# Psychosomatic Symptoms of Adolescents and Age of Alcohol Onset: Examining the Moderating Role of Strictness of Alcohol Policy

Utrecht University

Name: Aletta Kroon

Student number: 5726972

Supervising lecturer: Dr. Ina Koning

Master program: Youth Studies

Date: 15-06-2020

Word count: 5000

**Abstract**

Drinking at an early age can have severe health and social consequences, which highlights the need to identify factors that predict an early age of alcohol onset. One of these relevant predictors might be psychosomatic symptoms of adolescents as adolescents might cope with their symptoms by drinking alcohol. As the impact of psychosomatic symptoms on alcohol onset might depend on national legal regulations regarding alcohol consumption, the present cross-national study examined the association between psychosomatic symptoms and age of alcohol onset and if this association differs according to the strictness of three national alcohol policies (strict, medium strict and lenient). Data consisted out of 5152 adolescents aged fifteen and sixteen who participated in the 2013-2014 Swedish, Polish and Dutch Health Behavior in School-aged Children (HBSC) study. As expected, multinomial logistic regression analyses revealed that more psychosomatic symptoms increased the risk of an early age of alcohol onset. Furthermore, this association was weakest in a strict alcohol policy. In supporting adolescents to cope with their psychosomatic symptoms, interventions should, in addition to reducing and preventing psychosomatic symptoms, aim to teach adolescents different and more effective coping strategies to increase the age of alcohol onset.

*Keywords: psychosomatic symptoms, alcohol onset, adolescents, strictness of alcohol policies*

**Samenvatting**

Op een jonge leeftijd alcohol drinken kan ernstige gezondheids- en sociale consequenties hebben. Dit benadrukt de noodzaak om factoren te identificeren die een vroege aanvangsleeftijd van alcoholgebruik kunnen voorspellen. Een van deze relevante voorspellers kunnen psychosomatische symptomen van adolescenten zijn, omdat adolescenten met hun symptomen zouden kunnen omgaan door alcohol te gaan drinken. Aangezien de impact van psychosomatische symptomen op de aanvangsleeftijd van alcoholgebruik kan afhangen van nationale wettelijke alcoholvoorschriften, wordt in de huidige cross-nationale studie het verband onderzocht tussen psychosomatische symptomen en de aanvangsleeftijd van alcoholgebruik en of dit verband verschillend is voor drie landen met een andere striktheid van het alcoholbeleid (strikt, middelmatig strikt en mild). De steekproef bestond uit 5152 adolescenten van vijfteen en zestien jaar die deelnamen aan de 2013-2014 Zweedse, Poolse en Nederlandse Health Behavior in School-aged Children (HBSC) studie. Zoals verwacht lieten multinomiale logistische regressieanalyses zien dat meer psychosomatische symptomen het risico op een vroege aanvangsleeftijd van alcoholgebruik verhoogd. Bovendien was dit verband het zwakst in een strikt alcoholbeleid. Om de leeftijd van het eerste alcoholgebruik te verhogen, zouden interventies, naast het verminderen en voorkomen van psychosomatische symptomen, ernaar moeten streven om adolescenten verschillende en effectievere coping strategieën aan te leren.

*Kernwoorden: psychosomatische symptomen, alcohol initiatie, adolescenten, striktheid van alcoholbeleid*

## Introduction

In industrialized countries, most people start to drink alcohol during adolescence (Kuntsche et al., 2013). Nonetheless, drinking at an early age can have severe health and social consequences. Research has shown that an earlier age of alcohol onset increases the risk of alcohol abuse (Hingson & Zha, 2009), alcohol disorders (Guttmannova et al., 2011), other substance use (Nelson, Van Ryzin, & Dishion, 2015), academic problems and delinquent behaviors (Peleg-Oren, Sain-Jean, Cardenas, Tammara, & Pierre, 2009). These adverse outcomes highlight the need to identify factors that predict an early age of alcohol onset and may therefore inform interventions. One of the relevant predictors of drinking alcohol are subjective health complaints often referred to as psychosomatic symptoms. Psychosomatic symptoms consist of psychological and somatic symptoms such as sleeping difficulties, irritability, headache and backache. Psychosomatic symptoms of adolescents have been found to predict regular alcohol use (e.g. Norell-Clarke & Hagquist, 2016), but it is yet unknown if psychosomatic symptoms also predict the age of alcohol onset. In addition, the impact of psychosomatic symptoms on onset of drinking may depend on the national legal regulations on alcohol consumption. Most countries have developed policies regarding alcohol use and often these alcohol policies differ in strictness (Brand, Saisana, Rynn, Pennoni, & Lowenfels, 2007). These different alcohol policies might influence the impact of psychosomatic symptoms on alcohol use. Therefore, the objective of this study is to examine the relationship between psychosomatic symptoms and age of alcohol onset and to examine if this relationship differs according to the strictness of national alcohol policy across three countries.

### Psychosomatic symptoms and age of alcohol onset

Psychosomatic symptoms increase in adolescence (Weinberg, Stevens, Duinhof, & Finkenauer, 2019). Adolescents report more irritability, headache, backache, feeling low, nervousness, and dizziness than children in primary school. Furthermore, from 2001 to 2017 the number of adolescents that experience psychosomatic symptoms has increased (Weinberg et al., 2019).

There is sufficient evidence that the display of psychosomatic symptoms is related to the level of alcohol use among youth (e.g. Norell-Clarke & Hagquist, 2016). Two processes that may contribute to this relation are (1) a shared underlying sensitivity and (2) drinking as a coping strategy. These processes are further discussed below. First, the Problem Behavior Theory (Jessor & Jessor, 1975) might be able to shed light on the association between

psychosomatic symptoms and alcohol use. That is, the problem behavior theory proposes an underlying sensitivity to several problem behaviors. This underlying sensitivity is a result of interactions between factors which can be categorized into three systems: (1) the personality system (e.g. self-esteem), (2) the perceived environment system (e.g. parental support) and (3) the behavior system (e.g. academic performance). Taken together, these three systems can determine the psychological proneness for the development of problem behaviors (Jessor, 1987). As the problem behavior theory posits an underlying psychological proneness for several problem behaviors, the same factors that can make adolescents vulnerable for psychosomatic symptoms might make adolescents vulnerable for an early onset of drinking, e.g. school pressure (Murberg & Bru, 2004; Unger et al., 2001). Furthermore, another explanation of the association between psychosomatic symptoms and age of alcohol onset might be that adolescents start to drink alcohol as a coping strategy for their psychosomatic symptoms. Drinking alcohol can be a strategy to cope with distressed feelings (Gorka, Ali, & Daughters, 2012), negative emotions (Corbin, Farmer, & Nolen-Hoekesma, 2013) and pain (Zale, Maisto, & Ditre, 2015). Since psychosomatic symptoms consist of psychological and somatic symptoms these symptoms include forms of distressed feelings, negative emotions and pain. Therefore, adolescents with psychosomatic symptoms might try to cope with their symptoms by drinking alcohol. Accordingly, psychosomatic symptoms can be considered a risk factor for an early age of alcohol onset.

Multiple cross-sectional studies reported a positive association between psychosomatic symptoms and alcohol use of adolescents (Baceviciene, Jankauskiene, & Emeljanovas, 2019; Giannakopoulos et al., 2015; Norell-Clarke, & Hagquist, 2016; Simpson, Janssen, Boyce, Pickett, 2006; Walsh et al., 2008). However, to the best of our knowledge, no longitudinal studies have examined the association between psychosomatic symptoms and alcohol use of adolescents. Giannakopoulos et al. (2015) compared binge drinking rates of adolescents with high and low levels of psychosomatic symptoms. They showed that adolescents with more psychosomatic symptoms were more likely to be involved in binge drinking compared to adolescents with fewer psychosomatic symptoms. Similarly, Norell-Clarke and Hagquist (2016) divided adolescents into three groups based on their psychosomatic symptoms: (1) the group with least psychosomatic symptoms, (2) the in-between group and (3) the group with most psychosomatic symptoms. The authors found that the group with most psychosomatic symptoms had almost 12 times higher odds of regular alcohol use than the group with least psychosomatic symptoms (Norell-Clarke & Hagquist, 2016). Thus, cross-sectionally, several studies have demonstrated the link between psychosomatic symptoms of adolescents and the

level of alcohol use. However, the relationship between psychosomatic symptoms of adolescents and the onset of drinking is, to the best of our knowledge, not yet established. Based on the theoretical perspectives and the empirical findings, a negative relationship between psychosomatic symptoms and age of alcohol onset is expected to be found.

**Strictness of alcohol policy**

The impact of individual factors (e.g. psychosomatic symptoms) on behavior (e.g. alcohol use) often depend on contextual factors (Bronfenbrenner, 1977). A contextual factor that might impact the influence of psychosomatic symptoms on age of alcohol onset is the strictness of alcohol policies of countries. European countries have different alcohol policies (Brand et al., 2007) which can be ranked as strict, medium strict or lenient. Karlson, Lindeman and Österberg (2012) based this ranking on six subcategories of alcohol policy measures: (1) control of production, retail sale and distribution of alcoholic beverages, (2) age limits and personal control, (3) control of drunk driving, (4) control of advertising, marketing and sponsorship of alcoholic beverages, (5) public policy and (6) alcohol taxation and price. The strictness of alcohol policies can influence the level of alcohol use of adolescents (Grube & Nygaard, 2001). Cross-national studies found that the stricter the alcohol policy, the lower the level of adolescent alcohol use (Karlsson et al., 2012; Simons-Morton, Pickett, Boyce, Ter Bogt, & Vollebergh, 2010). However, it is yet unknown if a strict alcohol policy can be a protective factor in the association between psychosomatic symptoms and age of alcohol onset. Adolescents with psychosomatic symptoms might cope with their symptoms by drinking alcohol, as drinking can be a coping strategy for distressed feelings (Gorka et al., 2012), negative emotions (Corbin et al., 2013) and pain (Zale et al., 2015). In countries with lenient alcohol policies, alcohol is easier to obtain than in countries with medium strict and strict alcohol policies (Karlsson et al., 2012). Then, in countries with lenient alcohol policies, it is easier for adolescents to start drinking alcohol to cope with their psychosomatic symptoms compared to adolescents living in countries with medium strict and strict alcohol policies. Simultaneously, in countries with strict alcohol policies, it is more difficult for adolescents to cope with their psychosomatic symptoms by starting to drink alcohol compared to adolescents living in medium strict and lenient alcohol policies countries. Therefore, the association between psychosomatic symptoms and age of alcohol onset is expected to be strongest in countries with lenient alcohol policies and weakest in countries with strict alcohol policies.

