormal score. Significantly more girls show a normal score. The peer problems scale shows no gender differences with respect to normal scores, borderline scores and abnormal scores. Concerning abnormal scores of the primary school children, a significant difference between boys and girls can be seen on the subscales emotional problems, conduct problems, hyperactivity and pro-social behavior. A higher percentage of girls (8.9%) show abnormal scores with respect to emotional problems, whereas a higher percentage of boys score abnormal on the subscales conduct problems (9.3%), hyperactivity (12.0%) and pro-social behavior (3.8%).

Table 3.4 shows a comparison of the abnormal scores on the five subscales of psychosocial health. With respect to the total research population, abnormal scores on the hyperactivity scale appear more often than abnormal scores on the other subscales. Comparing the abnormal scores separately for boys and girls, the analyses show other results. For boys,

abnormal scores on the conduct problem- and hyperactivity scale appear more often than abnormal scores on the other indicators of psychosocial health. Comparing the conduct problem scale with the hyperactivity scale, boys show no significant difference. In girls, abnormal scores on the emotional problems scale appear more often than abnormal scores on the scales of conduct problems, peer problems and pro-social behavior. They show no significant difference when comparing the abnormal emotional scores with the abnormal hyperactivity scores.

Table 3.3: Overview of SDQ-indicators, which refer to the psychosocial health of the primary school children

				Number of children (%) N= 1500													
				Normal				Borderline				Abnormal				Unknown	
		M	SD	N	%	χ^2	*p*	N	%	χ^2	*p*	N	%	χ^2	*p*	N	%
Emotional symptoms scale						16.688	**.000**			5.409	**.020**			10.332	**.001**		
	Total	1.46	1.53	1270	84.7			75	5.0			103	6.9			52	5.3
	Boys	1.39	1.47	654	88.4			27	3.6			35	4.7			24	3.2
	Girls	1.53	1.56	612	81.3			47	6.2			67	8.9			27	3.6
Conduct problems scale						12.549	**.000**			6.657	**.010**			5.102	**.024**		
	Total	1.36	1.18	1261	84.1			94	6.3			118	7.9			27	1.8
	Boys	1.43	1.25	598	80.8			58	7.8			69	9.3			15	2.0
	Girls	1.29	1.07	660	87.6			35	4.6			47	6.2			11	1.5
Hyperactivity scale						5.724	**.017**			.671	.413			5.578	**.018**		
	Total	1.48	1.30	1161	77.4			152	10.1			154	10.4			33	2.2
	Boys	1.53	1.33	554	74.9			80	10.8			89	12.0			17	2.3
	Girls	1.42	1.24	603	80.1			72	9.6			63	8.4			15	2.0
Peer problems scale						.405	.524			.900	.343			.214	.643		
	Total	1.38	1.17	1184	78.9			229	15.3			59	3.9			28	1.9
	Boys	1.37	1.14	590	79.7			106	14.3			31	4.2			13	1.8
	Girls	1.38	1.16	590	78.4			121	16.1			28	3.7			14	1.9
Pro-social scale						35.093	**.000**			26.110	**.000**			8.026	**.005**		
	Total	1.27	1.19	1347	89.8			83	5.5			39	2.6			31	2.1
	Boys	1.34	1.26	632	85.4			63	8.5			28	3.8			17	2.3

	Girls	1.19	1.07	710	94.3			19	2.5			11	1.5			13	1.7
Total difficulties score						.294	.588			.281	.596			.030	.864		
	Total	1.38	1.02	1180	78.7			173	11.5			130	8.7			17	1.1
	Boys	1.37	1.00	588	79.5			81	10.9			63	8.5			8	1.1
	Girls	1.38	1.00	590	78.4			89	11.8			66	8.8			8	1.1

Numbers in bold indicate a significant difference; Chi-square $p < 0.05$

Table 3.4: Comparing the abnormal scores of the different subscales of psychosocial health

