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# **THE ADOLESCENT DRINKER: CORRELATES AND PREDICTORS OF ALCOHOL CONSUMPTION AMONG SWEDISH YOUTH**

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# The adolescent drinker: Correlates and predictors of alcohol consumption among Swedish youth

## Thesis for Doctoral Degree (Ph.D.)

By

**Lars Sjödin**

The thesis will be defended in public at Atriumsalen, Nobels väg 12B, Solna, on the 1<sup>st</sup> of December 2023, at 10 AM.

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## Populärvetenskaplig sammanfattning på svenska

Allt färre ungdomar dricker alkohol. Bland dem som dricker konsumeras mindre mängder än hos tidigare generationer. Denna utveckling har pågått sedan millenniumskiftet och har observerats i de flesta höginkomstländer. Samtidigt är det fortfarande många ungdomar som dricker. Alkoholkonsumtion är förenat med en lång rad av skador, sociala problem och negativa konsekvenser. Det är därför viktigt att undersöka olika faktorer som hänger samman med drickande. Den här avhandlingen bidrar med ny kunskap på området genom att fokusera på motiv bakom drickandet och hur olika former av tillit kan kopplas till ungdomars alkoholanvändning. Därtill utforskas hur psykosociala faktorer och debutålder hänger ihop med drickande över tid.

En omfattande skolenkät riktad till ungdomar i nionde klass har genomförts över hela Sverige och följts upp två år senare. Svenska ungdomar drack främst av sociala och förhöjande (njutningsfulla) skäl. Graden av sådan motivation hängde också samman med hur ofta de drack. Tillit till samhällets institutioner och tillit till människor i allmänhet var också starkt sammankopplat med att avstå alkohol i tonåren. De som inte drack hade bättre psykisk hälsa och mer nöjda relationer till sina föräldrar, men också sämre relationer till vänner och jämnåriga. Tidiga drickare hade sämst psykosocial situation. Åldern för alkoholdebut hade ett starkt samband med hur mycket ungdomarna drack. Tidig debutålder var nära förknippat med ökat drickande i sena tonåren.

Alkoholkonsumtion i tonåren har stor social betydelse, men har även koppling till hur ungdomar mår. De som börjar dricka alkohol tidigt är en sårbar grupp som är särskilt utsatta för en mängd olika problem. Tidigt drickande föranleder också ökat drickande i sena tonåren. För att förhindra att ungdomar dricker bör fokus ligga på att förbättra relationerna till föräldrar, bygga upp tillit och förbättra deras psykiska hälsa. Om tidigt drickande förhindras kan alkoholkonsumtionen hos ungdomar i sena tonåren sannolikt minskas.

## Popular science summary of the thesis

Fewer adolescents are drinking today, and the consumption among those who do drink is considerably lower than amongst previous generations. The non-drinking trend is observed in most high-income countries and is traced back to the turn of the millennium. Despite the declining trend, drinking remains common in adolescence. Alcohol intake is related to a vast number of harms, social problems, and negative consequences. For this reason, studying different factors related to drinking is crucial. This thesis contributes to this issue by exploring how drinking motives and forms of trust are connected to adolescent drinking, and furthermore how psychosocial factors and the age of drinking onset relate to alcohol use in this age group.

A nationwide survey was carried out among Swedish adolescents aged 15/16 years, with a follow-up two years later. The papers in this thesis rely on analyses of self-reported questionnaires. Adolescents in Sweden were mainly driven by social and enhancement motives to drink, and these motivations were closely related to how often they were drinking. Trust towards institutions of society, and people in general, were linked to adolescents' abstaining from drinking. Abstaining from alcohol was also associated with worse relationships with friends, yet also better mental health and more satisfied relationships with parents. Early drinkers reported the least favorable psychosocial conditions, and an early onset was related to higher consumption in late adolescence.

Drinking during adolescence has major social importance and is linked with overall well-being. Early drinkers are a particularly vulnerable group exposed to unfavorable conditions and multiple problems. An early drinking onset predicts increased drinking in late adolescence. To prevent youth drinking, a focus should be on improving relationships with parents, building trust, and supporting their mental health. Available healthier activities that are social, fun, and exciting may substitute for drinking. If early drinking is prevented, alcohol consumption in late adolescence can likely be reduced.

# Abstract

**Background:** Drinking among adolescents has declined in most high-income countries during the past two decades. In Sweden, the reduction in youth drinking has been more pronounced than in many other parts of the world. The lower alcohol consumption has been reflected in several indicators. However, many adolescents still drink, and there is an urgency to understand the current situation in light of the non-drinking trend. The studies in this thesis examine concurrent and longitudinal factors not previously examined in a Swedish context.

**Overall aim:** The overarching objective of this thesis is to improve our understanding of alcohol use during mid and late adolescence among contemporary youth. The four studies included in this thesis address this aim by answering the following research questions: (I) What are the motivations for drinking, and how are motives associated with drinking? (II) How are general and institutional trust associated with drinking? (III) How are psychosocial factors related to two-year drinking status? and (IV) Does the age of onset have an independent effect on subsequent drinking?

**Data and method:** All studies of this thesis exploited data from the Futura01 project. Since 2017, this project has followed a cohort of Swedish adolescents born in 2001. A self-reporting school survey was carried out at baseline (T1), and at a follow-up (T2) in 2019, when the respondents were 15/16 and 17/18 years, respectively. At T1, 5,537 individuals (81.7%) participated; at T2, 4,018 individuals (72.4%) participated. Multivariable linear and logistic regression models examined associations with alcohol use.

**Results:** (I) Social and enhancement motives were most strongly associated with drinking frequency, whereas enhancement motives had the strongest association with heavy drinking frequency. Coping-depression motives also

had a positive but weaker link with drinking and heavy drinking frequency. Conformity motives were negatively related to how often adolescents drank.

(II) General and institutional trust was found to be negatively associated with drinking status, and institutional trust had the stronger link. Cross-combinations with low scores on both trust dimensions were related to the highest probability of drinking. Parental control and support, along with school satisfaction, modified the associations.

(III) Abstainers reported better mental health and parental relationships, and worse friendships, whereas the opposite was true for early-onset drinkers. Later-onset drinkers were linked to a more favorable psychosocial situation than early drinkers.

(IV) An early drinking onset predicted higher alcohol consumption two years later. Those with the earlier onset scored higher on AUDIT-C and had a higher probability of risky and binge drinking in late adolescence. Early binge drinking was found to be more predictive of later binge drinking than the age of onset of any drinking. Those with early drinking onset were more exposed to risk factors.

### **Conclusions:**

Adolescents' motivations for drinking are closely related to their consumption of alcohol. The social aspects of drinking are supported by the links between different forms of trust and alcohol use, in addition to patterns of parent/friend relationships and drinking status in adolescents. Early drinkers are a psychosocially vulnerable group burdened with numerous problems and risk factors for alcohol use. An early drinking onset is also related to more alcohol use in late adolescence. To prevent youth drinking, it is important to improve parent-child relationships, build trust, and support mental health. Preventing early drinking likely reduces alcohol consumption in late adolescence.

## List of scientific papers

- I. Sjödin, L., Larm, P., Karlsson, P., Livingston, M., & Raninen, J. (2021). Drinking motives and their associations with alcohol use among adolescents in Sweden. *Nordic Studies on Alcohol and Drugs*, 38(3), 256–269.
  
- II. Sjödin, L., Livingston, M., Karlsson, P., Larm, P., & Raninen, J. (2022). Associations between trust and drinking among adolescents. *Drug and Alcohol Review*, 41(1), 221–229.
  
- III. Sjödin, L., Karlsson, P., & Raninen, J. (2023). Psychosocial correlates of drinking transitions: A longitudinal study among adolescents in Sweden. *Drug and Alcohol Review*, Advance online publication.
  
- IV. Sjödin, L., Raninen, J. & Larm, P. Early drinking onset and subsequent alcohol use in late adolescence: A longitudinal study of drinking patterns. Submitted.



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# 1 INTRODUCTION

Adolescent drinking in Sweden has undergone a remarkable decline since the turn of the millennium. This major drop has resulted in the proportion of consumers in certain age groups falling by more than half. For example, the share of Swedish 9th graders (age 15/16) who had consumed alcohol was 81% in 2000, while in 2022, the corresponding number was 38% [1]. Such low alcohol consumption among adolescents as that seen today has not been observed during the 50 years of surveys in Sweden. Decreased drinking is also reflected in various indicators besides the share of alcohol consumers/abstainers: drinking frequency, drinking quantity, binge drinking, age of drinking onset, and per capita alcohol consumption [1–5]. The research behind this doctoral thesis examined risk and protective factors for, and outcomes of, adolescent drinking in the wake of this drop in alcohol consumption.

The declining trend in youth drinking has not been an anomaly limited to Sweden. Adolescent drinking has declined in most high-income countries [6–8], although the timing, magnitude, and stability vary between countries [8]. Nordic countries and the British Isles have reported the steepest declines, while Eastern and Southern Europe have generally experienced a later peak and a more gentle downward slope [9]. The trend of declining alcohol consumption in adolescents likely started in North America during the late 90s. It was noted in Northern Europe at the beginning of the 2000s and subsequently in Western Europe, Australia, and Asia a few years later [9]. The broad nature of this phenomenon suggests a widespread cultural shift in the younger generations' approach to alcohol. The vastness of this change has led some researchers to speak about a "sober generation" [7, 10, 11]. However, whether today's adolescents persist as "Generation Dry" in future remains to be seen. This development has been surprising for Sweden, as adolescent drinking has traditionally been in sync with adult alcohol consumption. However, shortly before the new millennium, adolescents took a separate pathway and

decoupled from the tendency in the general adult population [3]. The proportion of drinkers in the Swedish general adult population has been relatively stable, with slight decreases during the last two decades, with fewer younger adults and more older adults drinking [12].

A significant event in Sweden during the mid-90s was expected to increase alcohol consumption among adolescents. Sweden became a member of the European Union (EU) in 1995, which resulted in a more liberal and commercialized alcohol policy in the following years that challenged strict alcohol regulation [13-15]. For the general population in Sweden, this meant that alcohol became both cheaper and more available. All predictions pointed to increased drinking, which made adolescents' increasingly restrictive approach to alcohol highly unexpected.

Health and risk behaviors are often clustered together and appear as syndromes or lifestyles [16-18] and trends thus tend to change together in interconnected ways [19]. Other trends in adolescents behaviors accompany the non-drinking trend [20]. For example, young people's smoking has undergone a steep decline during the last two decades. In 2000, 66% of Swedish 15/16-year-olds had smoked during the past year, whereas this share had dropped to 24% in 2022 [1]. Declining youth crime rates have also been reported during the same time period. The prevalence of all sorts of offenses, including minor delinquency, violence, and property crime, has dropped in frequency by about 50% from 1999 to 2017 among 15-year-olds in Sweden [21]. In line with the drinking trends, the drop in smoking, crime, and other risk behaviors is visible in a number of countries in Western Europe, North America, and Oceania [20-23]. A marked decline in other activities related with adulthood, such as having sexual intercourse, getting a driver's license, and working for pay, has also been observed in the US since the new century [24-26]. Altogether, such large-scale changes suggest that the modern adolescent is somewhat different from previous generations' adolescent [20, 22]. These

developments form the backdrop for this doctoral project. However, the aim of this thesis is not to study these changes per se, and it will not focus on circumstances before or during the declining period. Rather, it surveys the new landscape of adolescent drinking and charts today's setting, as drinking is still common in this age group.