**The present study**

The aim of the present cross-national study is to examine the relationship between psychosomatic symptoms and age of alcohol onset among adolescents, and the extent to which this is moderated by the level of strictness of alcohol policy. This study investigates this aim among adolescents aged fifteen and sixteen from the Netherlands (lenient policy), Poland (medium strict policy) and Sweden (strict policy). Based on theoretical perspectives and empirical research, a negative association between psychosomatic symptoms of adolescents and age of alcohol onset is expected to be found (H1). Strictness of alcohol policy is expected to moderate this negative association, whereby the relationship between psychosomatic symptoms and age of alcohol onset is expected to be strongest in countries with lenient alcohol policies and weakest in countries with restrictive alcohol policies (H2). The research model of this study is depicted in Figure 1.


*Figure 1.* Research model of the association between psychosomatic symptoms and age of alcohol onset and the moderation effect of strictness of alcohol policy.

## Method

**Procedure and participants**

The present cross-national study used data from the 2013-2014 Health Behaviour in School-Aged Children (HBSC) study. The HBSC study assesses the health and health behaviour of adolescents aged 11- to 16-years old every four years in 42 European and North-American countries. Each participating country obtained ethical approval to conduct the survey. Data were collected in schools between September 2013 and June 2014, where adolescents anonymously and voluntarily filled in the survey. In advance to the survey, adolescents and their parents were informed about the research approach and the procedures concerning confidentiality and anonymity. In order to get a representative group of 11-, 13-,

and 15-years old adolescents in each country, clustering sampling was used to select schools and classes. The HBSC-survey upholds a standardized methodology to ensure consistent measures and procedures across countries. In each country, translation and back-translation took place under supervision of national research teams to secure language uniformity of the measures (Currie et al., 2014).

The present study used data from the Netherlands, Poland and Sweden ($N$ = 16.547). As the question that measures the outcome age of alcohol onset was only asked to adolescents aged fifteen and sixteen, participants in the present study consisted of fifteen- and sixteen-years old adolescents ($N$ = 5435). Participants who had missing values on relevant research variables were excluded listwise from analyses, which resulted in a sample of 5152 adolescents. The mean age of the participants was 15.57 years old ($SD$ = .31), which variated from a mean age of 15.48 ($SD$ = .32) in the Netherlands, 15.62 ($SD$ = .31) in Poland and 15.58 ($SD$ = .30) in Sweden. Gender was almost equally distributed with 52.4% of the participants being females, which variated with 52.2% of the participants in the Netherlands, 54.8% of the participants in Poland and 51.4% of the participants in Sweden being females.

**Measures**

*Age of alcohol onset.* The dependent variable age of alcohol onset was measured by asking adolescents at what age they drank their first glass of alcohol. Answer categories consisted of never, 11 years old or less, 12 years old, 13 years old, 14 years old, 15 years old, and 16 years or older. The variable has been recoded into a variable with three categories: (0) early onsetters (14 years old or younger), (1) late onsetters (15 and 16 years old) and (2) non-drinkers (adolescents who have never drunk alcohol). The decision was made to classify early onsetters as adolescents that drank their first glass of alcohol at 14 years old or younger as this classification was most often used in former research (e.g. Dooley & Prause, 2007; Rossow & Kuntsche, 2013).

*Psychosomatic symptoms.* The independent variable psychosomatic symptoms was measured with the Health Behavior in School-aged Children symptom checklist (HBSC-SCL), which has been validated as a reliable assessment of psychosomatic symptoms in 35 countries and therefore enables cross-national comparison (Ravens-Sieberer et al., 2008). The HBSC-SCL consists of the following eight items: headache, stomachache, backache, feeling low, irritability or bad temper, feeling nervous, difficulties in getting to sleep and feeling dizzy. Adolescents could indicate how often they experienced these symptoms in the last six months on a 5-point Likert scale from (1) rarely or never to (5) about every day. The mean

score of these eight items was taken, where higher scores indicate more psychosomatic symptoms. The items had a good internal consistency (α = .85).

*Strictness of alcohol policy.* The moderator strictness of alcohol policy was created by following the alcohol policy ranking (the AMPHORA scale) of Karlsson et al. (2012). Karlsson et al. (2012) scored countries on six subcategories of alcohol policy measures, including age limits and alcohol taxation and price. The mean alcohol policy score in Europe was 71.3 out of a possible score between 0 and 160, where high scores indicate strict alcohol policies. Sweden had a score of 124 and was coded as strict, Poland had a score of 87 and was coded as medium strict, while the Netherlands had a score of 62 and was coded as lenient (0 = lenient, 1 = medium strict, 2 = strict).

*Control variables.* This study controlled for three variables: gender, age and family affluence. It controlled for gender (0 = boy, 1 = girl) as there are gender differences in psychosomatic symptoms (Ravens-Sieberer et al., 2009). It controlled for age as psychosomatic symptoms increase with age in adolescence (Weinberg et al., 2019) and it controlled for family affluence as family affluence is negatively associated with psychosomatic symptoms of adolescents (Holstein et al., 2009). Age was measured by asking adolescents to report their birthdate. Family affluence was measured by using the six items of the HBSC Family Affluence Scale (FAS). Items included “Does your family own a car, van or truck” (no, yes one, yes two or more), “Do you have your own bedroom for yourself” (no, yes). The mean score of the items was taken where higher scores indicate higher family affluence. The items had an acceptable internal consistency (α = .61).

**Data analysis**

Data analyses were performed using IBM SPSS Statistics 26. A significance level of $p < .05$ was used for the analyses. Missing values were assessed using missing value analysis. No variable had more than 3% of missing values. These cases were deleted listwise. Outliers were checked by examining Cook’s distance. No outliers were found. Descriptive analyses were performed to get an understanding of the sample. Furthermore, ANOVA analyses were performed to compare the three age of alcohol onset groups and Games-Howell post hoc tests were performed to report which groups differ significantly. As the research variables consisted of categorical variables and of not normally distributed continuous variables, Spearman correlations were performed to explore the relationships between the variables.

Multinomial logistic regression analyses were performed to analyse the association between the independent variable psychosomatic symptoms and the dependent variable age of

alcohol onset (0 = early onsetters, 1 = late onsetters, 2 = non-drinkers). Before performing these analyses the associated assumptions were tested. The multinomial logistic regression analyses were performed in four steps. In the first step, control variables (gender, age, family affluence) were included in the model. In the second step, the independent variable psychosomatic symptoms was added. To test if strictness of alcohol policy was a moderator, an interaction term between a mean centered variable psychosomatic symptoms and a dummy variable medium strict alcohol policy and the moderator itself were added to the model in the third step. In the fourth step, the before mentioned interaction term was replaced with an interaction term between a mean centered variable psychosomatic symptoms and a dummy variable strict alcohol policy.

## Results

### Descriptive statistics

Descriptive statistics of the research variables are presented in Table 1. Notable is the number of participants (51.1%) located in the strict alcohol policy country. In the lenient and medium strict alcohol policy countries most participants, respectively 49.8% and 50.8%, had an early age of alcohol onset. However, in the strict alcohol policy country most participants (49.4%) were non-drinkers, while only 31.5% of the participants had an early onset of drinking. The mean value of psychosomatic symptoms was highest in the strict alcohol policy country ($M$ = 2.40, $SD$ = .86) and lowest in the lenient alcohol policy country ($M$ = 2.04, $SD$ = .81).

Table 2 presents the descriptive statistics of the research variables separated by the different age of alcohol onset groups. Moreover, table 2 presents if the mean values of the research variables differ in the three age of alcohol onset groups. The groups differ significantly in the mean value of psychosomatic symptoms, Brown-Forsythe $F(2, 4037.66) = 65.57$, $p < .01$. The mean value of psychosomatic symptoms was highest in the early onsetters group ($M$ = 2.45, $SD$ = .94), and lowest in the non-drinkers group ($M$ = 2.13, $SD$ = .83). Furthermore, noteworthy in Table 2 is the gender distribution of the different age of alcohol onset groups. The early and late onsetters consisted of more females than males, with respectively 54% and 56.4% being females, while the non-drinkers consisted of significantly more males than females, with 48.9% being females.

Table 1

*Descriptive Statistics of the Research Variables separated by the Strictness of Alcohol Policies.*

| | Total (*N* = 5152) | Lenient alcohol policy (*N* = 24.3%) | Medium strict alcohol policy (*N* = 24.5%) | Strict alcohol policy (*N* = 51.1%) |
|---|---|---|---|---|
| Female *(%)* | 52.4 | 52.2 | 54.8 | 51.4 |
| Age, *mean (SD)* | 15.57 (.31) | 15.48 (.32) | 15.62 (.31) | 15.58 (.30) |
| Family affluence, *mean (SD)* | 2.41 (.38) | 2.43 (.32) | 2.13 (.41) | 2.53 (.33) |
| Psychosomatic symptoms, *mean (SD)* | 2.30 (.90) | 2.04 (.81) | 2.33 (.99) | 2.40 (.86) |
| Age of alcohol onset[a], *mean (SD)* | .99 (.90) | .82 (.88) | .78 (.86) | 1.18 (.88) |
| - Early onsetters *(%)* | 40.6 | 49.8 | 50.8 | 31.5 |
| - Late onsetters *(%)* | 19.4 | 18.8 | 20.7 | 19.1 |
| - Non-drinkers *(%)* | 39.9 | 31.4 | 28.6 | 49.4 |

*Note*. [a]0 = early onsetters, 1 = late onsetters, 2 = non-drinkers. N = sample size; SD = standard deviation.

Table 2

*Descriptive Statistics of the Research Variables by Age of Alcohol Onset*

| | Early onsetters | Late onsetters | Non-drinkers |
|---|---|---|---|
| Female *(%)* | 54[a] | 56.4[a] | 48.9[b] |
| Age, *mean (SD)* | 15.54 (.32)[a] | 15.67 (.29)[b] | 15.55 (.31)[a] |
| Family Affluence, *mean (SD)* | 2.39 (.40)[a] | 2.40 (.37)[ab] | 2.43 (.38)[b] |
| Psychosomatic symptoms, *mean (SD)* | 2.45 (.94)[a] | 2.32 (.88)[b] | 2.13 (.83)[c] |

*Note*. SD = standard deviation. Means in a row with different superscripts are significantly different from each other ($p < .05$) in a Games-Howell post hoc test, while means with the same superscript are not significantly different from each other.