		Abnormal score emotional problems scale				Abnormal score conduct problems scale				Abnormal score hyperactivity scale				Abnormal score peer problems scale				Abnormal score pro-social scale			
		N	%	χ^2 (df = 1)	*P*	N	%	χ^2 (df = 1)	*p*	N	%	χ^2 (df = 1)	*p*	N	%	χ^2 (df = 1)	*p*	N	%	χ^2 (df = 1)	*p*
Abnormal score emotional problems scale	Total	-	-	-	-	23	1.60	36.15	.639	24	1.68	21,87	**.001**	10	.70	11.61	**.001**	1	.07	.76	**.000**
	Boys	-	-	-	-	6	.85	3.21	**.002**	9	1.27	6.82	**.000**	4	.56	5.65	.892	1	.14	.02	.419
	Girls	-	-	-	-	17	2.36	52.41	**.007**	14	1.96	16.72	.610	6	.85	6.89	**.000**	0	.00	.79	**.000**
Abnormal score conduct problems scale	Total					-	-	-	-	33	2.27	5.13	**.009**	8	.55	2.81	**.000**	9	.62	13.78	**.000**
	Boys					-	-	-	-	21	2.93	24.89	.059	5	.70	1.68	**.000**	7	.98	7.85	**.000**
	Girls					-	-	-	-	11	1.50	15.74	.082	3	.41	1.15	.064	2	.27	3.83	**.000**
Abnormal score hyperactivity scale	Total									-	-	-	-	8	.55	1.02	**.000**	13	.90	23.38	**.000**
	Boys									-	-	-	-	3	.42	.15	**.000**	10	1.40	15.82	**.000**
	Girls									-	-	-	-	5	.69	4.48	**.000**	3	.41	5.07	**.000**
Abnormal score peer problems scale	Total													-	-	-	-	5	.34	7.91	**.042**
	Boys													-	-	-	-	4	.56	6.99	**.008**
	Girls													-	-	-	-	1	.14	.84	**.008**

Numbers in bold indicate a significant difference; Chi-square $p < 0.05$

3.3 Substance use

The current status of the primary school children with respect to substance use, including smoking and alcohol consumption, is described in table 3.5 and table 3.6.

3.3.1 Smoking

As can be seen in table 3.5, most children never smoked (93.4%). Of the children that smoked a cigarette at least once during their life, fourteen children are currently smoking (14,1%). This concerns more girls than boys, but the difference is not significant.

Table 3.5: Smoking behavior of the primary school children

	Number of children							
	Total		Boys		Girls			
	N	%	N	%	N	%	χ^2	Sig.
Children that have ever smoked (N= 1492)							1.611	.204
Yes	99	6.6	55	7.5	44	5.9		
No	1391	93.4	679	92.5	708	94.1		
Children that are currently smoking (N= 1500)							.244	.621
Yes	14	0.9	6	0.8	8	1.1		
No	1477	99.1	728	99.2	743	98.9		

3.3.2 Alcohol consumption

Table 3.6 gives an overview of variables that are concerned with alcohol consumption. The table shows that approximately half of the children indicated that they consumed alcohol at least once in their lifetime. This significantly involves more boys than girls. When it concerns alcohol consumption during the past four weeks, also significantly more boys (17.2%) than girls (8.0%) reported that they drank alcohol. Furthermore, 45.3% of the primary school children indicated that they had an agreement with their parents about the age on which they are allowed to drink alcohol; 48.2% of the boys and 42.5% of the girls. There was no significant difference between boys and girls with respect to the age on which they agreed. Of the children, approximately 50% agreed with their parents on the age of 16 years old. On average, the mean age for boys was 16.4 and for girls 16.5. With respect to consuming alcohol at home, most primary school children think that they are not allowed to drink alcohol when their parents are at home. Also this variable shows a significant difference between boys

and girls; more boys than girls think that they are allowed to consume alcohol when their parents are at home.

Table 3.6: Alcohol consumption of the primary school children

	Number of children (%)							
	Total		Boys		Girls			
	N	%	N	%	N	%	χ^2	Sig.
Alcohol consumption during life							39.020	**.000**
Yes	751	50.6	429	58.8	320	42.6		
No	734	49.4	300	41.2	431	57.4		
Alcohol consumption during the past four weeks							28.138	**.000**
Yes	184	12.5	123	17.2	60	8.0		
No	1289	87.5	594	82.8	690	92.0		
Child thinks that he/she is allowed to drink alcohol when parents are at home							8.911	**.003**
Yes	140	9.4	86	11.7	54	7.2		
No	1346	90.6	646	88.3	695	92.8		
Agreement with parents about the age of alcohol consumption							4.613	**.032**
Yes	656	45.3	343	48.2	311	42.5		
No	792	54.7	369	51.8	420	57.5		
Age on which children agreed with their parents about consuming alcohol							-	.495
14	16	2.2	9	2.4	7	2.1		
15	36	5.0	16	4.2	20	6.0		
16	363	50.6	203	53.6	157	46.7		
17	69	9.6	25	6.6	44	13.1		
18	147	20.5	78	20.6	69	20.5		
Else	87	12.1	48	12.7	39	11.6		