With a focus on psychosocial aspects and the age of onset from a population perspective, the studies contribute to this field of research by examining less thoroughly explored topics related to adolescent drinking. Each of the studies will address knowledge gaps in the literature. Two of the four included studies cross-sectionally examine how the motivation behind drinking and how general and institutional trust are related to alcohol use at age 15/16. The other two studies focus on how psychosocial factors and how the age of drinking onset are related to longitudinal status and patterns of drinking from age 15/16 to 17/18.

## **2 LITERATURE REVIEW**

This literature review will serve as a background to the research field in which this thesis is located. This will be done by providing a comprehensive overview of different aspects that have relevance to adolescent drinking. The knowledge described in this chapter will complement the more specific details on the subjects put forward in each individual study included. The chapter will start with what the drinking patterns look like among the Swedish general population, and in more in detail, how adolescents drink in Sweden. This will be followed by summaries of drinking culture, trends in drinking preferences, and variation over the life course to sketch a broad picture of adolescent drinking as a field of study. Then, the characteristics of the adolescent life phase are described, along with the consequences of drinking, and alcohol prevention and policy. I further touch on risk and protective factors, addressing knowledge gaps in the current literature, and lastly I put forward theories of relevance to this topic.

## **2.1 Alcohol use in the general and adolescent population**

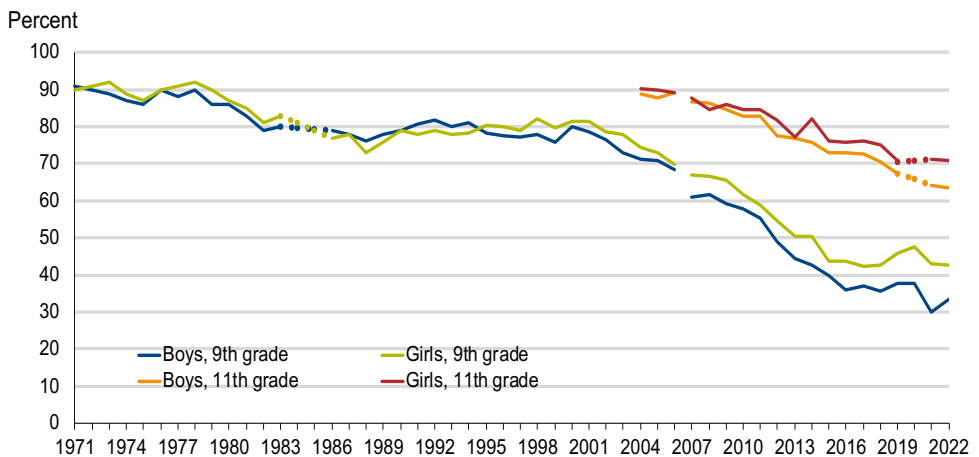
### **2.1.1 Adult prevalence, pattern, and sociodemography**

Alcoholic beverages are the drugs of choice in the Western world. Alcohol consumption is deeply embedded in the cultural fabric by norms, traditions, and ways to socialize. A survey coordinated by the World Health Organization (WHO) in 2016 found that the majority of adults (15+) in Europe, the Western Pacific, and the Americas had consumed alcohol at least once within the last 12 months [27]. In Sweden, surveys in 2021 found that about 85% of the population (age 17–84) had been drinking during the past year [28], and 75% had been drinking during the past month [12]. The average number of drinking occasions was about five times a month for the general population, while the average was three and a half times for the youngest group aged 17–29. Over the year, consumption in Sweden is highest during typical vacation periods, from June to August, and in December. Day to day, consumption peaks on weekends, with the highest on Saturdays, followed by Fridays, while Mondays are the least typical day to drink [12]. The highest consumption is located in larger cities, followed by medium-sized towns and smaller rural villages. Men drink in general more than women, and foreign-born residents drink less than those born in Sweden. People with higher education generally drink more often than those with lower education [12].

### **2.1.2 Prevalence and trends in Swedish adolescents' drinking**

Intake of alcohol is a behavior for which age-appropriateness is ensured by purchase restrictions in nearly all countries [27]. Underage drinking is common, however, and many adolescents try alcohol before they reach the legal age. Most start drinking during the adolescent phase and have started drinking by the time they reach adulthood [29]. In Sweden, the majority take up drinking between the age of 15 and 18 [30]. In 2022 (see Figure 1), just below 40% of adolescents in Sweden had been drinking at age 15/16, and the corresponding number at age 17/18 was around 70%.

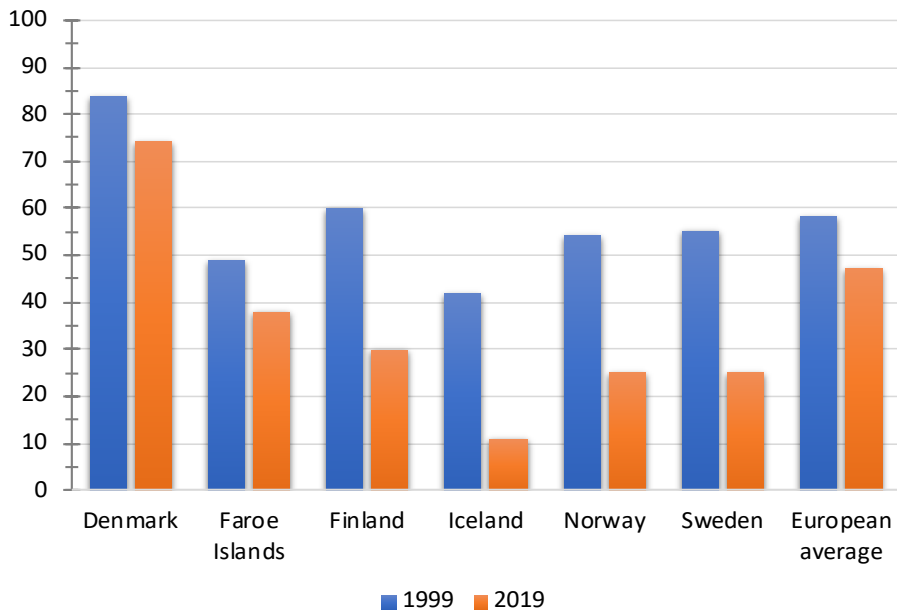
There is a long tradition of annual school surveys in Sweden, and at the start of 1971, about 90% were drinking in 9th grade (age 15/16). The long-term trend shows that three decades later, in the new millennium, about 80% were drinking, and today that proportion has dropped by half among 9th graders [1]. However, in recent years indicators suggest that the decline may have stagnated and stabilized at around 40% prevalence of alcohol consumers aged 15/16. Older adolescents aged 17/18 have also curtailed their drinking, but not as drastically as in the younger group. The surveys of this older group in 11th grade started in 2004, and at that point 89% were drinkers, while in 2022 this share had declined to 67%. Nowadays, it has become more common for adolescent girls to drink than boys throughout age groups 15–18.



**2.1.2.1 Figure 1.** The proportion of past year alcohol consumers in Sweden, by gender and school grade. 1971–2022 [1].

### 2.1.3 International comparison of adolescent drinking

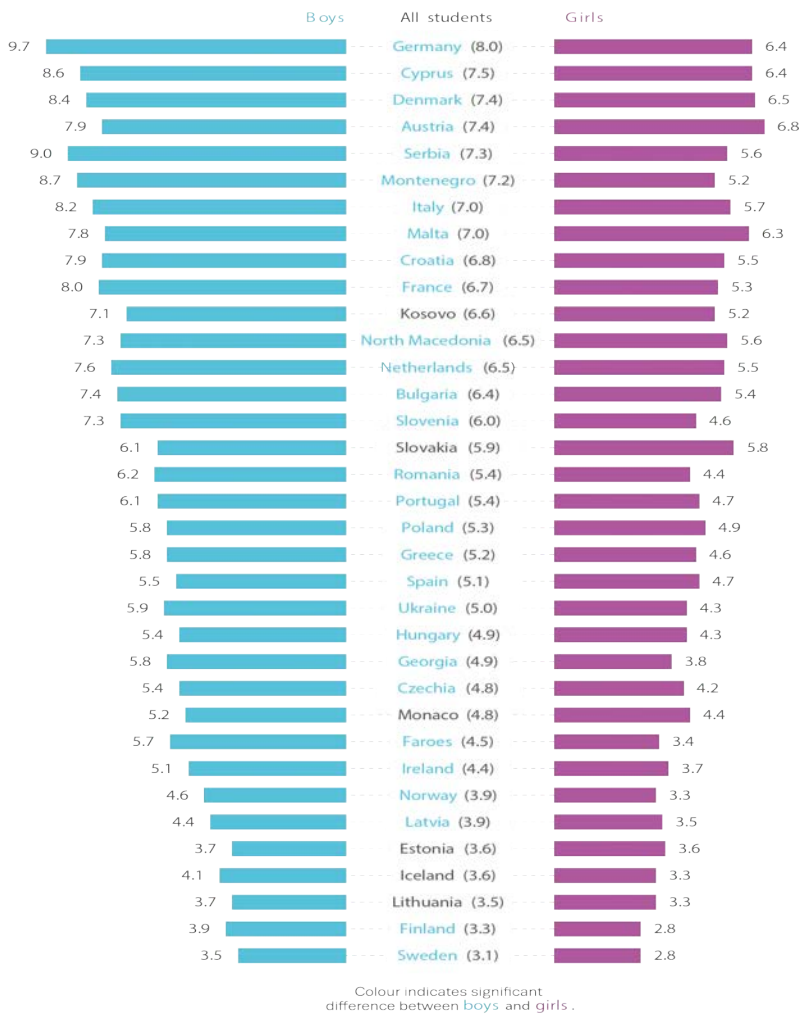
The trend among young people to abstain from alcohol is not limited to Sweden. Similar patterns can be observed in other parts of Europe. There is variation between the Nordic countries, but overall, the decline here has been more pronounced than the European average (see Figure 2).



**Figure 2.** The proportion of 9th graders who consumed alcohol in the past month in the Nordic countries and the average in 25 European countries [31].

Moreover, Figure 3 shows that Swedish 9th graders drink rarely, with an average of about three occasions per month (3.1), compared to the European average of 5.6 occasions per month.