**Correlations**

Spearman correlations of the variables are shown in Table 3. As expected, psychosomatic symptoms and age of alcohol onset were significantly negatively correlated ($r_s$ = -.15, $p$ < .01), indicating that adolescents with more psychosomatic symptoms were more likely to have an early age of alcohol onset. The correlation between strictness of alcohol policy and age of alcohol onset was significant and positive ($r_s$ = .20, $p$ < .01), indicating that the age of alcohol onset is higher in stricter alcohol policies. Psychosomatic symptoms and strictness of alcohol policy were significantly positively correlated ($r_s$ = .17, $p$ < .01), indicating that psychosomatic symptoms were higher in stricter alcohol policies. These correlations are of small to moderate effect size and confirm the patterns of the results that were found in the descriptive statistics. All demographic variables correlate significantly with the independent variables and/or with the dependent variable, which validates the choice to use these variables as control variables.

Table 3

*Spearman Correlation Matrix of the Demographic Variables, Psychosomatic Symptoms, Strictness of Alcohol Policy and Age of Alcohol Onset.*

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Gender[a] | 1.00 | | | | | |
| 2. Age | .01 | 1.00 | | | | |
| 3. Family Affluence | -.04* | -.05** | 1.00 | | | |
| 4. Psychosomatic symptoms | .32** | .04** | -.02 | 1.00 | | |
| 5. Strictness of alcohol policy[b] | -.01 | .11** | .23** | .17** | 1.00 | |
| 6. Age of alcohol onset[c] | -.05** | .02 | .05** | -.15** | .20** | 1.00 |

*Note*. [a]0 = male, 1 = female. [b]0 = lenient, 1 = medium strict, 2 = strict. [c]0 = early age of alcohol onset, 1 = late age of alcohol onset, 2 = non-drinkers. * p < .05. ** p < .01.

**Main effect**

A multinomial logistic regression analysis was performed to test the effect of psychosomatic symptoms on age of alcohol onset. Table 4 shows the results of the

multinomial logistic regression for the main effect while controlling for gender, age and family affluence (model 2). The outcome variable, age of alcohol onset, consisted of three groups (early onsetters, late onsetters, non-drinkers), and the early onsetters group was used as the reference group in the multinomial logistic regression. After controlling for the demographic variables, early onsetters were at a higher risk for more psychosomatic symptoms compared to late onsetters (OR = .81, CI = .75, .89, $p < .01$) and compared to non-drinkers (OR = .67, CI = .62, .72, $p < .01$).

Table 4

*Multinomial Logistic Regression Analysis of the Influence of Psychosomatic Symptoms on Age of Alcohol Onset (Reference Group is the Early Onsetters Group).*

| | Late onsetters | | | Non-drinkers | | |
|---|---|---|---|---|---|---|
| Predictors | *B* | *OR* | *95% CI* | *B* | *OR* | *95% CI* |
| Gender[a] | .21 | 1.23* | [1.05, 1.45] | .02 | 1.02 | [.90, 1.11] |
| Age | 1.33 | 3.80** | [2.96, 4.86] | .14 | 1.15 | [.94, 1.16] |
| Family affluence | .10 | 1.11 | [.91, 1.35] | .26 | 1.29** | [1.10, 1.52] |
| Psychosomatic symptoms | -.21 | .81** | [.75, .89] | -.41 | .67** | [.62, .72] |

*Note.* [a]0 = boys, 1 = girls. *B* = regression coefficient; OR = odds ratio; CI = confidence interval. * $p < .05$. ** $p < .01$

**Moderation effect**

To assess if the relationship between psychosomatic symptoms and age of alcohol onset was moderated by strictness of alcohol policy, the created interaction terms of psychosomatic symptoms and strictness of alcohol policy were analyzed one at a time. One interaction term was found to be significant. The interaction term between psychosomatic symptoms and the strict alcohol policy (versus the lenient alcohol policy) was found to be significant, when the non-drinkers were compared to the early onsetters (OR = .86, CI = .74, .99, $p < .05$). This indicates that as psychosomatic symptoms increase, adolescents living in countries with a lenient and a medium strict alcohol policy were less likely to become non-drinkers than to become early onsetters, compared to adolescents living in a strict alcohol

policy country. In other words, comparing the non-drinkers to the early onsetters, the association between psychosomatic symptoms and age of alcohol onset was weakest in a strict alcohol policy.

## Discussion

The objective of this study was to examine the association between psychosomatic symptoms of adolescents and age of alcohol onset and to examine if this association differs according to the strictness of national alcohol policies across three countries. As expected, results showed that adolescents with higher amounts of psychosomatic symptoms have an increased risk to be early onsetters compared to being late onsetters and non-drinkers. The moderation effect revealed that the association between psychosomatic symptoms and age of alcohol onset was weakest in a strict alcohol policy.

### Psychosomatic symptoms and age of alcohol onset

Consistent with the first hypothesis of this study, a negative association between psychosomatic symptoms of adolescents and the age of alcohol onset was found. This indicates that adolescents with more psychosomatic symptoms have a higher risk to become early onsetters than to become late onsetters or non-drinkers. This finding is in line with previous cross-sectional studies that examined the association between psychosomatic symptoms and the amount of alcohol use of adolescents. These studies found that adolescents with more psychosomatic symptoms are more likely to drink alcohol regularly (Baceviciene et al., 2019; Giannakopoulos et al., 2015; Norell-Clarke, & Hagquist, 2016; Simpson et al., 2006; Walsh et al., 2008). This study adds to these studies that adolescents with more psychosomatic symptoms are also more likely to start drinking at an earlier age. However, it is important to note that the present study and the beforementioned studies all have a cross-sectional design. Nonetheless, to the best of our knowledge, this study is the first to demonstrate the association between psychosomatic symptoms of adolescents and the age of alcohol onset.

A possible explanation for the negative association between psychosomatic symptoms and the age of alcohol onset can be found in the problem behavior theory (Jessor & Jessor, 1975), which states that people can have an underlying sensitivity to multiple problem behaviors. As adolescents with psychosomatic symptoms are at an increased risk to initiate drinking alcohol at an early age, it is possible that an underlying sensitivity may apply to the display of psychosomatic symptoms and an early age of alcohol onset. Some examples of

possible factors that might help explain the development of an underlying sensitivity to psychosomatic symptoms and an early age of alcohol onset include the level of perceived stress and being bullied. Stress has found to be a risk factor for psychosomatic symptoms in adolescents (Hesketh et al., 2010) and of an early age of alcohol onset (Donovan, 2004). Moreover, adolescents that have been bullied have an increased risk to develop psychosomatic symptoms (Gini & Pozzoli, 2013) and an early age of alcohol onset (Swahn et al., 2011). Future longitudinal research is needed to examine the direction of the association between psychosomatic symptoms and age of alcohol onset and to examine factors that might help to explain the development of an underlying sensitivity to psychosomatic symptoms and an early age of alcohol onset.

Another possible explanation for the negative association between psychosomatic symptoms and age of alcohol onset can be that adolescents try to cope with their psychosomatic symptoms by drinking alcohol. Former research has shown that drinking alcohol can be a coping strategy to deal with stressed feelings (Gorka et al., 2012), negative emotions (Corbin et al., 2013) and pain (Zale et al., 2015). As psychosomatic symptoms consist of psychological and somatic symptoms it includes forms of stressed feelings, negative emotions and pain. Therefore, it is a substantiated possibility that adolescents with psychosomatic symptoms might try to cope with their psychosomatic symptoms by drinking alcohol, as drinking alcohol is known to be a coping strategy for adolescents (Hamdan-Mansour, Puskar, & Sereika, 2007). Future longitudinal research is needed to examine a causal relationship between psychosomatic symptoms and age of alcohol onset and to examine if drinking alcohol is used as a coping strategy for adolescents with psychosomatic symptoms.

**Strictness of alcohol policy as moderator**

The second hypothesis of this study, that strictness of alcohol policy is expected to moderate the relationship between psychosomatic symptoms and age of alcohol onset, was partly supported by the results. It was expected that the main effect would be strongest in countries with lenient alcohol policies and weakest in countries with restrictive alcohol policies. The results supported the section that the association between psychosomatic symptoms and age of alcohol onset was weakest in the strict alcohol policy. However, the results did not support the section that the association would be strongest in the lenient alcohol policy as there was not a differential effect between the lenient and medium strict alcohol policies.

A possible explanation for the observed moderation effect can be found in the alcohol availability to adolescents. As drinking alcohol can be a way to cope with stressed feelings (Gorka et al., 2012), negative emotions (Corbin et al., 2013) and pain (Zale et al., 2015), drinking alcohol might be a strategy for adolescents to cope with their psychosomatic symptoms. However, in a strict alcohol policy country, such as Sweden, the availability of alcohol is more restricted (Raninen, Härkönen, & Landberg, 2016), which makes it more difficult for adolescents to get access to alcohol than for adolescents living in countries with less strict alcohol policies. Furthermore, accessibility of alcohol has found to be associated with increased alcohol use and alcohol intentions of adolescents (Komro, Maldonado-Molina, Tobler, Bonds, & Muller, 2007). Then, due to lower access to alcohol, it is more difficult for adolescents living in a strict alcohol policy country to cope with their psychosomatic symptoms by drinking alcohol compared to adolescents living in medium strict or lenient alcohol policy countries. Thus, for adolescents living in a strict alcohol policy country, it is less likely that they cope with their psychosomatic symptoms by initiating drinking at an early age.