Numbers in bold indicate a significant difference; Chi-square $p < 0.05$

3.4 Association between indicators of psychosocial health and substance use

The results of the regression analyses that examined the association between indicators of psychosocial health and substance use are displayed in table 3.7, 3.8 and 3.9.

3.4.1 Psychosocial health and smoking

An overview of personal characteristics and their association with the smoking behavior of the primary school children is given in table 3.7. Based on multiple logistic regression analyses it can be stated that the results of the first model (including age and gender) show that only age is related to whether children ever smoked during their life. In addition to this model, model 2 describes that age as well as the child's score on the peer problems scale are associated. This means that the chance that children ever smoked is higher for older children, as well as for children with a higher score on the peer problems scale. By taking the subscales of the Strengths and Difficulties Questionnaire (SDQ) into account the model explains 3.2% of the total variance, which is comparing to model 1 a significant difference ($p = .046$).

The current smoking status of the primary school children shows associations with other characteristics. Model 1 shows that age and gender are not related to the current smoking status of the children. Model 2 adds the indicators of psychosocial health to the analyses. By taking these psychosocial subscales into account, the model shows that there is a significant association with the emotional problems scale and the hyperactivity scale. This means that the chance that children, 9 through 13 years old, are currently smoking is higher for children with an increased score on the emotional problems scale, and the chance is lower for children with a high score on the hyperactivity scale. This model explains 11.2% of the total variance, which indicates that the indicators of psychosocial health significantly add something ($p = .010$).

Table 3.7: Personal characteristics and the association with smoking

Characteristics	**Association with smoking behavior**											
	Children that have ever smoked						**Children that are currently smoking**					
	Model 1			Model 2			Model 1			Model 2		
	OR	CI 95%	*p*	OR	CI 95%	*p*	OR	CI 95%	*P*	OR	CI 95%	*p*
Personal characteristics												
Age	1.028	1.005-1.052	**.016**	1.028	1.005-1.051	**.017**	1.039	.982-1.100	.188	1.042	.985-1.103	.150
Gender*	.787	.521-1.189	.255	.800	.527-1.216	.297	1.321	.456-3.830	.608	1.296	.435-3.867	.642
Psychosocial health												
Emotional symptoms scale				.980	.842-1.141	.794				1.333	1.101-1.615	**.003**
Conduct problems scale				1.077	.905-1.282	.401				1.271	.943-1.712	.115
Hyperactivity scale				.921	.759-1.118	.407				.576	.355-.934	**.025**
Peer problems scale				1.175	1.007-1.371	**.040**				1.064	.765-1.479	.712
Pro-social scale				1.094	.936-1.279	.258				1.279	.984-1.663	.066
R^2	.013			**.032****			.013			**.112****		

Numbers in bold indicate a significant association (p <0.05).
* Variable coded as 1 (male) and 2 (female).
** Numbers indicate that the model significantly adds something to previous models (p <0.05).

3.4.2 Psychosocial health and alcohol consumption

By using multiple logistic regression, table 3.8 and 3.9 explain whether there are associations between personal and environmental characteristics, and the alcohol consumption of the children during their life as well as during the past month. The first two models in table 3.8 show that lifetime alcohol consumption of the primary school children is only strongly associated with the personal characteristic 'gender'. Model 3 adds environmental characteristics to the analyses. As can be seen, gender still shows a significant association but also whether or not children think that they are allowed to drink alcohol is significantly associated with the lifetime alcohol consumption of the children. This means that girls have a higher chance of lifetime alcohol consumption, whereas this chance is lower for children who think that they are allowed to drink alcohol when their parents are at home. By taking the environmental characteristics into account model 3 explains 12.9% of the total variance, which is a significant difference compared to model 1 and 2 ($p = .000$).