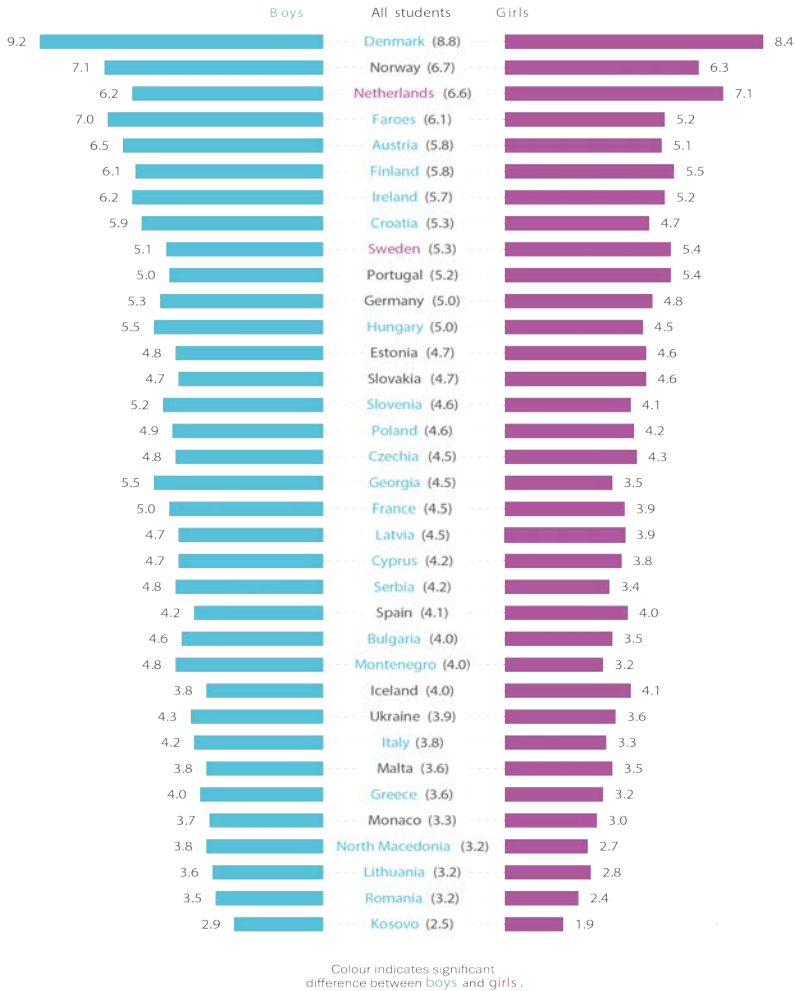




**2.1.3.1 Figure 3.** The average drinking frequency during the past month among 9th grade alcohol consumers in 35 European countries [8].

Swedish 9th graders hold quite a different position where the typical drinking quantity is concerned (see Figure 4). In estimates of the amount of pure (100%) alcohol consumed, adolescents in Sweden drank slightly above five centiliters (5.3) on the last drinking occasion. This is to be compared with the European average of 4.6 centiliters consumed on the last occasion for this age group. Three strong beers are roughly equivalent to five centiliters ( $0.05\text{alc}\% \times 33\text{cl} \times 3 \text{ cans} = 4.95\text{cl}$ ), meaning that Swedish adolescents on average drink slightly more than this, while the average quantity consumed by European adolescents is slightly less. In relative terms, adolescents in Sweden have a high alcohol

intake per occasion. This drinking pattern is also apparent in Norway, Denmark, and Finland.



**Figure 4.** The average quantity consumed during the past occasion among 9th grade alcohol consumers in 35 European countries [8].

### 2.1.4 Drinking cultures

Traditionally, a distinction has been made between Northern and Southern European drinking cultures. This distinction has been captured by the concepts of “dry” and “wet” drinking cultures [32]. The Nordics (and sometimes English-speaking countries) have been defined as dry societies, with drinking allocated mostly to sporadic, special occasions, such as weekends, celebrations, and

vacations. These countries are often characterized by restrictive alcohol policies and time-out behavior involving a drinking pattern with episodic heavy (binge) drinking, leading to high drunkenness, intoxication, and violence. Wet cultures are typified by France, Italy, and the entire Mediterranean region, characterized by alcohol being integrated into everyday life as an accompaniment to meals, in a frequent but moderate drinking pattern, with higher per capita consumption (in consumed liters pure alcohol per year) and elevated rates of alcohol-related death and diseases. However, drinking cultures are more convergent today, and patterns in different parts of Europe have gradually become less distinct [33–35].

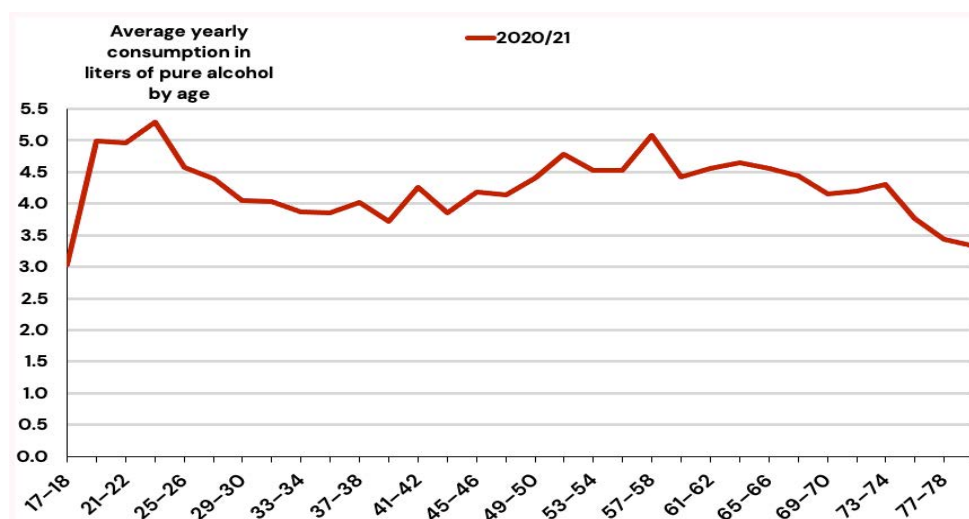
### **2.1.5 Yearly alcohol consumption by sex, age, and life course**

In Sweden, the average yearly self-reported consumption (including both drinkers and non-drinkers) in 2022 was 0.9 liters of pure alcohol among 9th graders (age 15/16) and 2.1 liters for 11th graders (age 17/18). Boys had a slightly higher yearly total consumption than girls in both 9th grade (0.9 vs. 0.8) and 11th grade (2.3 vs. 1.9) [1]. The corresponding self-reported average quantity was 4.3 liters of pure alcohol per citizen in the general Swedish adult population (age 17–84) in 2021.

Drinking behavior varies over the life course (see Figure 5). On a population level, the drinking rate varies with some regularity across typical milestones, life events, and social roles in the sequence of development stages. In the Swedish population, we can observe that after initiating drinking, the average amount of pure alcohol consumed per year increases with age, up to about 23–24 years of age, where drinking peaks at 5.3 liters [12]. These estimates are based on cross-sectional data and may thus vary between cohorts, and one generation from another, but internationally and across the life course, early-to-mid-twenties are the ages when people on average drink the most [36].

After this, drinking declines steeply until age 30, a period that for many is related to the transition towards parenthood, and the rate continues to be low

to about 40 years of age. This phase is followed by a gradual increase in consumption with some fluctuations, reaching a second peak at 5.1 liters at age 57–58, until old age and typical retirement, when drinking starts to decline again [12].



**2.1.5.1 Figure 5.** The average annual self-reported alcohol consumption in Sweden 2020/2021, distributed by age group [12].

In this context, it is important to highlight that alcohol consumption is not evenly distributed across the Swedish population. The top 10% of drinkers account for almost 50% of the total yearly consumption, as shown in both adolescents and the general population [2, 37]. One consequence is that the mean drinking quantity is considerably higher than the modal drinking quantity. In other words, the distribution of alcohol consumption is skewed. Also, binge drinking is more common among young people than among older people [38].

### 2.1.6 Beverage types and drinking preferences

The type of beverage that 9th grade students (age 15/16) in Sweden consumed the most in the year 2022, estimated as pure alcohol equivalents, was spirits (45%), followed by premixed drinks and cider (21%), strong beer (16%), light beer (9%), and wine (8%) [1]. The pattern is roughly the same among 11th grade students aged 17/18. A general trend among 15/16-year-olds in Europe seems to

be an increased preference for cider, premixed drinks, and so-called alcopops [39]. The sweet “Swedish Cider” became an international best-seller in the 2000s and aspires to be one of the leading cider products in the world [40].

These preferences among adolescents stand in contrast to the adult population. Throughout history, Sweden has been a “booze nation” where aquavit has been the predominant alcoholic beverage, as part of the Northern “Spirits or Vodka Belt” of the traditional “Alcohol Belts of Europe”, as opposed to the “Beer Belt” of Central Europe, and the “Wine Belt” of the Mediterranean [41, 42]. Consumption patterns of different types of alcoholic beverages consumed have quite recently shifted in Sweden. During the 1990s, beer and wine became more popular than spirits, and since the beginning of the 2020s, wine has been the dominating alcohol choice in Sweden [43]. On average, the most consumed alcoholic beverage in Sweden in 2021 was wine, followed by strong beer, spirit, light beer, cider, and premixed drinks (in estimations of pure ethanol equivalents) [12].

## **2.2 Adolescent life phase**

This section describes the characteristics of the adolescent life phase and how they relate to the consumption of alcohol. This will help to demonstrate what makes drinking during this age period of special concern.

Adolescence is an extended period of key transitions from childhood to adulthood [29]. Developments in adolescence largely form the foundation for future pathways and potential life outcomes [44–46]. In the growing-up process, psychosocial development during adolescence can be particularly demanding and challenging [44, 47–49]. In such a transition, identity formation often becomes particularly important for how life as an adult will turn out. Identity theorists maintain that establishing a sense of identity during adolescence impacts well-being, sense of direction, and psychosocial functioning [50]. It is a period of exploring new roles and experimenting with

values, beliefs, and opinions. Testing one's own and others' limits and boundaries fulfils important developmental purposes during this process [51].

### **2.2.1 Social reorientation**

Adolescent growth also involves major social changes and reorientation. The social sphere tends to expand, and the primary focus of social interaction and involvement shifts from family to friends [51, 52]. This involves increased separation from parents to become more independent. Reliance on and attachment to peers and friends make these relationships more important; they become increasingly necessary for social functioning. The search for social connection, relationships with friends, and membership in peer groups make bonding, acceptance, and belonging essential aspects of adolescent life. Nevertheless, this reorientation process is not exclusive to humans. There are observations of increased peer interaction and risk-taking in adolescence among other creatures [53], suggesting that emerging exploratory behaviors in this phase of life, when puberty occurs, partly have a biological component.

### **2.2.2 Traditions of problem-oriented portrayals**

Negative stereotypes are often used to portray the adolescent period in life. Typical conceptions include those of unruly and obnoxious youths that pose a threat to society [26]. The historical traces of this view recur consistently regardless of the contemporary context. A century ago, adolescence was depicted as a period of storm and stress [26, 54], and ancient Greek texts complain about misbehaving minors and their lack of respect for elders [55].