Nevertheless, with this reasoning we would also expect that the association between psychosomatic symptoms and age of alcohol onset is strongest in the lenient alcohol policy, yet the results do not support this expectation since there was no difference in the relationship between psychosomatic symptoms and age of alcohol onset in countries with a lenient and medium strict alcohol policy. A possible explanation for this can be found in a methodological decision that was made. In the present study Poland represented the medium strict alcohol policy while the Netherlands represented the lenient alcohol policy, as according to Karlsson et al. (2012) Poland and the Netherlands can respectively be ranked as a country with a medium strict and lenient alcohol policy. As described in the introduction, this ranking is based on six subcategories of alcohol policy measures. For example, Poland applied stricter rules in the subcategory age limits and personal control compared to the Netherlands. However, even though the strictness of alcohol policy was based on the sum of the six subcategories and Poland can be ranked as a medium strict alcohol policy (Karlsson et al., 2012), it is relatively easy for adolescents in Poland (Nowak, Papiernik, Mikulska, & Czarkowska-Paczek, 2018) as well as for adolescents in the Netherlands (Van Hoof, Roodbeen, Krokké, Gosselt, & Schelleman-Offermans, 2015) to obtain alcohol. So even though on average it is easier to obtain alcohol in countries with lenient alcohol policies compared to countries with medium strict and strict alcohol policies (Karlsson et al., 2012), this notion does not seem to apply to Poland. Then, as particularly alcohol availability is a risk

factor for an early age of alcohol onset (Komro et al., 2007) and adolescents in the medium strict and lenient alcohol policy can obtain alcohol relatively easy, it is not easier for adolescents in the lenient alcohol policy to cope with their psychosomatic symptoms by starting to drink alcohol compared to adolescents in the medium strict alcohol policy. This might explain the fact that the association between psychosomatic symptoms and age of alcohol onset was not different between the medium strict and lenient alcohol policy. Future research should examine multiple countries with different strictness of alcohol policies to get a clearer picture of the moderating effect of strictness of alcohol policy.

**Strengths and limitations**

The present study has several strengths. A strength of this study is that it is based on a large representative sample, which improves the reliability of the results. Another strength is the innovativeness of the study. This study is, to the best of our knowledge, the first to explore the relationship between psychosomatic symptoms of adolescents and the age of alcohol onset. Moreover, it also takes the moderating effect of strictness of alcohol policy into account which provides imperative knowledge about the influence of a contextual factor on adolescents' behavior.

Regardless of these strengths, this study also has some limitations. First, due to cross-sectional data, no causal relationship between psychosomatic symptoms of adolescents and the age of alcohol onset can be established. Future longitudinal research is needed to obtain more insight into the direction of the relationship. Second, this study only compared three countries representing one type of alcohol policy. Future research should investigate multiple countries with different types of alcohol policies (e.g. looking at the different subcategories) to get a better understanding of the effect of the strictness of alcohol policies. However, the present study provides a first indication of the effect of the strictness of alcohol policies. Third, the measures of the research variables are based on self-reports, which could have caused socially desirable answers. Even though self-reports have found to be a reliable method to measure alcohol use among adolescents (Koning, Harakeh, Engels, & Vollebergh, 2010), objective measures are preferred above self-reported measures. Nonetheless, in large studies objective measures are not feasible. Fourth, this study used data from the 2013-2014 HBSC study in the Netherlands, Poland and Sweden, which means that the analyzed data originated from six to seven years ago. The current situation does not necessarily have to reflect the situation from six to seven years ago. For example, the Netherlands increased the legal age to buy and drink alcohol from sixteen years old to eighteen years old in 2014. Future

research should examine this research question using more recent data. Nevertheless, the present study provides a first indication that the strictness of alcohol policy does affect the association between psychosomatic symptoms and age of alcohol onset.

**Conclusion and implications**

The present study found a negative association between psychosomatic symptoms of adolescents and age of alcohol onset. This association was moderated by the strictness of alcohol policy as this association was weakest in a strict alcohol policy. These results can be used to inform interventions that are aimed at increasing the age of alcohol onset. As this study found that one of the relevant predictors of age of alcohol onset are psychosomatic symptoms, interventions should focus, in addition to other relevant predictors, on reducing and preventing psychosomatic symptoms in adolescents. Furthermore, as initiating alcohol at an early age can be a way for adolescents to cope with their psychosomatic symptoms, interventions should aim to teach adolescents different and more effective coping strategies. This, in turn, might help to increase the age of alcohol onset. Moreover, in supporting adolescents to cope more effectively (or differently) with their psychosomatic symptoms, a strict alcohol policy might be helpful.

## Literature

Baceviciene, M., Jankauskiene, R., & Emeljanovas, A. (2019). Self-perception of physical activity and fitness is related to lower psychosomatic health symptoms in adolescents with unhealthy lifestyles. *BMC Public Health, 19*, 980-991. doi:10.1186/s12889-019-7311-2

Brand, D. A., Saisana, M., Rynn, L. A., Pennoni, F., & Lowenfels, A. B. (2007). Comparative analysis of alcohol control policies in 30 countries. *PLoS Medicine, 4*, 752-759. doi:10.1371/journal.pmed.0040151

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*, 513-531. doi:10.1037/0003-066X.32.7.513

Corbin, W. R., Farmer, N. M., & Nolen-Hoekesma, S. (2013). Relations among stress, coping strategies, coping motives, alcohol consumption and related problems: A mediated moderation model. *Addictive Behaviors, 38*, 1912-1919. doi:10.1016/j.addbeh.2012.12.005

Currie, C., Inchley, J., Molcho, M., Lenzi, M., Veselska, Z., & Wild, F. (eds.) (2014). *Health Behaviour in School-Aged Children (HBSC) Study Protocol: Background,*

*Methodology and Mandatory items for the 2013/14 Survey.* St Andrews: CAHRU. Access at: http://www.hbsc.org

Donovan, J. E. (2004). Adolescent alcohol initiation: A review of psychosocial risk factors. *Journal of Adolescent Health, 35,* 529-541. doi:10.1016/j.jadohealth.2004.02.003

Dooley, D., & Prause, J. (2007). Predictors of early alcohol drinking onset. *Journal of Child & Adolescent Substance Abuse, 16,* 1-29. doi:10.1300/J029v16n02_01

Giannakopoulos, G., Petanidou, D., Tzavara, C., Dimitrakaki, C., Kolaitis, G., & Tountas, Y. (2015). Psychosomatic symptoms, smoking and binge drinking in adolescence: A nationwide study in Greece. *International Archives of Medicine, 8.* 1-5. doi:10.3823/1736

Gini, G., & Pozzoli, T. (2013). Bullied children and psychosomatic problems: A meta-analysis. *Pediatrics, 132,* 720-729. doi:10.1542/peds.2013-0614

Gorka, S. M., Ali, B., & Daughters, S. B. (2012). The role of distress tolerance in the relationship between depressive symptoms and problematic alcohol use. *Psychology of Addictive Behaviors, 26,* 621-626. doi:10.1037/a0026386

Grube, J. W., & Nygaard, P. (2001). Adolescent drinking and alcohol policy. *Contemporary Drug Problems, 28,* 87-131. doi:10.1177/009145090102800104

Guttmannova, K., Bailey, J. A., Hill, K. G., Lee, J. O., Hawkins, J. D., Woods, M. L., & Catalano, R. F. (2011). Sensitive periods for adolescent alcohol use initiation: Predicting the lifetime occurrence and chronicity of alcohol problems in adulthood. *Journal of Studies on Alcohol and Drugs, 72,* 221-231. doi:10.15288/jsad.2011.72.221

Hamdan-Mansour, A. M., Puskar, K., & Sereika, S. M. (2007). Perceived social support, coping strategies and alcohol use among rural adolescents/USA sample. *International Journal of Mental Health and Addiction, 5,* 53-64. doi:10.1007/s11469-006-9051-7

Hesketh, T., Zhen, Y., Lu, L., Dong, Z. X., Jun, Y. X., & Xing, Z. W. (2010). Stress and psychosomatic symptoms in Chinese school children: cross-sectional survey. *Archives of Disease in Childhood, 95,* 136-140. doi:10.1136/adc.2009.171660

Hingson, R. W., & Zha, W. (2009). Age of drinking onset, alcohol use disorders, frequent heavy drinking, and unintentionally injuring oneself and others after drinking. *Pediatrics, 123,* 1477-1484. doi:10.1542/peds.2008-2176

Holstein, B. E., Currie, C., Boyce, W., Damsgaard, M. T., Gobina, I., Kökönyei, G., ... & Due, P. (2009). Socio-economic inequality in multiple health complaints among adolescents: international comparative study in 37 countries. *International Journal of Public Health, 54,* 260-270. doi:10.1007/s00038-009-5418-4

Jessor, R. (1987). Problem-behavior theory, psychosocial development, and adolescent problem drinking. *British Journal of Addiction, 82,* 331-342. doi:10.1111/j.1360-0443.1987.tb01490.x

Jessor, R., & Jessor, S. L. (1975). Adolescent development and the onset of drinking. A longitudinal study. *Journal of Studies on Alcohol, 36,* 27-51. doi:10.15288/jsa.1975.36.27

Karlsson, T., Lindeman, M., & Österberg, E. (2012). Does alcohol policy make any difference? Scales and consumption. In P. Anderson, F. Braddick, J. Reynolds, & A. Gaul (Eds.), *Alcohol Policy in Europe: Evidence from AMPHORA* (p. 15-23). Retrieved from: https://www.grea.ch/sites/default/files/amphora_alcohol_policy_europe_2012.pdf

Komro, K. A., Maldonado-Molina, M. M., Tobler, A. L., Bonds, J. R., & Muller, K. E. (2007). Effects of home access and availability of alcohol on young adolescents' alcohol use. *Addiction, 102,* 1597-1608. doi:10.1111/j.1360-0443.2007.01941.x

Koning, I. M., Harakeh, Z., Engels, R. C. M. E., & Vollebergh, W. A. M. (2010). A comparison of self-reported alcohol use measures by early adolescents: Questionnaires versus diary. *Journal of Substance Use, 15,* 166–173. doi:10.3109/14659890903013091

Kuntsche, E., Rossow, I., Simons-Morton, B., Bogt, T. F., Kokkevi, A., & Godeau, E. (2013). Not Early Drinking but Early Drunkenness Is a Risk Factor for Problem Behaviors Among Adolescents from 38 European and North American Countries. *Alcoholism: Clinical and Experimental Research, 37,* 308-314. doi:10.1111/j.1530-0277.2012.01895.x

Murberg, T. A., & Bru, E. (2004). School-related stress and psychosomatic symptoms among Norwegian adolescents. *School Psychology International, 25,* 317-332. doi:10.1177/0143034304046904

Nelson, S. E., Van Ryzin, M. J., & Dishion, T. J. (2015). Alcohol, marijuana, and tobacco use trajectories from age 12 to 24 years: Demographic correlates and young adult substance use problems. *Development and Psychopathology, 27,* 253-277. doi:10.1017/S0954579414000650