The results of the regression analyses referring to the alcohol consumption of the children during the past four weeks, are displayed in table 3.9. Model 1 shows that there is an association of this variable with gender. The results of the second model describe that gender, as well as the score of the child on the emotional problems scale is related to the chance that children consumed alcohol during the past month. This indicates that girls, and children with a high score on the emotional problems scale have a higher chance of consuming alcohol during the past month. Model 3 shows that alcohol consumption during the past four weeks depends on three significant characteristics. First, the chance is higher for primary school girls. Furthermore, the chance that children consumed alcohol during the past four weeks is lower for children that had an agreement with their parents about the age of alcohol consumption, and also for children who think that they are allowed to drink alcohol when their parents are at home. These results are based on the third model, since this model explains 24.9% of the total variance and the environmental characteristics significantly add something to the previous models ($p = .000$).

Table 3.8: Personal and environmental characteristics and the association with whether or not children consumed alcohol during their life

Characteristics	**Association with alcohol consumption during their life**								
	Model 1			Model 2			Model 3		
	OR	CI 95%	*p*	OR	CI 95%	*p*	OR	CI 95%	*p*
Personal characteristics									
Age	.994	.982-1.006	.300	.993	.981-1.005	.272	.995	.982-1.007	.435
Gender*	1.955	1.584-2.414	**.000**	1.946	1.573-2.407	**.000**	1.858	1.529-2.391	**.000**
Psychosocial health									
Emotional symptoms scale				.964	.891-1.043	.364	.983	.910-1.078	.688
Conduct problems scale				.980	.875-1.096	.720	.991	.896-1.135	.882
Hyperactivity scale				.911	.823-1.009	.073	.910	.823-1.018	.078
Peer problems scale				.989	.885-1.106	.849	1.005	.874-1.104	.937
Pro-social scale				.928	.832-1.036	.186	.907	.808-1.009	.086
Environmental characteristics									
Agreement with parents about the age of alcohol consumption							.814	.598-.938	.067
Child thinks that he/she is allowed to drink alcohol when parents are at home							.112	.256-.419	**.000**
R^2	.038			**.049****			**.129****		

Numbers in bold indicate a significant association (p <0.05).
* Variable coded as 1 (male) and 2 (female).
** Numbers indicate that the model significantly adds something to previous models (p <0.05).

Table 3.9: Personal and environmental characteristics and the association with whether or not children consumed alcohol during the past month

Characteristics	**Association with alcohol consumption during the past four weeks**								
	Model 1			Model 2			Model 3		
	OR	CI 95%	*p*	OR	CI 95%	*p*	OR	CI 95%	*p*
Personal characteristics									
Age	.993	.975-1.011	.448	.993	.976-1.011	.469	.998	.979-1.019	.878
Gender*	2.272	1.625-3.177	**.000**	2.344	1.669-3.291	**.000**	2.195	1.512-3.186	**.000**
Psychosocial health									
Emotional symptoms scale				.903	.819-.994	**.038**	.934	.835-1.046	.237
Conduct problems scale				.947	.816-1.098	.470	.957	.811-1.130	.606
Hyperactivity scale				.945	.824-1.084	.422	.939	.811-1.087	.400
Peer problems scale				.903	.784-1.040	.157	.919	.785-1.077	.298
Pro-social scale				1.110	.933-1.320	.241	1.035	.865-1.239	.705
Environmental characteristics									
Agreement with parents about the age of alcohol consumption							.599	.413-.868	**.007**
Child thinks that he/she is allowed to drink alcohol when parents are at home							.064	.042-.098	**.000**
R^2	.033			**.049****			**.249****		

Numbers in bold indicate a significant association (p <0.05).
* Variable coded as 1 (male) and 2 (female).
** Numbers indicate that the model significantly adds something to previous models (p <0.05).

4. Discussion

This chapter discusses the main findings and answers the research question. Subsequently, limitations of the study will be discussed and finally, recommendations for future research will be described.

4.1 Discussion of the main findings

This study tried to investigate which indicators of psychosocial health are associated with smoking cigarettes and consuming alcohol among 9-13 year old primary school children, living in South-Limburg. Many research has been done towards determinants that are of influence on smoking and alcohol consumption. Literature showed that psychosocial problems in childhood are related to risk behaviors, of which substance use (Tucker et al., 2006; Tyas and Pederson, 1980). Attention- or externalizing problems such as conduct problems, hyperactivity and impulsivity, are associated with a greater risk for smoking cigarettes and consuming alcohol (Ernst et al., 2006; Fergusson, Horwood and Ridder, 2005; Hawkins, Catalano and Miller, 1992; Lynskey and Fergusson, 1995; Tapert, Baratta, Abrantes and Brown, 2002; Chilcoat and Brealau, 1999).