Alcohol research has traditionally also been dominated by this type of problem-oriented focus [56]. Such conceptualization may have its relevance, but it also has its shortcomings. A counterclaim could be that it would be unjustified to pathologize a normative and fully adequate behavior, given that most individuals behave in accordance with the prevailing cultural drinking norm in society. In a fair view of the features of drinking, the underlying benefits are equally essential to recognize. Judging from the cultural acceptability and broad prevalence of alcohol use in contemporary Western societies, drinking

cannot be considered a deviant behavior among adolescents as they emerge into adulthood. From a statistical standpoint, it could be argued that not drinking alcohol is the more deviant behavior, in societies when the majority drink [51]. However, this premise is related to contextual issues and is highly age-dependent. Psychosocial development from child to adult is not clear-cut; the change does not happen overnight at the legal age governing alcohol use. The boundary for when drinking goes from a publicly discouraged unauthorized behavior to a culturally sanctioned expected behavior is equally unclear in terms of normality among adolescents.

### **2.2.3 Drinking as part of normal development**

Some claim that adolescent drinking is best understood as a psychosocial phenomenon with cultural meanings in place of a medical, biological, or genetic perspective [57, 58]. From this point of view, learning to drink is considered to be part of normal development during adolescence. It serves a purpose like any other learned behavior [58]. Some even view starting to drink as an appropriate adolescent developmental task to master in the process of becoming an adult [51, 59]. Consequently, if drinking is considered an important milestone in normal development, then abstaining from alcohol reflects a social malfunction [60]. Adolescents who drink, thus complying with mainstream culture, show that they are approaching their social role as adults, demonstrating the ability to be adventurous, yet mature. In this context, adolescent abstainers can be perceived as inadequate and immature.

Drinking as a normal part of adolescent development emerges if drinking is perceived as a rational, functional, and adaptive behavior used to work toward underlying goals. Such goals can be to (i) establish autonomy and independence from parents and other adults, (ii) gain acceptance and respect from peers, (iii) manifest rebellion against the establishment or authorities by expressing opposition to conventional norms and values in society, (iv) coping with difficult emotions or negative thoughts, (v) mark a passage toward maturity and adult status [18, 61].

From this perspective, drinking is an important behavior that fulfills essential aspects of psychosocial development in adolescence [58]. The transition towards adulthood may hence entail alcohol use since it conforms to the cultural norms and is part of the social role and image of the forthcoming life stage. The symbolic value of drinking can be recognized as a developmental milestone and as a means to take control over one's own life and achieve independence [58]. Alcohol can serve an important role in adolescents' social reorientation and facilitate the forming of adult relationships. For example, adolescent abstainers and those with later drinking onset have been shown to be less likely to have a steady partner as adults [62].

### **2.3 Consequences**

This section maps out the various consequences, risks, and harms linked to alcohol use. It describes risky drinking patterns, as well as the physical, mental, social, and economic consequences related to alcohol consumption.

Even though moderate alcohol consumption is common and generally considered socially acceptable, ingesting alcohol will always have a bodily impact, regardless of the amount consumed. The specific amount that will cause bodily harm varies between individuals, and which organ or condition is being affected. The exact point at which alcohol becomes harmful in different contexts (e.g., bodily, social) is somewhat disputed within the scientific community [63, 64]. However, there is consensus that alcohol use entails certain risks. It can both worsen existing harm and disease, and cause severe damage and health loss, which in turn may result in disease and death. Binge drinking or alcohol intake on an empty stomach will result in stronger intoxication. Intake of large quantities may lead to serious accidents and injuries, or even result in death due to alcohol poisoning [65].



### **2.3.1 Bodily harm**

Research has identified 230 distinct diseases and injuries that are at least partly attributable to the consumption of alcohol. Among the most common are liver cirrhosis and various cancers [27]. Evidence shows that alcohol can cause cancer in at least seven sites in the body [66]. Estimates show that up to 3 million deaths per year globally could be prevented if alcohol was not consumed [67].

Alcohol use is the leading risk factor for disability and premature death among people aged 15–49, accounting for almost 10% of the worldwide mortality in this age group [68]. In Europe, about 15% of all deaths among 15–to–19–year-olds have been attributed to alcohol [27]. Among adolescents aged 15–19 in Sweden, consuming alcohol is the factor that contributes most to disease burden [69]. According to Swedish records of alcohol-related mortality, about 2,100 individuals who died in 2021 had an alcohol-related diagnosis as a cause of death, of whom 76% were men [70].

### **2.3.2 Mental harm**

Alcohol use is associated with practically every known form of mental disorder [71]. For example, the prevalence of alcohol use disorder among people with an anxiety disorder ranges between 20–40%, and among those with a lifetime major depressive disorder, this prevalence ranges between 27–40% [72]. Despite clear associations, the relationships are complex, making it difficult to disentangle the causal direction [71, 72]. The risk of attempting suicide when drinking is approximately seven times higher than when not drinking. Heavier drinking increases this risk by a factor as high as 37 [73]. The complexity of the relationship between alcohol consumption and suicide is further examined in other studies [74].

### **2.3.3 Social harm**

Beyond causing harm to the individual drinker, people surrounding the drinker are often also affected. Secondary harm from other people's drinking can include birth defects, emotional neglect due to parental drinking, social

embarrassment, traffic accidents, violent acts, and alcohol-related property damage [75, 76]. Alcohol can also affect sex life and the likelihood of having children. Drinking increases the probability of sexual intercourse among adolescents [77], an effect that can be intentional or unintentional. Being under the influence of alcohol, or being amongst people who are, can also result in stressful or unsafe situations [65]. Situations involving alcohol are highly interrelated with crimes, particularly violent offending [78, 79]. Given the multiple harms related to drinking, it is often stated that alcohol is not an ordinary commodity [67].

More than one out of five people (22.3%) in the Swedish general population have experienced that an adult they lived with during childhood drank too much [80]. Of the Swedish population in 2021, more than one in four (26.2%) consider that someone in their life drank too much during the past year. About 12% of the population had been negatively affected by someone else's drinking, and slightly above 3% had been affected very negatively [81].

#### **2.3.4 Societal and economic harm**

Drinking risks causing harm not only to people nearby, but also to society at large. Alcohol consumption exacerbates the burden on the healthcare system by increasing the demand for mental health treatment as well as treatment for alcohol-related injuries and illnesses. Economic consequences of alcohol use also affect society in terms of lost productivity, traffic accidents, and crime [82, 83]. Alcohol consumption is estimated to cost the Swedish society over 103 billion SEK per year [84]. It is also related to social problems such as unemployment [85–87], marginalization [88], and homelessness [89]. Alcohol use in itself is often considered a social problem when it escalates into dependence or when minors engage in it [90]. However, our perception of who should be classed as a problematic alcohol user varies with the context, or as Levine put it: "Our perspective on alcohol use is shaped by society's interpretation of alcohol at a given point in time" [91].

### **2.3.5 Youth-specific concerns and risk of dependence**

Alcohol intake among minors is of particular concern since the adolescent brain is not yet fully mature. This makes it more sensitive and vulnerable to neurotoxic damage caused by alcohol [92, 93], potentially impacting cognitive ability and normal brain function. In observations of brains, differences in both volume and connections have been established between drinking and non-drinking adolescents [94–96]. Evidence suggests that patterns of alcohol consumption in adolescence form habits that continue into adulthood [97]. Alcohol has addictive properties. Routines foster addiction. Regular users develop a tolerance to the substance, and withdrawal symptoms can arise [98]. Those who begin to drink in early adolescence are more likely to become alcohol-dependent than those who start at a later age [82, 99, 100].

## **2.4 Prevention and policy**

The legal, regulatory, and preventive framework surrounding alcohol use will be described in this section. It will focus on the general aspects of alcohol prevention and the Swedish alcohol system and the philosophy behind it.

### **2.4.1 General alcohol prevention**

The risk of harm related to youth drinking is commonly reflected in law, as most countries have age restrictions for on-site purchase of alcoholic beverages [27]. Globally, 18 is the most common national minimum legal purchase age limit for sales both on- and off-premises [27]. According to WHO [27], the three most effective alcohol control policy measures to reduce alcohol consumption are (a) limiting physical availability, (b) restricting advertising and marketing, and (c) raising the price of alcoholic beverages through taxation. Out of these three measures, limiting availability probably affects adolescents the most. Universal measures affecting all of society are in line with prevention measures recommended by the research community; restrictions on alcohol availability and accessibility, combined with decreased affordability, are proposed as the most effective strategies to protect public health from alcohol-related harm [67]. Multifaceted policies may for instance cover various physical, financial, social, and psychological dimensions of alcohol availability. Some far-reaching

measures proposed include a total ban on alcohol marketing, high alcohol taxation, restricting outlet density, countermeasures against drunk driving, and brief interventions along with treatment of at-risk drinkers and individuals with alcohol dependence [67].

#### **2.4.2 The Swedish alcohol system**

In Sweden, the minimum legal drinking age is 18 for on-premises establishments monitored by staff who are under obligation not to serve alcohol to anyone who is too intoxicated [101]. Taking alcoholic beverages away from these premises is not permitted. The minimum legal age is 18, but some places voluntarily have higher age limits for entrance. Such venues are typically bars, nightclubs, pubs, and restaurants. For off-premises sales in grocery stores and gas stations, 18 years is the minimum age for purchasing alcoholic beverages containing up to 2.25% alcohol by volume (3.5% for beer). The cashiers are the ones responsible for not selling alcoholic beverages to minors. Beverages with alcohol content below 0.5% are considered alcohol-free, and EU regulations state that content exceeding 1.2% must be labelled on the container [102]. No permit is needed to serve beverages with alcohol content below 3.5%, but the serving venue must be registered as a food facility with the municipality and must fulfill several requirements. Misconduct can result in a warning or a sales ban. The municipality and the police monitor how alcohol-selling establishments comply with the rules, and the cost of this supervision is covered by a fee [103-105].

Beverages with an alcohol content above 2.25/3.5% for off-premise use can only be bought from the government-owned and state-run chain of retail monopoly stores (Systembolaget), where the minimum legal age is 20 years [106]. These non-profit stores' main goal is not maximize sales, but rather to take social responsibility by lowering alcohol-related deaths and diseases [107]. They do this by not applying discounts, making special offers, or arranging their stores in ways that encourage drinking. Furthermore, through their subsidiary company (IQ), they produce information campaigns on the risks of alcohol use,

for example, targeting the parents of adolescents [108]. The stores also are obliged to refuse service if they suspect that the customer is a straw buyer, that is, a customer who will give or sell alcohol to someone underaged (<20) [109]. The cashiers must ask all customers who appear younger than 25 for an identification card. A monopoly system like Systembolaget likely reduces adolescent drinking. When the Finnish laws changed to allow sale of stronger alcoholic beverages in grocery stores, adolescent drinking increased [110]. Moreover, adolescents were more affected than adults by the change in alcohol law [110].