Norell-Clarke, A., & Hagquist, C. (2016). Psychosomatic problems in relation to alcohol use and physical exercise: a study between 1988 and 2011 among adolescents in Sweden. *Journal of Public Health, 24,* 325-333. doi:10.1007/s10389-016-0729-4

Nowak, M., Papiernik, M., Mikulska, A., & Czarkowska-Paczek, B. (2018). Smoking, alcohol consumption, and illicit substances use among adolescents in Poland. *Substance Abuse Treatment, Prevention, and Policy*, *13*, 42-49. doi:10.1186/s13011-018-0179-9

Peleg-Oren, N., Saint-Jean, G., Cardenas, G. A., Tammara, H., & Pierre, C. (2009). Drinking alcohol before age 13 and negative outcomes in late adolescence. *Alcoholism: Clinical and Experimental Research, 33,* 1966-1972. doi:10.1111/j.1530-0277.2009.01035.x

Raninen, J., Härkönen, J., & Landberg, J. (2016). Long-term effects of changes in Swedish alcohol policy: can alcohol policies effective during adolescence impact consumption during adulthood?. *Addiction, 111,* 1021-1026. doi:10.1111/add.13323

Ravens-Sieberer, U., Erhart, M., Torsheim, T., Hetland, J., Freeman, J., Danielson, M., ... & HBSC Positive Health Group. (2008). An international scoring system for self-reported health complaints in adolescents. *European Journal of Public Health, 18,* 294-299. doi:10.1093/eurpub/ckn001

Ravens-Sieberer, U., Torsheim, T., Hetland, J., Vollebergh, W., Cavallo, F., Jericek, H., ... & Erhart, M. (2009). Subjective health, symptom load and quality of life of children and adolescents in Europe. *International Journal of Public Health*, *54,* 151-159. doi:10.1007/s00038-009-5406-8

Rossow, I., & Kuntsche, E. (2013). Early onset of drinking and risk of heavy drinking in young adulthood—A 13-year prospective study. *Alcoholism: Clinical and Experimental Research*, *37*, 297-304. doi:10.1111/j.1530-0277.2012.01924.x

Simons-Morton, B., Pickett, W., Boyce, W., Ter Bogt, T. F., & Vollebergh, W. (2010). Cross-national comparison of adolescent drinking and cannabis use in the United States, Canada, and the Netherlands. *International Journal of Drug Policy*, *21*, 64-69. doi:10.1016/j.drugpo.2009.02.003

Simpson, K., Janssen, I., Boyce, W. F., & Pickett, W. (2006). Risk taking and recurrent health symptoms in Canadian adolescents. *Preventive Medicine, 43*, 46-51. doi:10.1016/j.ypmed.2006.03.005

Swahn, M. H., Topalli, V., Ali, B., Strasser, S. M., Ashby, J. S., & Meyers, J. (2011). Pre-teen alcohol use as a risk factor for victimization and perpetration of bullying among middle and high school students in Georgia. *Western Journal of Emergency Medicine*, *12,* 305-309. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3117606/

Unger, J. B., Li, Y., Johnson, C. A., Gong, J., Chen, X., Li, C., ... & Lo, A. T. (2001). Stressful life events among adolescents in Wuhan, China: Associations with smoking,

alcohol use, and depressive symptoms. *International Journal of Behavioral Medicine, 8,* 1-18. doi:10.1207/S15327558IJBM0801_01

Van Hoof, J. J., Roodbeen, R. T., Krokké, J., Gosselt, J. F., & Schelleman-Offermans, K. (2015). Alcohol sales to underage buyers in the Netherlands in 2011 and 2013. *Journal of Adolescent Health*, *56,* 468-470. doi:10.1016/j.jadohealth.2014.11.025

Walsh, S. D., Kolobov, T., Raiz, Y., Boniel-Nissim, M., Tesler, R., & Harel-Fisch, Y. (2018). The role of identity and psychosomatic symptoms as mediating the relationship between discrimination and risk behaviors among first and second generation immigrant adolescents. *Journal of Adolescence, 64,* 34-47. doi:10.1016/j.adolescence.2018.01.004

Weinberg, D., Stevens, G. W., Duinhof, E. L., & Finkenauer, C. (2019). Adolescent Socioeconomic Status and Mental Health Inequalities in the Netherlands, 2001–2017. *International Journal of Environmental Research and Public Health*, *16,* 3605-3623. doi:10.3390/ijerph16193605

Zale, E. L., Maisto, S. A., & Ditre, J. W. (2015). Interrelations between pain and alcohol: An integrative review. *Clinical Psychology Review*, *37,* 57-71. doi:10.1016/j.cpr.2015.02.005

**Appendix 1: Syntax**

```
* Encoding: UTF-8.
* making a copy of the original file.
SAVE OUTFILE='C:\Users\alett\OneDrive\Documenten\Master
Project\Methods&results_HBSC2014_Aletta.sav'
  /COMPRESSED.

* Changing variable names to make them more clear.
RENAME VARIABLES (m43=alcohol_onset).
RENAME VARIABLES (m97=ps1) (m98=ps2) (m99=ps3) (m100=ps4).
RENAME VARIABLES (m101=ps5) (m102=ps6) (m103=ps7) (m104=ps8).
RENAME VARIABLES (m126=fas1) (m127=fas2) (m128=fas3).
RENAME VARIABLES (m129=fas4) (m130=fas5) (m131=fas6).

* Creating the variable strictness of alcohol policy, whereby a higher score means a stricter
alcohol policy.
* So as the Netherlands has a lenient alcohol policy this is coded as 0, Poland has a medium
strict policy and is coded as 1, Sweden has a strict policy and is coded as 2.
RECODE REG_NO (31=0) (33=1) (38=2) INTO Strictness_alcohol_policy.
VARIABLE LABELS  Strictness_alcohol_policy 'Strictness of alcohol policy'.
EXECUTE.

* Creating value labels for the variable strictness of alcohol policy.
VALUE LABELS
Strictness_alcohol_policy
0 lenient alcohol policy
1 medium strict alcohol policy
2 strict alcohol policy.
EXECUTE.

* As I find it more logical to interpret the items that measure psychosomatic symptoms if a
higher score indicates more symptoms, I will recode them so that this will be the case.
* So a higher score indicates more psychosomatic symptoms.
```

```
* item 1.
RECODE ps1 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps1.
VARIABLE LABELS  R_ps1 'Headache'.
EXECUTE.

* item 2.
RECODE ps2 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps2.
VARIABLE LABELS R_ps2 'Stomach-ache'.
EXECUTE.

* item 3.
RECODE ps3 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps3.
VARIABLE LABELS R_ps3 'Back ache'.
EXECUTE.

*item 4.
RECODE ps4 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps4.
VARIABLE LABELS R_ps4 'Feeling low'.
EXECUTE.

*item 5.
RECODE ps5 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps5.
VARIABLE LABELS R_ps5 'Irritability or bad temper'.
EXECUTE.

*item 6.
RECODE ps6 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps6.
VARIABLE LABELS R_ps6 'Feeling nervous'.
EXECUTE.

*item 7.
RECODE ps7 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps7.
VARIABLE LABELS R_ps7 'Difficulties in sleeping'.
EXECUTE.
```

```
*item 8.
RECODE ps8 (1=5) (2=4) (3=3) (4=2) (5=1) INTO R_ps8.
VARIABLE LABELS R_ps8 'Feeling dizzy'.
EXECUTE.

* creating the value labels of the recoded items that measure psychosomatic symptoms.
VALUE LABELS
R_ps1 to R_ps8
1 rarely or never
2 about every month
3 about every week
4 more than once a week
5 about every day.
EXECUTE.

* Compute variabele psychosomatic symptoms by computing the mean score of the items.
COMPUTE
Psychosomatic_symptoms=MEAN(R_ps1,R_ps2,R_ps3,R_ps4,R_ps5,R_ps6,R_ps7,R_ps8).
VARIABLE LABELS Psychosomatic_symptoms 'Psychosomatic symptoms'.
EXECUTE.

* Compute variable family affluence scale (FAS) by computing the mean score of the items.
COMPUTE FAS=MEAN(fas1,fas2,fas3,fas4,fas5,fas6).
VARIABLE LABELS  FAS 'Family affluence scale'.
EXECUTE.

* Recoding variable gender into a dummy variable girl.
RECODE m1 (1=0) (2=1) INTO Dummy_girl.
VARIABLE LABELS  Dummy_girl 'dummy girl'.
EXECUTE.

* creating the value labels of the dummy variable girl.
VALUE LABELS
```

```
Dummy_girl
0 boy
1 girl.
EXECUTE.

* deleting cases with a lower age than 15, because the participants in my thesis have to be 15 or 16 years old.
FILTER OFF.
USE ALL.
SELECT IF (AGE > 14.99).
EXECUTE.
*5435 cases remain.

* Checking missing values.
MVA VARIABLES=AGE R_ps1 R_ps2 R_ps3 R_ps4 R_ps5 R_ps6 R_ps7 R_ps8 Psychosomatic_symptoms FAS
    alcohol_onset Dummy_girl Strictness_alcohol_policy fas1 fas2 fas3 fas4 fas5 fas6
  /MAXCAT=25
  /CATEGORICAL=Dummy_girl Strictness_alcohol_policy fas1 fas2 fas3 fas4 fas5 fas6.
* There are not a lot of missing values. Each variable has less than 3% of missing values.

* Checking frequencies.
FREQUENCIES VARIABLES=Dummy_girl alcohol_onset fas1 fas2 fas3 fas4 fas5 fas6 R_ps1 R_ps2 R_ps3 R_ps4
    R_ps5 R_ps6 R_ps7 R_ps8 Strictness_alcohol_policy
  /ORDER=ANALYSIS.
* Gender is almost equally distributed. Most participants (39.8%) have never drunk alcohol. 19.4% of the participants were 14 year old when they first had an alcoholic drink.
* The percentages of the different possible outcomes of the variabel alcohol_onset differ quite a lot from each other.
* Most participants (around half of them) are in a strict alcohol policy. So this means that most participants in this dataset are from Sweden.
* Missing values are still included so the results could change a bit once they are out of the data.
```

```
* Checking descriptives.
DESCRIPTIVES VARIABLES=AGE Psychosomatic_symptoms FAS
  /STATISTICS=MEAN STDDEV MIN MAX.
```