4.1.1 Association between psychosocial health and smoking

Based on the results of this study no conclusions can be drawn from the analyses with respect to smoking. Ninety-nine primary school children in the age of 9 through 13 filled in that they smoked at least once during their life, and only 14 children stated that they are currently smoking. Due to this small number of participants, it is not possible to draw reliable conclusions. However, several trends that occur in this study are in line with previous research.

According to this study, the chance that children ever smoked a cigarette is higher for older children, as well as for children with a higher score on the peer problems scale. The number of children that ever smoked increases with age. Six percent of the 10 years old children ever smoked a cigarette. This percentage rises to 17% for 12-year-olds and 41% for 14-year-olds (STIVORO, 2010a). Therefore, it is not surprising that the results of this study show that the chance that children ever smoked a cigarette is higher for older children. Tyas and Pederson (1998) confirm that adolescent smoking is associated with age. Although some children already try a cigarette at a very young age, most children are going to experiment with cigarettes when they are around the

age of thirteen (van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007). Children who score high on the peer problems scale perceive problems in their contact with peers, for example they feel lonely or they do not have many friends. This study showed that the chance that children ever smoked a cigarette is higher for children who perceive peer problems. By smoking cigarettes, young people may believe they are adopting an image that makes them appear tough and sociable (Elders, Perry, Eriksen and Giovino, 1994; STIVORO, 2010b). Furthermore, research showed that smoking behavior similarity is an important criterion when selecting new friends during early adolescence (Mercken, 2009). When children do not have many friends and/or perceive problems with peers, it is possible that they are going to experiment with cigarettes in order to get more friends, to be popular and/or to belong to a certain group. They may see smoking as an opportunity to solve their problems with peers.

The analyses with respect to the current smoking status of the primary school children showed other associations. The chance that children are currently smoking is lower for children with a high score on the hyperactivity scale, which is in contrast with the results of previous research. Those studies found that tobacco users were more hyperactive and perceived more difficulties with attention than tobacco nonusers (Ernst et al., 2006; Tapert, Baratta, Abrantes and Brown, 2002; DiClemente, Hansen and Ponton, 1996). Also Millberger, Biederman, Faraone, Chen and Jones (1997) suggest that children with hyperactivity symptoms are more likely to smoke cigarettes. A reason for the deviating result cannot be given. Besides the association between the current smoking status and hyperactivity, this study also indicates that the chance that the research population is currently smoking is higher for children with an increased score on the emotional problems scale. Emotional problems include mood swings, anxiety, depression and psychosomatic symptoms. The result of this study is in line with other studies that show an association between emotional problems and smoking (Dudas, Hans and Barabas, 2005; Engels, Noom, Hale III and De Vries, 2005; Giannakopoulos et al., 2010). However, several studies state that the causal direction in the effects between depression and smoking are not clear-cut, and that there is substantial evidence that the effects are bidirectional (Otten, Van de Ven, Engels and Van den Eijnden, 2009; Goodman and Capitman, 2000). A possible explanation that supports the finding of this study is that children with depressive symptoms may perceive difficulties in resisting or adequately coping with peer

pressure to smoke, indicating that depressive symptoms increase the risk for smoking (Engels, Noom, Hale III and De Vries, 2005).