It is not a criminal offense for the underaged to drink alcohol in Sweden. It is prohibited but not sanctioned. Minors cannot be penalized for purchasing alcoholic beverages [21]. However, the police can confiscate or pour out alcohol that minors are drinking or carrying, and the case can be reported to social services. Swedish municipalities regulate alcohol use in public places, in terms of time and place, and the police can fine for individuals who violate these regulations [111]. All marketing and advertising of alcohol aimed at people under the age of 25 is prohibited in Sweden [112]. This is the second point that corresponds with WHO's recommendations on effective control policies to reduce alcohol use [27], which can impact adolescents drinking in this context. The evidence seems to be mixed on how affordability may affect youth drinking. In two long Nordic time-series analyses on alcohol consumption among mid-adolescents, one study from Sweden showed that the price had no impact [113], while a study from Finland found an association with disposable income [114].

#### **2.4.3 The basis of the Swedish alcohol control policy**

Many countries establish universal policies to target the prevalence of drinking among adolescents and adults. In the Swedish context, this has given rise to the "Total Consumption Model" [115], in which per capita consumption is the center of attention [116]. This perspective has its theoretical grounds in "The Single Distribution Theory" [117] and the "Collectivity of Drinking Cultures" [118].

Briefly put, according to the collectivity theory, social interaction is thought of as a contagion between people [119]. Like a spreading wave, individuals calibrate their perceptions, attitudes, and behaviors to match those of their social environment. Drinking is understood as a social act that is interconnected with other people in a process of mutual influence. This means that the practices of others largely shape individual drinking habits. This constitutes drinking as a social contagion and a matter of interdependence. More specifically, this model suggests that drinking is a socially synchronized behavior, meaning that harmful drinking among at-risk users and the total consumption among the whole population are connected. Changes in the average consumption within a population impact the drinking throughout the distribution spectrum [120]. In line with this, there is evidence of a link between the share of non-drinkers and the amount of alcohol consumed among drinkers [121]. Thus, it is expected that any change in drinking will affect everyone, including the number of heavy drinkers and non-drinkers. Consequently, excessive alcohol use among some individuals cannot be detached from how the rest of the population drinks [122]. For this reason, alcohol consumption becomes a concern for everyone.

This point of view taps into ideas that can be traced to the middle of the 1970s and the publication of what has later been called "The Purple Book" [123]. This pioneering work introduced a public health perspective on alcohol consumption. It made alcohol-related harm a collective responsibility rather than an individual matter, which is how alcohol control policy in Sweden is largely justified to this day. Related to this is the notion of "The Prevention Paradox", which claims that it is more effective to target the large group of moderate drinkers, as the total impact of alcohol problems is far greater in this group compared to the smaller group of heavy drinkers [124, 125]. Briefly summarized, this was a new public health approach towards alcohol consumption that shifted from primarily focusing on "alcoholism" and heavy-drinking individuals, towards a wider perspective, including most people who

drink alcohol [67]. The rationale for making drinking an all-embracing issue is that from a public health perspective, everyone is essentially responsible for the social well-being of others. Drinkers are part of a social climate that facilitates alcohol consumption, and that also shares the responsibility to shape an environment that does not pose a threat to people's well-being. More specifically, despite its upsides, drinking is related to risks, with the potential to cause harm to oneself and others [67]. This approach focuses on broad interventions around price and availability rather than treatment or targeted intervention.

## **2.5 Risk and protective factors**

In the previous section, factors that influence the alcohol consumption of the whole population were described in terms of prevention and policy. In this section, a number of factors that specific people are exposed to will be described. Learning about this increases our understanding of what factors are important for adolescent drinking.

In public health, risk and protective factors are fundamental concepts to understand why certain conditions and behaviors appear in some groups of a population. The approach to identifying such factors is called "the public health model for the prevention of disease and disorder" [126]. The idea is that exposure to some factors influences individuals in ways that increase the likelihood of certain outcomes, compared to non-exposed individuals randomly selected from the general population. Factors can be identified, for example, by studying the variation of characteristics among different groups to understand, and perhaps explain, why certain events occur. Protective factors reduce the chance of a detrimental occurrence, while risk factors increase the probability of a negative event. Protective factors are considered to buffer the negative influence of risk factors, which means they are not merely the opposite of risk factors. The presence of risk and protective factors can help identify individuals or groups that are more or less vulnerable to various potential negative outcomes.

### 2.5.1 Biological factors

The structure of our bodies governs our conditions as humans, and some aspects of individual variation are determined before birth. Behavior among humans can to some extent be genetically traced. This heritable influence is commonly considered to explain approximately 50% of the variation in behavior [127]. This is a rough estimate however, and the relative proportions of explanatory value between genes and the environment depend on what behavior is studied and by what means. It can also be difficult to distinguish the different dimensions of the human being. For example:

“...our brains are inescapably social, their structure and function deeply embedded in connections with other brains. Because our brains have evolved in this social context, we have individually developed the ability to link with other brains—attuning with each other, regulating each other’s emotional systems, and helping to grow each other’s neural networks.” [128]

An important characteristic of our disposition is that it results from a dynamic process, and not a deterministic process. The human brain constantly strives to adapt to new conditions. Our biology does put a limit on how much influence environmental factors and individual agency can have. However, within this biological framework, there is room to maneuver and leeway that entails a vast capacity for action. The environment moderates the genetic impact, and genetics can also play a role in the choice of environment [127]. For example, a person with susceptibility to alcohol dependence can avoid this outcome in a preventive environment. Still, the same person may be prone to choose an alcohol-friendly environment owing to genetic factors. The environment is more important for drinking initiation and experimental alcohol use in early adolescence, while genetics becomes increasingly important with more regular and established use at a later age [127]. Accordingly, alcohol abuse seems to mainly be traced to genetic variation, while drinking initiation mostly can be



attributed to psychosocial factors, such as personality traits and the peers surrounding the individual [129].

Adolescents with a family history of alcohol problems run an increased risk of developing alcohol problems compared to those without such issues within the family [130]. Vulnerability can be caused by genetics but can also be shaped by psychosocial factors during upbringing, such as nurturing, or simply spending a lot of time together with a drinker, and learning the practice, status, and role of drinking alcohol.

One way to conceptualize risk factors is to draw a distinction between those that are fixed and those that are modifiable. This makes it possible to highlight the factors that interventions can affect. Age is for instance a fixed biological factor, and although there is variation in the phase of maturity, aging is inevitable. Puberty may play a role in alcohol use as the visual appearance of the body becomes adult-like. Pubescent individuals may no longer perceive themselves – or be perceived by others – as children, and according to cultural norms, childhood is incompatible with using alcohol.

Sex is also often considered a fixed marker of risk for alcohol use [131], but this can of course be disputed. Anatomy at birth is unlikely to capture gender expectations based on culture and social norms for masculinity or femininity. Sex differences might be fixed in the sense of biochemical implications of alcohol use (e.g., body mass), while gender roles are dynamic. Gender is argued to be performative and constituted by actions, and these behaviors are comprehended as masculine or feminine [132].

Alcohol consumption is one such behavior where gender is typically manifested and interpreted [133–136]. In Sweden, men drink markedly larger amounts than women. The current trend is inverted, as men's consumption in the general population has declined since 2004, while women's consumption

level has been stable [12]. Internationally, boys are also more likely to engage in heavy episodic drinking than girls, although this gap is likewise decreasing [27, 31]. Preferences regarding the choice of beverages are further related to gendered attitudes. Drinking beer and spirits is more common among men, while wine and cider are more popular among women [80]. In Sweden in 2021, wine was the dominating beverage type among women, with a share of 67% of all consumed alcohol in the general Swedish female population aged 17–84. Among men, the most used beverage was beer, with 51% of the yearly consumption [12].

Findings from international studies point to an overall narrowing gap in drinking between men and women [137, 138]. Among youth, the decline in drinking has been larger among boys [7, 139]. In Sweden, there are no apparent sex differences in drinking habits among 15–16-year-olds today [30, 31]. Although recent studies show no difference in mean consumption nor frequency of high alcohol intake, it has become more common for 9th grade girls than for 9th grade boys in Sweden to drink, and this difference in prevalence is growing over time [140].

### **2.5.2 Psychological factors**

Individuals vary considerably in how their minds work, which makes personal characteristics important for drinking behavior. Certain personality traits make some people especially vulnerable to problematic behaviors, and the inverse also holds true, where problematic behaviors lead to changes in personality, thus causing a negative spiral [141]. The specific personality profile that has been strongly associated with early drinking initiation as well as later alcohol abuse, is the reward-related personality type. Hence, sensitivity to rewards seems to play an important role [129]. Individuals belonging to this category have traits such as sensation-seeking, impulsivity, novelty-seeking, and extraversion [129]. At the same time, a proneness towards these behaviors also seems to be part of normal development during the adolescent life stage [52, 53, 142].

Beyond personality traits, there is evidence that other psychological factors are relevant to alcohol consumption. For example, there is an association between mental health problems and alcohol use among both adolescent boys and girls [143]. Traumatic events and early-life stress are described as predictors of adolescents' drinking [144]. Anxiety, stress, and depressive mood are also related to binge drinking in general [38]. Among these adolescents, alcohol can be used for self-medication to relieve or forget painful emotions or negative experiences. Psychological symptoms in adolescents have been found to have long-term effects on heavy drinking later in life, but a reverse link was not found [145]. However, the long-term effects of adolescents' mental health on later drinking habits are not entirely clear. For example, one study found a link between internalizing problems and heavier drinking trajectories [146], while another found a negative association between internalizing problems and alcohol use [147]. Higher levels of depression symptoms have been found to predict elevated drinking in adulthood [148].

Swedish adolescents who externalize their problems have been shown to follow a high alcohol consumption trajectory later in life [146]. An ADHD diagnosis during childhood has also been identified as a risk factor for drinking initiation and escalation of drinking [149]. A lack of academic ambition among Swedish adolescents has also been shown to be a risk factor for binge drinking [126]. Positive expectations and generally positive attitudes about alcohol use are also linked to higher consumption [38, 150]. In summary, many psychological aspects have importance for alcohol use, and risk factors involve the reward-related personality type, several types of mental problems, psychiatric diagnoses, and positive perceptions of alcohol.

### **2.5.3 Social factors**

The adolescent's social environment involves different levels, spanning from society as a whole, via the narrower local community covering school and neighbors, to the closest ties with family and friends. Social relationships,

interpersonal connections, and the need to belong are among the most fundamental features of human beings [151]. The people who exert the strongest influence on an adolescent's approach to drinking are also the ones that the adolescent spends the most time with [152].

The relationship and interaction between the parent and child, alongside parenting styles, are associated with adolescent alcohol and substance use [29, 153]. Children whose mothers criticized and rejected them, and who were insensitive and unresponsive to the needs of their offspring have been shown to drink more often as they grow up [51]. Parenting styles characterized by low acceptance and involvement, such as authoritarian or neglectful parenting, have been linked to heavier drinking among Swedish adolescents [153]. Conversely, a high-quality relationship between parent and child is protective. Parental support, involvement, and monitoring also act as protective factors against adolescent drinking [154]. Parental monitoring and adult supervision are also important, as the parent's awareness of where their child currently is has a link to their adolescent's approach to alcohol [150].