* The mean age is around 15.5 year old. The mean value of the variable psychosomatic symptoms is around 2.3 which is just a bit closer to the minimum value of 1 compared to the maximum value of 5.

```
* deleting missing values.
FILTER OFF.
USE ALL.
SELECT IF (NOT(SYSMIS(Psychosomatic_symptoms) | SYSMIS(FAS) |
SYSMIS(alcohol_onset))).
EXECUTE.
```

* 5152 cases remain.

```
* Testing the reliability of the items that form the variable psychosomatic symptoms.
RELIABILITY
  /VARIABLES=R_ps1 R_ps2 R_ps3 R_ps4 R_ps5 R_ps6 R_ps7 R_ps8
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE
  /SUMMARY=TOTAL.
```

* Alpha = .848. This is a good number so we have a reliable scale.
* It was to be expected that the scale would be reliable as we're using an existing validated scale.

```
* Testing the reliability of the items that form the variable FAS.
RELIABILITY
  /VARIABLES=fas1 fas2 fas3 fas4 fas5 fas6
  /SCALE('ALL VARIABLES') ALL
  /MODEL=ALPHA
  /STATISTICS=DESCRIPTIVE
  /SUMMARY=TOTAL.
```

* Alpha = .605. This is an acceptable number, but not very high. The alpha would increase a bit if the item family holidays would be excluded.
* But since it's an existing validated scale and the increase is very small, this item will not be excluded.
* The scale is acceptable, but I expected a higher alpha value as we're using an existing validated scale.

```
* Checking descriptives without missing data.
DESCRIPTIVES VARIABLES=AGE Psychosomatic_symptoms FAS
  /STATISTICS=MEAN STDDEV MIN MAX.
```

* The descriptives have not changed much if you compare it to the descriptives we got without missing data.

```
*Checking frequencies with mean and standard deviation.
FREQUENCIES VARIABLES=Dummy_girl Strictness_alcohol_policy
  /STATISTICS=STDDEV MEAN
  /ORDER=ANALYSIS.
```

* Gender is almost equally distributed. There are more girls than boys though. Most participants are living in a strict alcohol policy.

```
* Creating dummy variable for medium strict alcohol policy.
RECODE Strictness_alcohol_policy (1=1) (ELSE=0) INTO
Dummy_mediumstrict_alcohol_policy.
VARIABLE LABELS  Dummy_mediumstrict_alcohol_policy 'Dummy for medium strict
alcohol policy'.
EXECUTE.

* creating the value labels for dummy medium strict alcohol policy.
VALUE LABELS
Dummy_mediumstrict_alcohol_policy
0 other alcohol policy
1 medium strict alcohol policy.
EXECUTE.
```

```
* Creating dummy variable for strict alcohol policy.
RECODE Strictness_alcohol_policy (2=1) (ELSE=0) INTO Dummy_strict_alcohol_policy.
VARIABLE LABELS  Dummy_strict_alcohol_policy 'Dummy for strict alcohol policy'.
EXECUTE.

* creating the value labels for dummy strict alcohol policy.
VALUE LABELS
Dummy_strict_alcohol_policy
0 other alcohol policy
1 strict alcohol policy.
EXECUTE.

* Compute centered variable psychsomatic symptoms.
COMPUTE Centered_psychosomatic_symptoms=Psychosomatic_symptoms-2.2955.
VARIABLE LABELS  Centered_psychosomatic_symptoms 'Centered variable psychsomatic
symptoms'.
EXECUTE.

* checking the assumption of normality (assumption for linear regression) by examining the
histogram and saving the standardized residuals so that later on I can examine those.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT alcohol_onset
  /METHOD=ENTER AGE Dummy_girl FAS
  /METHOD=ENTER Psychosomatic_symptoms
  /METHOD=ENTER Dummy_mediumstrict_alcohol_policy Dummy_strict_alcohol_policy
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS HISTOGRAM(ZRESID)
  /SAVE ZRESID.
* In the histogram we can see that the residuals are not normally distributed. This was
expected after examining the dependent variable.
```

* But just to be sure, I will also do a normality test (kolmogorov-Smirnov) by testing the saved standardized residuals.

```
* Checking normality by exploring the standardized residuals.
EXAMINE VARIABLES=ZRE_1
  /PLOT HISTOGRAM NPPLOT
  /STATISTICS DESCRIPTIVES
  /CINTERVAL 95
  /MISSING LISTWISE
  /NOTOTAL.
```

* The histogram is of course the same as we saw before, but now we also can see formal test results.
* The formal test results, show that the residuals are not normally distributed (kolmogorov-Smirnov test statistic = .168, df = 5152, $p < .001$).
* As the residuals are not normally distributed an assumption of the linear regression model is not met.
* A solution could be to recode the dependent variable into a binary variable where two groups are compared. If we do this, then we could perform a logistic regression.
* Or we could recode the dependent variable into three age of alcohol onset groups and do a multinominal logistic regression analysis.

```
* Creating new variable which separates three groups. 1 group is the young age of alcohol onset group, 1 group is the late age of alcohol onset group, and 1 group is the group that have never drunk alcohol.
DATASET ACTIVATE DataSet1.
RECODE alcohol_onset (1=2) (2=0) (3=0) (4=0) (5=0) (6=1) (7=1) INTO Group_age_alcohol_onset.
VARIABLE LABELS  Group_age_alcohol_onset 'Group age of alcohol onset'.
EXECUTE.

* creating the value labels of the group age alcohol onset variable.
VALUE LABELS
Group_age_alcohol_onset
0 young age of alcohol onset
```

```
1 late age of alcohol onset
2 never drunk alcohol.
EXECUTE.

* Frequencies of new created variable group age alcohol onset.
FREQUENCIES VARIABLES=Group_age_alcohol_onset
  /STATISTICS=STDDEV MEAN
  /ORDER=ANALYSIS.
```

* The young age of alcohol onset group and the never drunk alcohol group are almost equal in size. The late age of alcohol onset group is smallest in size.

```
* crosstab with group age alcohol onset & strictness alcohol policy.
CROSSTABS
  /TABLES=Group_age_alcohol_onset BY Strictness_alcohol_policy
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT COLUMN
  /COUNT ROUND CELL.
```

* in the lenient & medium strict alcohol policy most people are in the young age of alcohol group. In the strict alcohol policy most people are in the never drunk alcohol group.
* The late age of alcohol group is the smallest group in all strictness of alcohol policy groups.

```
* split file by strictness of alcohol policy.
SORT CASES  BY Strictness_alcohol_policy.
SPLIT FILE LAYERED BY Strictness_alcohol_policy.

* descriptives with split file on.
DESCRIPTIVES VARIABLES=AGE Psychosomatic_symptoms FAS
  /STATISTICS=MEAN STDDEV MIN MAX.
```

* The mean value of age is highest in the medium strict alcohol policy.
* The mean value of psychosomatic symptoms is highest in the strict alcohol policy and lowest in the lenient alcohol policy.
* The mean value of family affluence is highest in the strict alcohol policy and lowest in the medium strict alcohol policy.

```
* frequencies with split file on.
FREQUENCIES VARIABLES=Group_age_alcohol_onset Dummy_girl
  /STATISTICS=STDDEV MEAN
  /ORDER=ANALYSIS.
```

* In the lenient and medium strict alcohol policy most participants had a young age of alcohol onset, while in the strict alcohol policy most participants have never drunk alcohol.
* There doesn't seem to be that much difference in the lenient and medium strict alcohol policy.
* Most participants are girls in all the different alcohol policies.

```
* split file off.
SPLIT FILE OFF.
```

```
* split file by dependent variable.
SORT CASES  BY Group_age_alcohol_onset.
SPLIT FILE LAYERED BY Group_age_alcohol_onset.
```

```
* frequencies with split file on.
FREQUENCIES VARIABLES=Dummy_girl Strictness_alcohol_policy
  /ORDER=ANALYSIS.
```

* The early and late onsetters consisted of more girls than boys, while the non-drinkers consisted of slightly more boys than girls.
* the frequencies of strictness of alcohol policy are not really helpfull because of the fact that most participants (around 50% of the participants) are living in a strict alcohol policy.
* Therefore all percentages are highest in the strict alcohol policy group. But what you can see is that in the early onsetters group the difference isn't that big with the lenient and medium strict alcohol policy.

```
* descriptives with split file on.
DESCRIPTIVES VARIABLES=AGE FAS Psychosomatic_symptoms
  /STATISTICS=MEAN STDDEV MIN MAX.
```

* The mean value of family affluence is highest in the non-drinkers group, the mean value of family affluence is almost equal in the early onsetters and late onsetters groups.

* The mean value of psychosomatic symptoms is highest in the early onsetters group and lowest in the non-drinkers group.

```
*split file off.
SPLIT FILE OFF.

* Examining histogram of variable psychosomatic symptoms.
GRAPH
  /HISTOGRAM=Psychosomatic_symptoms.
```

* This variable doesn't look to be normally distributed so we can't use a Pearson correlation for this variable, but we should use a Spearman correlation.

```
* Examining histogram of variable family affluence scale.
GRAPH
  /HISTOGRAM=FAS.
```