4.1.2 Association between psychosocial health and alcohol consumption

Regarding alcohol consumption (lifetime prevalence, as well as during the past month), the following conclusions can be drawn. First, there is no association between (indicators of) psychosocial health and consuming alcohol. The analyses show that except for gender, personal characteristics do not appear to be of importance once environmental characteristics are taken into account. The analyses of this study show that the chance that children at the end of primary school consumed alcohol at least once during their life, as well as during the past month, is higher for girls. This cannot be confirmed by previous research. A recent study among children at the end of primary school showed that more boys than girls were consuming alcohol (Kuunders and Van Laar, 2009). The age on which children consume their first glass of alcohol is also lower for boys (Vet and Van den Eijnden, 2007). However, van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh (2007) state that the stereotype that consuming alcohol is typical for boys, does not longer exist when children become adolescents. The fact that in this study the chance of alcohol consumption is higher for girls could be explained by the fact that girls start their period of puberty earlier than boys (Medicinfo, 2008). There is substantial evidence that early pubertal timing in girls is associated with higher rates and earlier initiation of substance use (Dick, Rose, Viken and Kaprio, 2000; Ge et al., 2006). So instead of only trying a sip of a drink at a younger age, they are actually going to experiment with several alcoholic drinks because consuming alcohol demonstrates autonomy and ‘being grown up’ (Stolle, Sack and Thomasius, 2009). Moreover, in puberty girls are more sensitive for social stress than boys (Rijksuniversiteit Groningen, 2010). They want to adopt a certain attitude towards other children, and especially towards (older) boys with which they spend their time. Second, the analyses demonstrate that the chance of lifetime alcohol consumption and alcohol consumption during the past month is lower for children who think that they are allowed to drink alcohol when their parents are at home. These results are in contrast with the existing literature. The number of children that consume alcohol is lower among children that do not get permission to drink alcohol at home (Schrijvers and Schuit, 2010). Therefore, it is hard to give an explanation for this result. It might be that children at the beginning of puberty want to resist against

their parents. They are curious towards new things, like to experiment, and want to belong to a group and behave just like peers (NIGZ, 2006). However, when parents allow their children to consume alcohol, the challenge to drink decreases. Finally, the analyses with respect to consuming alcohol during the past month showed that the chance that children consumed alcohol during this time period is lower for children that had an agreement with their parents about the age of alcohol consumption. This is in line with a number of studies that show that strict rules regarding consuming alcohol work especially preventive for starting to consume alcohol. Rules about alcohol can postpone the age on which children actually start to drink, instead of that they are experiencing with alcohol (by means of e.g. taking a sip of alcohol) (Van der Vorst, Engels, Meeus, Deković and Van Leeuwe, 2005; van der Vorst, Engels, Meeus and Deković, 2006; van der Vorst, 2007; Nederlands Instituut voor Gezondheidsbevordering en Ziektepreventie, 2006).

Although research showed that alcohol users are more impulsive and sensation seeking, and that they perform more externalizing symptoms (Ernst et al., 2006; Martin et al., 2002), the conclusion of this study does not confirm that there is an association between indicators of psychosocial health and alcohol consumption.

4.2 Epidemiology of psychosocial health and substance use

In this paragraph, the epidemiological results of the research population with respect to (indicators of) psychosocial health, smoking and alcohol consumption will be presented. Differences between boys and girls will be mentioned, and the results will be compared with Dutch children who are of the same age.

4.2.1 Psychosocial health compared to Dutch peers

The Health Behavior in School-aged Children study (van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007) states that concerning Dutch primary school children, on average 17 percent scores abnormal on the (total difficulties scale of the) Strength and Difficulties Questionnaire. This study found that this percentage is much lower among primary school children living in South-Limburg, namely 8.6%. Boys and girls often show other psychosocial problems (van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007; Verhulst et al., 1997; Vollebergh et al., 2006). The results of this study also demonstrate some gender-differences. Conduct problems and hyperactivity problems appear more often among boys, whereas a

relatively higher percentage of girls show emotional problems. For this reason, it can be concluded that the participating children behave in the same manner as their peers; internalizing problems occur more often among girls and externalizing problems occur more often among boys (Junger, Mesman and Meeus, 2003; ter Bogt, van Dorselaer and Vollebergh, 2003). Compared to previous research one difference in psychosocial health was found. Results show that the number of girls with emotional problems does not significantly deviate from the number of girls with hyperactivity problems.

4.2.2 Smoking compared to Dutch peers

Lifetime smoking behavior of children aged 9 through 13 and living in the region South-Limburg, is similar to other Dutch primary school children. For both groups the lifetime prevalence of smoking is approximately 7% (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). Also with respect to the current smoking status, there are no large differences. Fourteen children included in this study (0.9%) filled in that they are smoking. Less than one percent (0.7%) of the Dutch children who are of the same age smokes (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). Therefore, it can be concluded that the percentage of children that are currently smoking is still low at primary school. Though, it is important to pay attention to this age group and inform them about the negative consequences smoking cigarettes has on health because the use of tobacco increases especially when children are between 12 and 15 years old (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). Dutch research showed that boys are more experimental than girls (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008; van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007). This cannot be confirmed by this study, since no significant differences were determined between boys and girls in lifetime prevalence. This also applies the current smoking status of the primary school children.