Among parents, favorable attitudes towards alcohol, provision of alcohol, and own drinking habits are risk factors for both drinking onset and later alcohol use among their adolescent offspring [154]. Young people are more likely to drink frequently and heavily if they are exposed to a close family member who drinks or has seen a parent being drunk [130, 150]. In dysfunctional families, older siblings' drinking has been shown to exert a stronger influence on their younger siblings than in families with better relationships and better monitoring [38]. In Sweden, adolescents whose parents permit them to drink tend to drink more heavily than those who are not [153]. Adolescents who have been introduced to alcohol by parents or relatives are more likely to seek out drinking friends [82]. Meanwhile, parental disapproval of alcohol use is related to lower involvement with alcohol-using peer networks [152]. Parental divorce and leisure time spent with peers have been shown to predict elevated consumption later in life [148].

Thus, it is clear that parenting exerts a critical influence on adolescent drinking.

Poor family relationships and high peer contact during adolescence have been shown to have long-term effects on alcohol use later in life [155]. During the adolescent period, the direct influences from parents decrease with age, whilst the influences from peers gain importance [152]. The probability that an adolescent starts drinking is also increased if their friends drink. Additionally, the volume of alcohol an adolescent drinks is associated with the amount that their friends drink [130]. One of the strongest predictors of adolescents' use of substances is having substance-using friends [29]. The number of evenings spent with friends during a week is associated with adolescent drinking [150]. Most adolescents drink during weekend evenings [156]. The risk for alcohol use and high consumption is higher in the company of large groups, and there are also indications that mixed-gendered groups are related to drinking [156]. Adolescents' best friends seem to influence substance use more than siblings and adults [157]. Adolescents who spent their last drinking occasion with an older friend or partner have also been shown to drink more during that occasion [150]. It has also been shown that many adolescents overestimate their peers' alcohol use [158]. Consequently, it is evident that influences from peers and friends are central to alcohol consumption in adolescence.

Moreover, peer influence on adolescents' substance use is believed to function directly, for example through substance availability and peer pressure, as well as indirectly, through norms and other social mechanisms [53]. A distinction has been made between two separate social mechanisms of peers affecting adolescent substance use. Peer socialization (or peer influence) refers to the tendency to adjust one's substance use behavior according to the peer group. On the other hand, peer selection refers to the inclination to seek like-minded peers and behave similarly [53]. Besides having a negative impact, such as the promotion of harmful behaviors like alcohol use, peers can also have a positive influence, for instance as support, by encouraging school engagement, or

promoting health behaviors with a protective effect against substance use [53]. High social support from friends during adolescence is related to reduced risk of using alcohol for self-medication purposes [159]. Peers can thus be crucial in motivating certain behaviors with potentially far-reaching consequences.

A high sense of belonging at school, school attachment and enjoyment are protective against alcohol use among adolescents [160–162]. The school situation and teacher engagement can also play a compensatory role for adolescents with family alcohol problems, as greater student focus is protective against stress-related issues for this group [163]. Being in a negative school environment in adolescence has also been shown to be associated with an increased risk of substance use [164]. Poor classmate relationships during adolescence increase the probability of future heavy drinking among women [155]. A culture of heavy drinking in school has also been proven to affect drinking in adulthood [165].

The neighborhood has also been demonstrated to be strongly related to adolescent drinking. Consumption-discouraging norms and attitudes within the neighborhood make adolescents less likely to use alcohol [152]. Easy access to alcohol is a strong influencing factor. Adolescents who consider it easy to obtain alcohol also drink more than those who have more trouble getting hold of alcohol [150, 156]. Living in disadvantaged areas is associated with drinking, as experiencing violence in childhood is related to exposure to youth delinquency and alcohol use. Likewise, witnessing drug deals or seeing peers use alcohol has been linked to increased adolescent drinking [152]. Truancy and criminal activity have also been identified as risk factors for binge drinking among Swedish adolescents [126].

Generally, people with higher socioeconomic status (SES) drink more often than others, whilst people with lower SES drink larger total amounts [152]. Groups with lower socioeconomic positions have higher alcohol-related harm,

mainly due to more harmful heavy drinking, but also partly due to other social and behavioral risk factors [166]. However, adolescents with higher educational aspirations are less likely to drink, and lower perceived family wealth points to higher drinking [167]. At present, the strength and direction of associations between adolescents' socioeconomic status and drinking habits are not entirely consistent and seem to vary depending on the indications used [168].

## **2.6 Knowledge gaps**

The previous chapters have presented a wide background of knowledge on alcohol use and adolescents. In this subsection, the gaps in the literature will be addressed. This research project attempts to fill these gaps in four studies. The topics of these studies will be briefly introduced under each subheading in this section.

### **2.6.1 Motivation behind drinking**

Many adolescents choose to drink despite the negative consequences of using alcohol. Greater knowledge of what causes drinking could be helpful to prevent and reduce harm from drinking. One crucial aspect to consider when trying to understand drinking behavior is the individual motivation to engage in this activity [169]. Drinking motives can thus help us to understand why people consume alcohol and the needs underlying the motivation to drink. The importance of drinking motives for adolescents' drinking has been identified in many countries [170]. A common approach to studying this is by using the Four-Factor Model [171]. In brief, this model comprises a cross-categorization of endogenous intrapersonal and exogenous interpersonal incentives, stemming from positive or negative feelings. This model is based on the theoretical framework developed by Cox and Klinger [172] and is condensed into the internationally most used measuring instrument, Drinking Motives Questionnaire-Revised (DMQ-R) [171]. This questionnaire was developed from a previous three-factor version [173] and has since then been refined further into a short version [174] and a five-factor variant [175].

Previous research has revealed that social drinking motives (socialize with others) are most common among adolescents, followed by enhancement motives (liking the feeling alcohol causes), coping motives (managing emotional problems), and the least prevalent are conformity motives (fear of being left out) [169, 170].

*“Some people like the way it feels, some people wanna kill their sorrow,  
Some people wanna fit in with the popular, that was my problem.”*

Kendrick Lamar – Swimming Pools (Drank) [2012].

Studies on associations between drinking motives and outcomes of alcohol use present relatively coherent results [170, 176]. Social motives are often strongly associated with frequent but moderate drinking, and enhancement motives with heavy drinking [169, 170, 174]. Coping motives often have the strongest association with adverse consequences [169, 177]. Conformity motives are consistently associated negatively with alcohol use among European adolescents [170].

Drinking motives are claimed to be the last common pathway for all factors influencing the choice to drink, and thus work as a mediator for more distal factors [171, 172]. This claim finds support in that drinking motives explain a substantial amount of the variance in alcohol intake [169]. However, there is a lack of studies on drinking motives from Nordic countries. The few existing studies that have investigated the topic among Swedish adolescents are not contemporary and thus carried out when adolescent drinking was more common than today. They also had a regional or qualitative focus and are hampered by methods less suited for international comparisons today [178, 179]. Sweden has traditionally had a dry drinking culture involving sporadic heavy drinking [32], and the decline in adolescent drinking has been more prominent in this part of the world than in others [31]. Without studies in the



Nordic context, we are left uncertain of whether the international evidence on drinking motives applies to our settings.

### **2.6.2 Trust among adolescents and its relation to drinking**

Social capital is a broad concept that captures various dimensions of the social environment among societies, groups, and individuals. Common features of social capital are human bonds, reciprocity, and cohesion. Socioeconomic inequality is a critical driver of social capital [180, 181]. Trust is one key component of social capital that has shown great importance in numerous conditions and behaviors. This includes individuals' health, happiness, and satisfaction [182-185]. Drinking is a health-related behavior and customarily a social activity where trust potentially plays a part. Trust seems to be formed at a young age and partly by parents' warmth/compassion, beliefs about justice, and view of other people [186, 187]. We know from previous research that social relationships influence drinking [152-156]. Trust is a relatively unexplored social factor with potential links to youth drinking.

Today, potential links between trust and adolescent drinking are poorly understood since the current evidence is inconsistent. Trust in other people, often referred to as "general trust", has in some studies been associated with the consumption of alcohol among adolescents [188-190], while in other studies [191, 192], no such relationship has been found. Trust in public institutions of society, referred to as "institutional trust", is associated with alcohol consumption in the general adult population [193]. Still, there have been no studies on institutional trust and drinking among adolescents. A novel approach would be to examine both dimensions of trust and how cross-combinations of these relate to drinking in an adolescent population. This would further our understanding of how a scarcely studied aspect of psychosocial factors is linked to alcohol use. By conducting a study on trust and drinking among adolescents, we will make a contribution to the research field. Evidence on the link between trust and drinking may have potential for youth programs that

facilitate trust [194]. Building trust could be a potential asset in preventing alcohol use among adolescents.

### **2.6.3 Transition into drinking and related psychosocial factors**

In Sweden in the year 2022, drinking has become an established behavior among a majority in the time window between the ages of 15/16 and 17/18 [1]. This is an important age period when many adolescents begin to use alcohol, and psychosocial factors are at play to differentiate who starts drinking and when. It has been suggested that the decline in young people's alcohol consumption may have changed how drinking is related to psychosocial factors among adolescents [195, 196].

As most adults drink in Western societies, non-drinking is, in practice, a deviation from normal behavior. During adolescence, this means that abstaining from alcohol becomes increasingly outside social norms across this life stage as more and more young people initiate consumption. In earlier research, when drinking was more common and began at younger ages, abstainers had more mental health problems and social problems than drinkers during adolescence [59, 60, 62, 119, 197-202]. This implies that abstaining from alcohol also might be associated with risks. This notion is further supported by evidence showing that adolescents who do not start to drink when it is conventional to begin drinking have more mental health problems than those who follow the norm [62]. It remains to be studied whether this is true today when the drinking norms among young people look different, and adolescents who abstain from alcohol are growing in numbers. When the approach towards drinking becomes more conservative, alcohol use may become devalued, while abstaining may become more highly regarded. If psychosocial associations are changing in parallel with drinking norms, it would be indicative of whether such links are of a relative or absolute nature. For example, will drinking always be associated with certain factors or is it dependent on how common drinking is?

There is a need to identify the psychosocial composition of contemporary

adolescent drinkers and define their characteristic features. In order to understand which adolescents are most prone to starting to drink, examinations of different groups by their drinking status (drinkers/non-drinkers) and age of onset (early drinkers/later drinkers) are required. It is possible that a psychosocial gradient can be detected in the timing of alcohol initiation, which makes the age of onset an essential factor to consider. The developmental pathways in the transition from non-drinking to drinking and how various factors are associated with different drinking groups would deepen our knowledge of the psychosocial position alcohol has for young individuals today. Alcohol prevention programs usually aim to promote non-drinking, and thus knowledge about non-drinkers, and potential proneness to drinking transition, would be helpful in preventive efforts.