* This variable is not perfectly normally distributed, but I would say that the distribution is good enough to be considered as normally distributed.
* But since all the other variables aren't at interval or ratio level or are measured at that level but aren't normally distributed, we have to use Spearman correlations for all variables.
* I haven't checked the variable age even though this is normally seen as a interval variable, but since we only include participants with an age above 14.99, we only have participants that are 15 and 16 years old.

```
* Examining spearman correlations.
NONPAR CORR
  /VARIABLES=Group_age_alcohol_onset FAS Psychosomatic_symptoms
    Strictness_alcohol_policy Dummy_girl AGE
  /PRINT=SPEARMAN TWOTAIL NOSIG
  /MISSING=LISTWISE.

* computing interaction term. Centered psychosomatic symptoms multiplied by dummy medium strict alcohol policy.
COMPUTE
CPS_x_MSAP=Centered_psychosomatic_symptoms*Dummy_mediumstrict_alcohol_policy.
```

```
VARIABLE LABELS  CPS_x_MSAP 'Centered variable psychosomatic symptoms
multiplied by dummy variable medium strict alcohol policy'.
EXECUTE.

* computing interaction term. Centered psychosomatic symptoms multiplied by dummy strict
alcohol policy.
COMPUTE
CPS_x_SAP=Centered_psychosomatic_symptoms*Dummy_strict_alcohol_policy.
VARIABLE LABELS  CPS_x_SAP 'Centered variable psychosomatic symptoms multiplied
by dummy variable '+
    'strict alcohol policy'.
EXECUTE.

* multiple linear regression analysis to test the assumption multicollineairity and to save
cook's distance to check for possible outliers.
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS COLLIN TOL
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Group_age_alcohol_onset
  /METHOD=ENTER AGE FAS Dummy_girl
  /METHOD=ENTER Psychosomatic_symptoms
  /METHOD=ENTER Dummy_mediumstrict_alcohol_policy Dummy_strict_alcohol_policy
  /SAVE COOK.
* VIF values are all around 1 so this means that there is no multicollinearity and we meet this
assumption.

* inspected cook's distance by sorting cases (descending). No case has a cook's distance above
1 so this means that there are no outliers.

* Creating new variable to test for the assumption of linearity of logit.
* the natural log transformation of the variable psychosomatic symptoms is created.
COMPUTE LnPS=LN(Psychosomatic_symptoms).
```

```
VARIABLE LABELS  LnPS 'LN psychosomatic symptoms'.
EXECUTE.

* Creating new variable to test for the assumption of linearity of logit.
* the natural log transformation of the variable FAS is created.
COMPUTE LnFAS=LN(FAS).
VARIABLE LABELS  LnFAS 'LN family affluence scale'.
EXECUTE.

* creating interaction variable to test assumption linearity of the logit (psychosomatic
symptoms).
COMPUTE LnPS_x_PS=LnPS * Psychosomatic_symptoms.
VARIABLE LABELS  LnPS_x_PS 'log psychosomatic symptoms multiplied by
psychsomatic symptoms'.
EXECUTE.

* creating interaction variable to test assumption linearity of the logit (FAS).
COMPUTE LnFAS_x_FAS=LnFAS * FAS.
VARIABLE LABELS  LnFAS_x_FAS 'log family affluence multiplied by family affluence'.
EXECUTE.

*testing assumption linearity of the logit.
NOMREG Group_age_alcohol_onset (BASE=FIRST ORDER=ASCENDING) BY
Strictness_alcohol_policy WITH AGE
    Dummy_girl FAS Psychosomatic_symptoms LnPS_x_PS LnFAS_x_FAS
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
    SINGULAR(0.00000001)
  /MODEL
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=PARAMETER SUMMARY LRT CPS STEP MFI.
```

* 1 of the interactions is significant. The interaction of the LN psychosomatic symptoms x psychosomatic symptoms is significant when early onsetters are being compared to non-drinkers.
* All the other 3 interactions (1 more of psychosomatic symptoms and 2 of family affluence) are not significant.
* So as 1 of the interactions is significant we have not completely met this assumption. This should be kept in mind.

```
*multinominal regression model 1 control variables.
NOMREG Group_age_alcohol_onset (BASE=FIRST ORDER=ASCENDING) WITH AGE
FAS Dummy_girl
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
    SINGULAR(0.00000001)
  /MODEL
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=PARAMETER SUMMARY LRT CPS STEP MFI.
```

* When comparing early onsetters to late onsetters, age is a significant predictor.
* When comparing early onsetters to non-drinkers, gender and family affluence are significant predictors.

```
* multinominal regression model 2 control variables and psychosomatic symptoms.
NOMREG Group_age_alcohol_onset (BASE=FIRST ORDER=ASCENDING) WITH AGE
FAS Dummy_girl
    Psychosomatic_symptoms
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
    SINGULAR(0.00000001)
  /MODEL
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
```

```
  /PRINT=PARAMETER SUMMARY LRT CPS STEP MFI.
```

* When comparing early onsetters to late onsetters and when comparing early onsetters to non-drinkers, psychosomatic symptoms is a significant predictor.

* multinominal regression model 3 control variables, psychosomatic symptoms, strictness of alcohol policy and first interaction.

```
NOMREG Group_age_alcohol_onset (BASE=FIRST ORDER=ASCENDING) BY
Strictness_alcohol_policy WITH AGE
    FAS Dummy_girl Psychosomatic_symptoms CPS_x_MSAP
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
    SINGULAR(0.00000001)
  /MODEL
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=PARAMETER SUMMARY LRT CPS STEP MFI.
```

* Strictness of alcohol policy is a significant predictor in both parts of the model.
* the interaction (moderator) is not significant in both parts of the model. Although when comparing early onsetters to non-drinkers the interaction was almost significant (p=.05).

* multinomial regression model 3 but with the other interaction (dummy strict alcohol policy * centered psychosomatic symptoms) in place.

```
NOMREG Group_age_alcohol_onset (BASE=FIRST ORDER=ASCENDING) BY
Strictness_alcohol_policy WITH AGE
    FAS Dummy_girl Psychosomatic_symptoms CPS_x_SAP
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20)
LCONVERGE(0) PCONVERGE(0.000001)
    SINGULAR(0.00000001)
  /MODEL
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE)
ENTRYMETHOD(LR) REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=PARAMETER SUMMARY LRT CPS STEP MFI.
```

* the interaction is significant but only when early onsetters are being compared to non-drinkers (p = .048).

```
* Oneway anova with dummy girl and age of alcohol onset.
DATASET ACTIVATE DataSet1.
ONEWAY Dummy_girl BY Group_age_alcohol_onset
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS.
```

* Assumption of homogeneity of variance is not met, so we should check Brown-Forsythe F.

```
* Oneway anova with dummy girl and age of alcohol onset and Brown-Forsythe F.
ONEWAY Dummy_girl BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS.
```

* Brown-Forsysth F is significant, F(2, 4503.92) = 9.39, p < .001. So we should do a post-hoc to see which groups differ.

* As the group sizes are unequal I will choose to use Games-Howell.

```
* Post hoc Games-Howell.
ONEWAY Dummy_girl BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS
  /POSTHOC=GH ALPHA(0.05).
```

* Early onsetters and late onsetters do not significantly differ. However non-drinkers differ significantly with early onsetters and non-drinkers.

```
* Oneway anova with age and age of alcohol onset.
ONEWAY AGE BY Group_age_alcohol_onset
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS.
```

* Levene's test is significant so we will check Brown-Forsythe F again.

```
* Oneway anova with age and age of alcohol onset and Brown-Forsythe F.
ONEWAY AGE BY Group_age_alcohol_onset
```

```
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS.
```

* Brown-Forsysth F is significant, F(2, 4368.93) = 66.61, p < .001. We will do a post hoc again (Games-Howell).

```
* Post hoc Games-Howell.
ONEWAY AGE BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS
  /POSTHOC=GH ALPHA(0.05).
```

* Early onsetters and non-drinkers do not differ. However late onsetters differ from early onsetters and non-drinkers.

```
* Oneway anova with family affluence and age of alcohol onset.
ONEWAY FAS BY Group_age_alcohol_onset
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS.
```

* Levene's test is significant again so we will check Brown-Forsythe.

```
* Oneway anova with family affluence and age of alcohol onset and Brown-Forsythe F.
ONEWAY FAS BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS.
```

Brown-Forsysth F is significant, F(2, 4140.95) = 6.11, p = .002. We will do a post hoc again (Games-Howell).

```
* Post hoc Games-Howell.
ONEWAY FAS BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS
  /POSTHOC=GH ALPHA(0.05).
```

* Late onsetters do not differ from early onsetters and non-drinkers. However non-drinkers differ from early onsetters.

```
* Oneway anova with psychosomatic symptoms and age of alcohol onset.
ONEWAY Psychosomatic_symptoms BY Group_age_alcohol_onset
  /STATISTICS DESCRIPTIVES HOMOGENEITY
  /MISSING ANALYSIS.
* Levene's test is significant again so we will check Brown-Forsythe.

* Oneway anova with psychosomatic symptoms and age of alcohol onset and Brown-Forsythe F.
ONEWAY Psychosomatic_symptoms BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS.
```

Brown-Forsysth F is significant, $F(2, 4037.66) = 65.57$, $p < .001$. We will do a post hoc again (Games-Howell).

```
* Post hoc Games-Howell.
ONEWAY Psychosomatic_symptoms BY Group_age_alcohol_onset
  /STATISTICS BROWNFORSYTHE
  /MISSING ANALYSIS
  /POSTHOC=GH ALPHA(0.05).
* All groups differ significantly from each other. So early onsetters differ from late onsetters and non-drinkers. Furthermore late onsetters and non-drinkers differ.
```

**Appendix 2: Contract data use (TED)**

Utrecht, 2020

This letter constitutes formal confirmation of the fact that the data from the Utrecht University Youth Studies 2019/2020 have been made available to Aletta Kroon of Utrecht University.

These data will not be made available to others, and the data may be used only for analysis and reporting on topics for the thesis, about which agreement has been reached with Gonneke Stevens.

Aletta Kroon will receive access to the data from the dataset in order to answer the following research questions within the framework of the thesis:

Research question: To what extent is there an association between psychosomatic symptoms of adolescents and age of alcohol onset, and is this association moderated by strictness of alcohol policy?

The following variables will be used:

Dependent variable: age of alcohol onset (drinking alcohol initiation) MQ26

Independent variables: psychosomatic symptoms (health complaints) MQ 55, strictness of alcohol policy: I want to compare Sweden (strict alcohol policy), Poland (medium strict alcohol policy) and the Netherlands (lenient alcohol policy)

Other variables: gender MQ1, age MQ3-4, family affluence MQ64-69

No report based on the data from the project entitled Health Behaviour in School-Aged Children (HBSC) 2013/2014 Survey may be made public, unless permission has been obtained in advance from the Project Coordinator for the Health Behaviour in School-Aged Children (HBSC) 2013/2014 Survey

After the expiration of this contract, dated 01-09-2020, Aletta Kroon shall delete the Health Behaviour in School-Aged Children (HBSC) 2013/2014 Survey data.