4.2.3 Alcohol consumption compared to Dutch peers

Twenty-eight percent of the Dutch children state that they have an agreement with their parents about the age on which they are allowed to consume alcohol (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). This

percentage is much higher (45.3%) among children living in South-Limburg. The age on which both groups agree with their parents is in general 16 years or older (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). In spite of these agreements, approximately half of the primary school children that participated in this study said that they consumed alcohol at least once during their life. A lower percentage (36%) has been documented by Dutch boys and girls (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). This indicates that children living in South-Limburg have their first experience with alcohol at an earlier age than their peers in other parts of the Netherlands. Nevertheless, this is not directly alarming. The Netherlands Institute for Health Promotion (NIGZ) (2006) found that most children start experiencing with consuming alcohol when they are between 11 and 13 years old. Moreover, this study did not specify the question about how much the children drank at the particular occasion. For this reason, it is not clear whether children who filled in that they drank one glass of alcohol actually consumed a full glass, or if they only had a sip of a drink. Although research proves that gender is not related to the frequency of alcohol use (Schrijvers and Schuit, 2010), this study does show some gender differences. The lifetime prevalence of alcohol is significantly higher among boys, which is similar to other Dutch children (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008; van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007). With regard to alcohol consumption during the past four weeks, also significantly more boys (17.2%) than girls (8.0%) reported that they drank alcohol. This means one out of eight children (12.5%), whereas other children from the same age show a lower percentage (9%) (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter and Vollebergh, 2008). From these results, it can be concluded that lifetime prevalence as well as alcohol consumption during the past month is compared to Dutch peers higher among children living in South-Limburg. However, although the alcohol percentages are higher among the research population, most children (90%) still think that they are not allowed to consume alcohol when their parents are at home. Only 11 children (0.7%) are convinced that they are allowed to drink one glass of alcohol (or more), which is less than the national average of 3.0% (van Dorsselaer, Zeijl, van den Eeckhout, ter Bogt and Vollebergh, 2007).

4.3 Limitations of the study

There are some limitations to the present study. First, since it concerns a cross-sectional study, no causal relationships can be drawn between determinants (indicators of psychosocial health) and outcome measures (smoking and alcohol consumption). Second, the questionnaire was only aimed at primary school children who are living in South-Limburg. Therefore, the results cannot be applied to children from other regions in the Netherlands. Besides, the children may not be a good reflection of Dutch children from the same age. A third limitation concerns the fact that it is difficult to compare the results of this study with other studies, because of the variation in methods and measures. The questionnaire of this study contained multiple topics, of which health and lifestyle. The Strength and Difficulties Questionnaire has been used for examining psychosocial health. The SDQ detects inattention and hyperactivity better than the CBCL and compared to the Rutter questionnaire, the SDQ showed a better coverage of inattention, peer relationships and prosocial behavior (Goodman, 1997; Goodman and Scot, 1999; Klasen et al., 2000). The differences between questionnaires are of influence on determining psychosocial health and can therefore also be of influence on the association between psychosocial problems and smoking, or alcohol consumption. Although the questionnaire of this study consisted 25 questions that examined the psychosocial health of the primary school children, only a small number of questions has been asked with respect to smoking and alcohol consumption. The Municipal Health Service of South Limburg based these questions on indicators of the Local and National Health Monitor for Youth. The Monitor makes a distinction between children (4-12 years old) and adolescents (12-19 years old), also when it concerns questions about lifestyle. Because this study was aimed at primary school children, the questionnaire included only general questions with respect to smoking and alcohol consumption; smoking and alcohol consumption ever/during the past month, agreement with parents about consuming alcohol and alcohol consumption at home. The descriptions of smoking and alcohol consumption in this study therefore differ from definitions used in other studies. The amount of cigarettes and alcohol, for example, has not been asked in this study. This may lead to other associations between psychosocial health and substance use (including smoking and alcohol consumption). Within this study children were, for example, classified as a smoker when they smoke every day, when they smoke at least once a week, and also when they smoke less than once a week. Ernst et al.