#### **2.6.4 Age of drinking onset and later drinking habits**

One centerpiece in preventing underage drinking is postponing the onset of drinking [203]. The timing of initiation into drinking, usually captured by the concept “age of onset”, is believed to have a lasting impact on alcohol use. Yet this issue has not been scientifically settled [204, 205]. The adolescent body, especially the brain, is not fully developed and may thus be more vulnerable to the toxic effects of alcohol [206–209]. Besides affecting cognitive ability, early drinking may also have a psychosocial impact. Being an early drinker can influence how you and others perceive you in terms of social position, identity, and relationships [210–212]. For example, by daring to take the lead and adopt early drinking, one may gain new risk-taking friends and acquire a self-concept as an adventurous and rebellious thrill-seeker. It is also possible that early introduction to alcohol has a lasting biochemical influence, as alcohol has known habit-forming and addictive properties [211, 213].

One scenario is that certain risk factors cause early drinking onset, which in turn has an additive effect leading to future high consumption. Another scenario is that certain risk factors cause early drinking onset but that the early age of onset in itself does not affect drinking habits. In this other scenario, the

age of onset can be misinterpreted as causing heavy drinking, while the pre-existing risk factors are the real cause. If so, the age of onset would just be a marker of other risk factors. These two ideas can be referred to as “the cause hypothesis” [214] and “the marker hypothesis” [203, 215].

In a systematic review, the empirical basis for the role of the age of drinking onset on future alcohol use was shown to be weak [203]. Results have been inconsistent in appropriately and rigorously designed studies that have examined the issue [216, 217]. This research question could be addressed by a longitudinal study with a large sample that controls for a variety of risk factors. Whether the effect of the age of drinking onset remains after such adjustments is yet to be answered. The importance of drinking status at the age of 15/16 for the level and pattern of drinking at age 17/18 could be demonstrated by such a study.

## **2.7 Theory**

In this section, useful theoretical frameworks will be described. These may partly explain, support, and facilitate our understanding of the role drinking has for adolescents today. It starts off by introducing the notions related to the crucial question of whether this generation’s drinking habits will have a lasting impact or not. This is followed by a brief presentation of the Problem Behavior Theory that posits that starting to drink during adolescence is an important milestone towards an adult role in a context where alcohol consumption is normal and expected. Additionally, this theory also describes that problems tend to cluster among groups of individuals. The other model outlined is the Psychosocial Acceleration Theory, an idea of drinking as a matter of timing in development and why this timing may vary between individuals. These serve as preconceptions that will be discussed in relation to study findings in the discussion section.

### **2.7.1 Adolescent-limited or life-course-persistent habits?**

A core topic brought up by quantitative research on youth drinking concerns the forecasts of contemporary adolescents' drinking habits as adults.

A fundamental assumption in Theory of Generations [218, 219] is that people are affected by sociohistorical conditions during their upbringing and that different conditions during the time when different birth cohorts grow up have a lasting impact on their values and behaviors. One key point in the decline in adolescent drinking is whether this shift reflects a larger change in drinking culture or if it is just a manifestation of a postponed and delayed drinking onset. This matter is crucial regarding its potential consequences, as it either points to long-lasting cohort effects that render this generation likely to drink less throughout their whole life course or to time-limited health benefits mainly during adolescence. Today, it is not clear whether the restricted approach to alcohol in this cohort is a temporary or lasting tendency [220-227].

There is currently not enough evidence to determine whether the drinking habits of this cohort of adolescents will remain more moderate than previous generations' as they grow older. The current indicative results are mixed. Some studies suggest that this birth cohort will catch up and drink as much as previous generations once they enter adulthood [225]. Other research found a similar catching-up phenomenon but found some evidence that this not was a universal pattern covering all adolescents, as non-drinkers with few behavioral problems appeared somewhat protected against future drinking [224]. Contrasting studies forecast that this sober generation will drink less as adults than previous generations [228]. Whether this will be "A Dry Generation" remains to be assessed in future. The study period covered in this thesis will not be long enough to make any final assessment, but preliminary conclusions will be drawn based on the indications of the present empirical evidence.

### **2.7.2 Maturity as focal point**

A possible approach to theorize this issue is by focusing on maturity.

Maturation is a central element of this period of life, perfectly illustrated by the term “Adolescent” coming from the Latin verb “adolescere”, which translates to “grow up” [130]. We have witnessed a major socio-cultural shift among the new generation of adolescents, which may or may not entail a wider change in the drinking culture of future adults. Alongside the drop in drinking, there is a general change in behavior, with declining rates of smoking, crime, sexual intercourse, taking a driving license, and working for pay also observed among adolescents [1, 20, 21, 24–26]. An increased proportion of young adults continue to live in their parents’ home [229]. Taken together, this suggests that we are witnessing a change in age norms. Viewed from a broader perspective, these trends largely indicate a new zeitgeist and a transformed meaning of adolescence.

### **2.7.3 Non-drinking immaturity**

According to Jessor’s Problem Behavior Theory, starting to drink is perceived as a normal and important *developmental milestone* in adolescence. It is a *transition-marking* behavior signifying taking steps towards adulthood. In its essence, Problem Behavior Theory shares common ground with Moffitt’s theory on the Maturity Gap [230, 231], as both posit that adolescents use alcohol for the purpose of wanting to feel and be perceived as mature. Drinking is expected when growing up and coming of age, as adults normally drink [18, 232]. This may suggest that today’s sober adolescents are more immature and are growing up more slowly as they delay transitioning to adulthood by not engaging in adult-like activities to the same extent as prior generations.

### **2.7.4 Non-drinking maturity**

In contrast to the view of contemporary adolescents as more immature, other researchers put forward contrasting narratives. A crucial topic brought up in qualitative research on youth drinking concerns the mature attitude among contemporary adolescents. Studies have found emerging adults to emphasize being responsible, considerate, and in control in ways that signal maturity [11]. In

terms of self-control, personal responsibility, and health choices, individualism has emerged as a guiding principle that young people have learned to follow, resulting in moralistic attitudes towards unhealthy behaviors such as heavy drinking [233-235]. This mature lifestyle highlights the importance of productive pursuits and disciplined pleasure [233]. These attitudes and values are attributed to contemporary neoliberal doctrines on individual responsibility and public health discourses on risks as ways to cope with present societal demands [11, 233, 234]. In line with such neoliberal ideas, young Swedish cannabis users in treatment have recently also been found to portray substance use as a bad individual choice among irresponsible risk-takers without consideration of influences from social conditions and structural factors [236]. Young people are perceived as well-mannered, sensible, tidy, and disciplined. Contemporary youth's emphasis on personal responsibility and a strong belief in being able to control all the powerful forces at play that influence human behavior, can be interpreted as them having a mature mindset early.

#### **2.7.5 Slow and fast life strategy**

The Psychosocial Acceleration Theory [237, 238] may contribute another perspective on this issue. The foundation of this theory is based on an evolutionary understanding of socialization [238], stemming from the Life-History Theory. The basic assumption is that early life experiences shape human development and that individuals adjust and respond to their contextual environment in a way that forms their general worldview, outlook, and predicted future life.

The central idea of this theory is that these experiences actually affect the *pace* and *timing* of maturity, puberty, and associated behaviors. This is illustrated by distinguishing two ways of handling life decisions: A future-oriented "*slow life strategy*" and a present-oriented "*fast life strategy*". These two strategies point to the generally conflicting goals in terms of the trade-off between focusing on short-term consumption and long-term investment.

Future forecasts are decisive in whether one should prioritize present or forthcoming opportunities. A slow strategy might make a person more inclined to focus on health behaviors and accumulate abilities and resources for future use, while a person adopting a fast strategy may consider it more rational to make the most out of the present situation, seek immediate pleasure, and be more prone to engage in risky behaviors.

By using the gaze that these theoretical conceptions provide, study results can be contextualized into a broader understanding of the potential role drinking has for the new generation of adolescents. In the discussion section, I draw on these theories and concepts put forward in other research to discuss the study results from a wider perspective.

## **2.8 The rationale for this thesis**

This section describes the urgency and the need for this research project.

Adolescent drinking has steeply declined in most high-income countries in the last 20 years. In Sweden, this decline has been particularly striking. At the same time, other behaviors among adolescents are changing. There is a need to understand underage drinking in today's setting and update our knowledge of its related factors.

Given the extensive decline in youth drinking, research is needed to understand the current conditions better. Many adolescents still drink, which motivates examining factors related to contemporary alcohol use. Population studies on alcohol consumption have traditionally been dominated by a focus on total consumption, alcohol-related harm, and alcohol policy. This thesis adds to the research field by exploring psychosocial aspects related to drinking and evaluating the importance of when a person starts drinking. Most previous population studies have used cross-sectional data, and this thesis contributes to the field with longitudinal results.

Alcohol consumption is a major public health issue, and population studies



using epidemiological designs can provide an extensive picture of how common drinking and its related factors are. The benefit of a quantitative approach is the ability to compare and test systematic differences and similarities among groups to find correlations and predictors. A nationwide study with a large and random sample is suited to providing more general conclusions about the study subjects. Surveys are a very efficient method to acquire detailed personal information about larger groups.

### 3 RESEARCH AIMS

The overarching aim of this thesis is to improve our understanding of alcohol use during mid-to-late adolescence among contemporary youth. The focus is on examining psychosocial factors that are cross-sectionally associated with and longitudinally predictive of various forms of drinking. The thesis will provide knowledge on factors related to adolescent alcohol use and how the age of onset impacts subsequent drinking habits.

More specifically, this aim will be addressed by the following research questions:

Study I: What is the motivation for drinking, and how are motives associated with drinking?

Study II: How are general and institutional trust associated with concurrent drinking/non-drinking?

Study III: How are psychosocial factors related to drinking/non-drinking over time?

Study IV: Does the age of onset have an independent effect on subsequent drinking?

## 4 Materials and Methods

This chapter describes the methods used in each study. Table 1 provides an overview of the data and methodological approaches used in the four studies.

**Table 1.** Methodological overview of each included study.

	<b>Study I</b>	<b>Study II</b>	<b>Study III</b>	<b>Study IV</b>
<b>Design</b>	Cross-sectional	Cross-sectional	Longitudinal	Longitudinal
<b>Data</b>	Baseline (T1)	Baseline (T1)	Baseline (T1) Follow-up (T2)	Baseline (T1) Follow-up (T2)
<b>Age</b>	15/16	15/16	15–18	15–18
<b>Participants</b>	5,549	5,549	4,018	4,018
<b>Predictors</b>	Drinking motives	General and institutional trust	Psychosocial factors (T1)	Early age of onset (T1)
<b>Outcomes</b>	Drinking frequency Heavy drinking frequency	Past year drinking status	Longitudinal drinking status (past year drinking T1+T2)	AUDIT-C (T2) Risky drinking (T2) Binge drinking monthly (T2)
<b>Statistics</b>	Mean values Confidence intervals Confirmatory factor analysis Mann–Whitney U Spearman correlation Linear regression R-squared Interaction analysis	Mean values Prevalence rates Confidence intervals t-test Chi-square Pearson correlation Logistic regression Interaction analysis	Mean values Confidence intervals t-test Absolute/relative change Spearman correlation Logistic regression	Mean values Prevalence rate Confidence intervals t-test Spearman correlation Linear regression Logistic regression R-squared Interaction analysis
<b>Covariates</b>	Sex	Sex Parents' rules Parents' control Parents' support Health/well-being School satisfaction Economic disadvantage	Sex Economic disadvantage Parents' alcohol problems	Sex Sensation-seeking Impulsivity Aggressivity Emotional symptoms Peer problems Conduct problems Hyperactivity Parents' permissiveness of drunkenness Alcohol problems among parents Drinking/drunkenness among friends

#### **4.1 The Futura01 project**

The studies included in this doctoral thesis are solely based on data from a larger research project named Futura01. This project aims to follow a national cohort of Swedish adolescents born in 2001 into the future to investigate changes over time, long-term associations, and causal inference. A primary focus is how drinking habits evolve and form during adolescence.