Dates and signature: 23-01-2020

Name of student: Aletta Kroon

Name of Project Coordinator: Gonneke Stevens

## Appendix 3: Igitur form

### Information about your thesis

Please save this form, modify it and e-mail it to your supervisor together with the digital final version of your thesis. For further questions see: http://studion.fss.uu.nl/helpdesk/student/scrol

| | |
|---|---|
| Student nummer: | 5726972 |
| Initials & prefixes: | A |
| Family name: | Kroon |
| Master: | Youth Studies |

*Begeleider*

| | |
|---|---|
| Name supervisor/assesor: * | Ina Koning |
| Name 2th assesor: | Tom ter Bogt |

*Scriptie*

| | |
|---|---|
| Title thesis: * | Psychosomatic Symptoms of Adolescents and Age of Alcohol Onset: Examining the Moderating Role of Strictness of Alcohol Policy |
| Language thesis: * | English |
| Abstract: | Drinking at an early age can have severe health and social consequences, which highlights the need to identify factors that predict an early age of alcohol onset. One of these relevant predictors might be psychosomatic symptoms of adolescents as adolescents might cope with their symptoms by drinking alcohol. As the impact of psychosomatic symptoms on alcohol onset might depend on national legal regulations regarding alcohol consumption, the present cross-national study examined the association between psychosomatic symptoms and age of alcohol onset and if this association differs according to the strictness of three national alcohol policies (strict, medium strict and lenient). Data consisted out of 5152 adolescents aged fifteen and sixteen who participated in the 2013-2014 Swedish, Polish and Dutch Health Behavior in School-aged Children (HBSC) study. As expected, multinomial logistic regression analyses revealed that more psychosomatic symptoms increased the risk of an early age of alcohol onset. Furthermore, this association was weakest in a strict alcohol policy. In supporting adolescents to cope with their psychosomatic symptoms, interventions should, in addition to reducing and preventing psychosomatic symptoms, aim to teach adolescents different and more effective coping strategies to increase the age of alcohol onset. |
| Key words: (seperated by ;) | *psychosomatic symptoms; alcohol onset; adolescents; strictness of alcohol policies* |

| | |
|---|---|
| Make public: * | Yes |
| Make public after date: | |

Ingevuld op: * 15-06-2020
Door: * Aletta Kroon

* = Obliged to fill in

**Appendix 4: Interdisciplinary approach**

The present study examined the association between psychosomatic symptoms and age of alcohol onset and whether this association is moderated by strictness of alcohol policy. Individuals who start to drink at a young age are at a much higher risk for developing alcohol abuse and dependence than individuals who start to drink at a later age (DeWit, Adlaf, Offord, & Ogborne, 2000). Therefore, the need exists to identify predictive factors of an early age of alcohol onset. There are many factors related to the age of alcohol onset and these factors can be classified into different levels of influence that are central in Bronfenbrenner's ecological model. This ecological model emphasizes that behavior shapes and is shaped by multiple levels of influence (Bronfenbrenner, 1977). Bronfenbrenner's ecological model makes a distinction between the following levels of influence: the individual, the microsystem, the mesosystem, the exosystem and the macrosystem (Bronfenbrenner, 1977). At the individual level, gender has been found as a factor related to adolescents alcohol use (Hong, Lee, Grogan-Kaylor, & Huang, 2011). On average, boys start drinking at an earlier age than girls (Inchley et al., 2016). At the microsystem level, deviant peers have found to be associated with an early age of alcohol initiation (Trucco, Colder, Wieczorek, Lengua, & Hawk, 2014). Furthermore the results of Trucco et al. (2014) indicate that associations with deviant peers lead to decreased quality of parenting. This can be seen as a level of influence at the mesosystem. At the exosystem level, neighborhoods have been found to be associated with adolescents alcohol use (Ennett et al., 2008). At the macrosystem level, parenting practices have been identified as an important factor for adolescents alcohol use (Hong et al., 2011). The present study examined the role of psychosomatic symptoms and strictness of alcohol policy in explaining age of alcohol onset. Psychosomatic symptoms can be seen as a factor at the individual level, while the strictness of alcohol policy of countries can be seen as a factor at the macrolevel.

Interdisciplinarity is defined as "the cognitive scientific process by which individuals draw on disciplinary perspectives and integrate their insights to advance their understanding of a complex problem with the goal of applying the understanding to a real-world problem" (Repko, Szostak, & Buchberger, 2014, p. 28). The present study was at the intersection of the individual and macrolevel, as it addressed psychosomatic symptoms (individual level) as well as different alcohol policies of societies (macrolevel). Therefore, it can be said that this study used an interdisciplinary approach as it integrated insights of different levels of influence.

**Literature**

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, *32*, 513-531. doi:10.1037/0003-066X.32.7.513

DeWit, D. J., Adlaf, E. M., Offord, D. R., & Ogborne, A. C. (2000). Age at first alcohol use: a risk factor for the development of alcohol disorders. *American Journal of Psychiatry, 157*, 745-750. doi:10.1176/appi.ajp.157.5.745

Ennett, S. T., Foshee, V. A., Bauman, K. E., Hussong, A., Cai, L., Reyes, H. L. M., ... & DuRant, R. (2008). The social ecology of adolescent alcohol misuse. *Child Development, 79*, 1777-1791. doi:10.1111/j.1467-8624.2008.01225.x

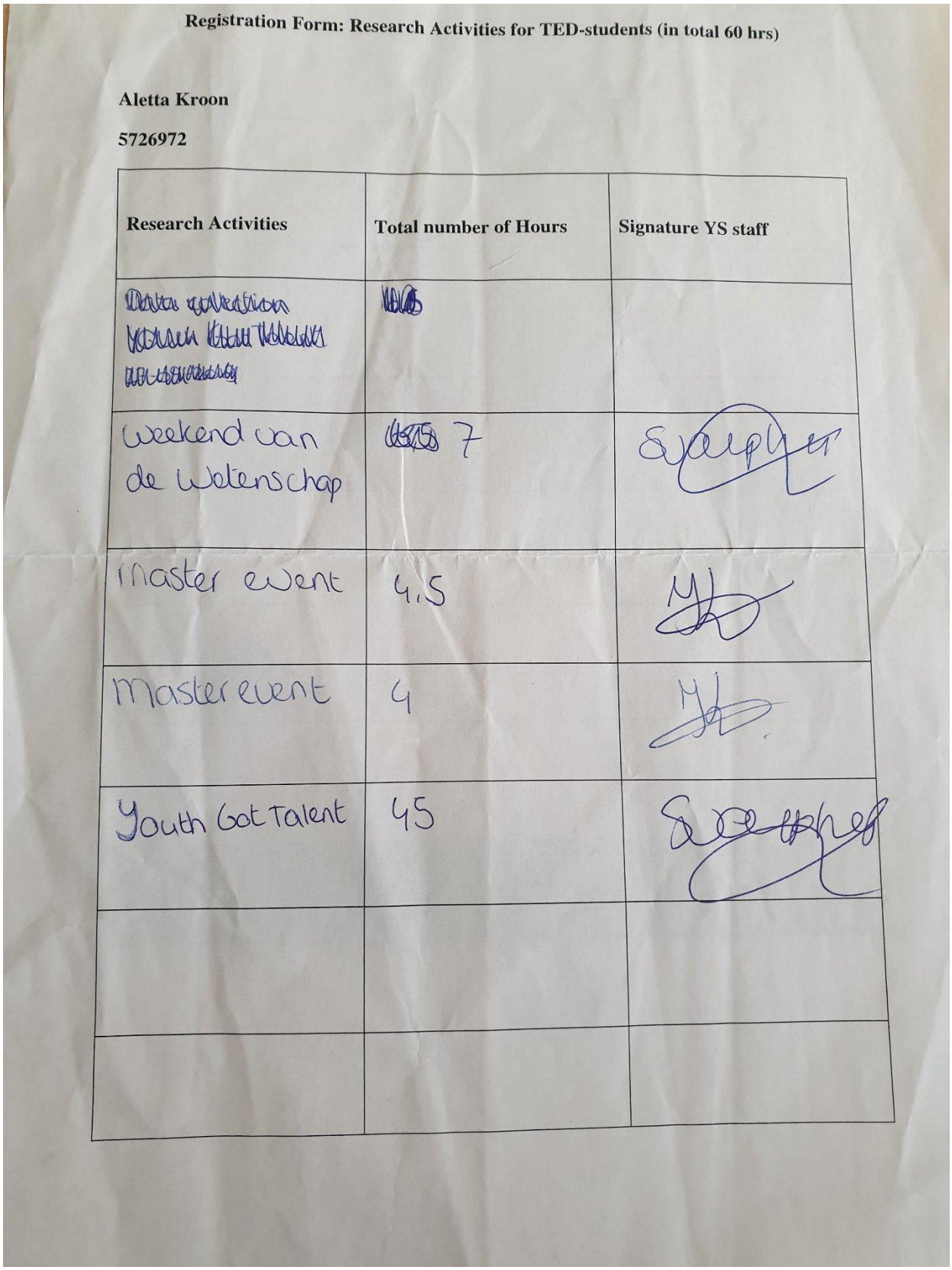
Hong, J. S., Lee, N. Y., Grogan-Kaylor, A., & Huang, H. (2011). Alcohol and tobacco use among South Korean adolescents: An ecological review of the literature. *Children and Youth Services Review, 33,* 112-1126. doi:10.1016/j.childyouth.2011.02.004

Inchley, J., Currie, D., Young, T., Samdal, O., Torsheim, T., Augustson, L., … & Barnekow, V. (2016). *Growing up unequal: Gender and socioeconomic differences in young people's health and wellbeing. Health Behaviour in School-aged Children (HBSC) study: international report from the 2013/2014 survey*. Retrieved from: http://www.euro.who.int/__data/assets/pdf_file/0003/303438/HSBC-No.7-Growing-up-unequal-Full-Report.pdf

Repko, A.F., Szostak, R., Buchberger, M.P. (2014). *Introduction to Interdisciplinary Studies*. Thousand Oaks: SAGE Publications, p. 28.

Trucco, E. M., Colder, C. R., Wieczorek, W. F., Lengua, L. J., & Hawk, L. W. (2014). Early adolescent alcohol use in context: How neighborhoods, parents, and peers impact youth. *Development and Psychopathology*, *26*, 425-436. doi:10.1017/S0954579414000042

**Appendix 5: Research activities for data collection hours**



**Registration Form: Research Activities for TED-students (in total 60 hrs)**

**Aletta Kroon**

**5726972**

| Research Activities | Total number of Hours | Signature YS staff |
|---|---|---|
| [illegible] | [illegible] | |
| weekend van de Wetenschap | 7 | |
| master event | 4.5 | |
| Master event | 4 | |
| Youth Got Talent | 45 | |
| | | |
| | | |