(2006) characterize a child as a smoker when he or she smokes cigarettes more than twice a month. They found that tobacco use was associated with hyperactivity and attention problems, which is in contrast with the results of this study. Besides the use of different definitions, most research that examined the association of psychosocial health with smoking and alcohol consumption was aimed at adolescents. This could be an alternative explanation for deviating results because associations found among adolescents are not always applicable to primary school children. A final limitation of the study was that, due to the fact that the data was already available, the choices with respect to the questions of the questionnaire were not based on the aim of this study. Therefore, it was not possible to test a specific theory.

4.4 Recommendations for future research

The following aspects should be taken into account to improve research on the subject of this study. First, in order to see whether psychosocial problems in childhood can predict smoking cigarettes and/or consuming alcohol later in life, future research on this relationship should use longitudinal studies instead of cross-sectional data. It is also recommended to base this longitudinal study on testing a specific theory, for example the Problem Behavior Theory. Second, many research has been done towards risk behaviors of adolescents. However, at the end of primary school children already start experiencing with for example smoking cigarettes and consuming alcohol, and there is not a lot of research done among this age group. Many of the children, in the age of 9-12, are unaware of the consequences of risk behaviors. It is important to inform children about risk behavior and possible consequences before they are going to experiment with substances. Therefore, more attention should be paid to children who are the final classes of primary school. Prevention programs should play a crucial role in this. Also for the Municipal Health Service of South Limburg this was the first time they investigated health and lifestyle of primary school children. Perhaps in the future knowledge about children from primary en secondary schools that are located in the same region can be combined. By acting this way, it is possible to choose suitable prevention programs and apply these in first class of secondary school. The third recommendation is related to measuring psychosocial health. It could be that primary school children have difficulties with estimating their own health and behavior. Many studies also ask parents and teachers of children to fill in the Strengths and Difficulties Questionnaire. So in order to target psychosocial problems

for preventive purposes, it could be useful to add the results of parents and teachers to the self-reported version of the children. A final recommendation for future research is to gather more information about alcohol consumption among primary school children, by adding more specific questions on this topic to the questionnaire. For example by including a question about how old children were when they first drank alcohol (this could also be a sip of a drink), and ask specifically how old they were when they drank their first full glass. This study demonstrates that children at the end of primary school already consume alcohol. However, it remains unclear how much alcohol these children drink (a sip or a full glass).

4.5 Conclusion

The results of this study can not confirm that risk behaviors can start as a result of psychosocial problems in childhood. With respect to smoking, there were some significant associations found between psychosocial health and smoking. However, due to the small number of children that (ever) smoked it is not possible to draw reliable conclusions. When it concerns alcohol, the chance that primary school children consumed alcohol (ever, or during the past month) is higher for girls, and lower for children who think that they are allowed to drink alcohol when their parents are at home. Moreover, the chance that the children drank alcohol during the past four weeks was lower for children who had an agreement with their parents about the age of alcohol consumption. Therefore, it can be concluded that although previous research on adolescents found associations between psychosocial problems and substance use (smoking and alcohol), no such associations were found with respect to children who are in the final classes of primary school. Given these results, it is not necessary to investigate this association any further. However, it remains important to examine (other) determinants that are of influence on smoking and alcohol consumption among primary school children, aged 9 through 13.

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Appendix 1 Overview questions psychosocial health

	Items	Cronbach's alpha
Emotional symptoms scale	I get a lot of headaches, stomach-aches or sickness	0.715
	I worry a lot	
	I am often unhappy, downhearted or tearful	
	I am nervous in new situations	
	I have many fears, I am easily scared	
Conduct problems scale	I often get very angry and/or lose my temper	0.781
	I usually as I am told	
	I fight a lot	
	I am often accused of lying or cheating	
	I take things that are not mine	
Hyperactivity scale	I am restless. I cannot stay still for long	0.811
	I am constantly fidgeting or squirming	
	I am easily distracted	
	I think before I do things	
	I finish the work I am doing	
Peer problems scale	I am usually on my own	0.786
	I have one good friend ore more	
	Other people my age generally like me	
	Other children or young people pick on me	
	I get on better with adults than with people my age	
Pro-social scale	I try to be nice to other people	0.815
	I usually share with others	
	I am helpful if someone is hurt, upset or feeling ill	
	I am kind to younger children	
	I often volunteer to help others	

Appendix 2 Questionnaire