#### **4.2 Baseline data collection**

A randomized sample of Swedish schools was drawn to be surveyed, and one class in each school was asked to answer a paper-and-pen questionnaire. The sampling was conducted by Statistics Sweden (Statistiska centralbyrån, SCB) with instructions to select 500 random Swedish schools within primary education that serve 9th-grade students. This sample was drawn from the nationwide pool of schools, and a proportional-to-size sampling design was applied so that the probability of inclusion stood in proportion to the number of students in the school. Larger schools with many registered pupils thus had a higher probability of being selected than smaller schools with fewer pupils. After this sampling procedure, the schools were contacted with a request to specify the number of 9th grade classes and the number of pupils in each of those classes. 460 schools provided information on the number of classes and pupils. One class in each participating school was randomly chosen and asked to be part of the study in a second step. A proportional-to-size sampling design was used again in the selection of classes. All pupils in the included classes were then asked to participate in the study. Altogether, 343 schools decided to participate in the study, which corresponds to a participation rate of 68.6% among the selected schools.

In total, 6,777 students were in school on the day the survey was carried out. 21.5% of the pupils were absent on the survey day, of which 43.5% were absent due to illness, 36% due to other valid reasons, and 20% were absent for invalid reasons. Reminders were sent out during the baseline data-collecting phase between March and May 2017. After this phase, 5,576 individuals had filled out

the questionnaire and given their informed consent to participate. 778 pupils did not want to be part of the study, 269 did not fill out an informed consent to participate, and 154 filled out unreadable digits that made them impossible to identify. 19 participants were excluded due to not answering crucial questions, and eight were excluded due to overly repeated, unrealistic, or contradictory responses. This procedure finally resulted in a study sample of 5,549 respondents, corresponding to an individual response rate among study participants of 81.9%.

### **4.3 Follow-up data collection**

In the Futura01 survey, the pupils were also asked to declare their Personal Identity Number on a sheet that was separate from but linked to the questionnaire they filled out. This made it possible for the participants to be contacted again.

In 2019, two years after baseline, a follow-up data collection (T2) was carried out. A revised questionnaire and cover letter were sent to the listed home addresses of baseline respondents. The respondents could choose to answer the questionnaire either on paper or digitally. The cover letter provided a link and a quick response code for answering the questionnaire online. The questions in the web survey were identical to the physical copy they received in their private mailbox. More than four out of five (82.2%) used the digital questionnaire, and less than one in five (17.8%) used the paper version. A total of 4,018 of the original respondents (72.4%) participated in the follow-up survey. At this time, almost the entire sample was attending secondary education (98.1%). The respondents were reimbursed for their participation with two movie tickets.

#### 4.4 Measurements

The measures used in each of the four studies can be seen at a glance in Table

2.

**Table 2.** Measurements overview of each included study.

		Study I	Study II	Study III	Study IV
<b>Exposures</b>	Drinking motives	X			
	General trust		X		
	Institutional trust		X		
	General health/well-being		X	X	
	Psychosomatic problems			X	
	Psychiatric medication			X	
	School enjoyment/satisfaction		X	X	
	Emotional symptoms			X	X
	Peer relationship problems			X	X
	Prosocial ability			X	
	Satisfaction with father relationship			X	
	Satisfaction with mother relationship			X	
	Satisfaction with friend relationships			X	
<b>Outcomes</b>	Past year drinking status		X		
	Longitudinal drinking status			X	
	The age of drinking onset				X
	Drinking frequency	X			
	Heavy drinking frequency	X			
	AUDIT-C				X
	Risky drinking				X
	Binge drinking monthly or more often				X
<b>Covariates</b>	Sex at birth	X	X	X	X
	Parents' rules		X		
	Parents' control		X		
	Parents' support		X		
	Economic disadvantage		X	X	
	Alcohol problems among parents			X	X
	Impulsivity				X
	Sensation-seeking				X
	Aggressivity				X
	Conduct problems				X
	Hyperactivity				X
	Parents permissiveness of drunkenness				X
	Drinking and drunkenness among friends				X

The measurements will be described in detail below. The original source for each measure is referred to for validated or previously used measurements, and in the absence of reference, the measure is to be considered exploratory.

#### 4.4.1 Exposures

In Study I, drinking motives were examined. Drinking motives were measured at baseline with the question: "If you think about the times you were drinking during the past 12 months, how often was it because of...". The question was followed by a list of 18 reasons to drink taken from the Modified Drinking Motives Questionnaire-Revised (Modified DMQ-R) [175]. The five possible response options were: (1) "Never", (2) "Seldom", (3) "About half of the times", (4) "Most often", and (5) "Always". The different items were combined in accordance with the Modified DMQ-R and were further tested by confirmatory factor analysis. This resulted in a five-factor model with composite mean score scales of social, enhancement, coping depression, coping anxiety, and conformity motives, and the internal consistency and inter-item reliability were good to excellent with a Cronbach Alpha range of 0.77-0.89.

In Study II, two dimensions of trust were examined. The items were selected from the Organisation for Economic Co-operation and Development's data bank on social capital [239] and then customized for the target population. Institutional trust was measured at baseline with five items using the question: "How much do you normally trust...". The five items for the institutional trust were: (a) "Parliament and government", (b) "The justice system (police and courts)", (c) "Teachers", (d) "News (TV, Radio)", and (e) "Researchers and experts". The four possible response options were: (1) "Very much" (2), "Fairly much", (3) "Not that much", and (4) "Not at all". As the response options were in reversed order, the order was converted to facilitate interpretation so that a higher value indicated higher trust. Then, a composite mean score scale for institutional trust was created based on the five items, and the internal consistency and inter-item reliability were good, with a Cronbach Alpha of 0.77.

General trust was measured at baseline with five items: "Now consider society as a whole and mark the alternative that best corresponds with how you feel". The five items for the general trust were: (a) "One can trust most people", (b)

“One can never be too careful when meeting strangers”, (c) “Most people are trying to be helpful”, (d) “Most people mainly care about themselves”, and (e) “Most people are honest”. The four possible response options were: (1) “Totally correct”, (2) “Partly correct”, (3) “Partly incorrect”, and (4) “Totally incorrect”. The response options were in reverse order except for items (b) and (d). For this reason, the order was converted to facilitate interpretation, so a higher value indicated higher trust in all items. Then, a composite mean score scale for general trust was created based on the five items, and the internal consistency and inter-item reliability was not satisfactory, with a Cronbach Alpha of 0.59. This was managed by omitting item (b), which resulted in a final adequate Cronbach Alpha of 0.70.

Cross-combinations of the two trust dimensions were also utilized. Relative cut-off points were derived by splitting the variables by the median value into two low and two high trust variables. This allowed combining them into four cross-dimensions: high/high, high/low, low/high, and low/low. Those with an above-median level of institutional and general trust in the high/high group and so on.

In Study II and III, general health/well-being was examined. Note that general health/well-being was used as an exposure in Study III, and as a covariate in Study II. General health/well-being was measured at baseline with the question: “If you consider your health, how would you say that you feel?”. The five possible response options were: (1) “Very well” (2), “Quite good”, (3) “Neither good nor bad”, (4) “Quite bad”, and (5) “Very bad”. As the response options were in reversed order, the order was converted to facilitate interpretation so that a higher value indicated better health.

In Study III, psychosomatic problems were examined. They were measured at baseline with the question: “During the past six months, how often have you...”. The five items for the psychosomatic problems were: (a) “...had a stomach-



ache", (b) "...felt stressed", (c) "... had difficulties keeping awake during class", (d) "had trouble falling asleep", and (e) "had a headache". The five possible response options were: (1) "Every day", (2) "A few times a week", (3) "Once a week", (4) "A few times a month", and (5) "More seldom or never". As the response options were in reversed order, the order was converted to facilitate interpretation so that a higher value indicated more problems. Then, a composite mean score scale for psychosomatic problems was created based on the five items with a Cronbach Alpha of 0.73.

In Study III, psychiatric medication was examined. This was measured at baseline with the question: "Have you ever received a drug prescription from a physician for...". The three items for the psychiatric medication were: "Depression (e.g., Fluoxetine, Olanzapine, Zoloft)", "Sedatives and anxiety relievers (e.g., Theralen, Sobril, Olanzapine)", and "Sleeping problems (e.g., Imovane, Propavan, Zopiclone)". The three possible response options were: (1) "Yes", (2) "No", and (3) "Do not know". From this, three new variables were created: affirmative responses were coded as (1), negative responses as (0), and "Do not know" responses as missing values. Then, a composite mean score scale for psychiatric medication was created based on the three new variables, and the internal consistency and inter-item reliability were adequate, with a Cronbach Alpha of 0.69.

In Study II and III, school enjoyment/satisfaction was examined. Note that school enjoyment/satisfaction was used as an exposure in Study III, and as a covariate in Study II. School enjoyment/satisfaction was measured at baseline with the question: "How do you enjoy school?". The five possible response options were: (1) "Very much" (2), "Pretty well", (3) "Neither well nor badly", (4) "Pretty bad", and (5) "Very badly". As the response options were in reversed order, the order was converted to facilitate interpretation so that a higher value indicated a higher enjoyment/satisfaction.

In Study III and IV, emotional symptoms and peer relationship problems were examined, and in Study III, prosocial ability was additionally examined. Note that emotional symptoms and peer relationship problems were used as exposures in Study III, and as covariates in Study IV. Emotional symptoms, Peer relationship problems, and Prosocial ability were measured at baseline with the question: "How do the following statements correspond with how you are as a person?" The question was followed by five statements for each concept from the instrument The Strengths and Difficulties Questionnaire [240] for 11-17-year-olds. The three possible response options were: (1) "Not correct", (2) "Partly correct", and (3) "Absolutely correct". The values of each variable were subtracted by one so that the "Not correct"-response was equal to zero. After this, three separate composite sum score scales (0-10) were created for Emotional symptoms, Peer relationship problems, and Prosocial ability. This instrument has been tested on this sample and these results are reported elsewhere [241].

In Study III, satisfaction with three different relationships was examined. Satisfaction was measured at baseline with the question: "How satisfied are you usually with...". The question was followed by three items: (a) "the relationship with your mother", (b) "the relationship with your father", and (c) "the relationship with your friends?". The five possible response options were: (1) "Very satisfied", (2) "Satisfied", (3) "Not so satisfied", (4) "Not satisfied at all", and (5) "Not applicable/Do not know". As the response options were in reversed order, the order was converted to facilitate interpretation so that a higher value indicated a better relationship. The "Not applicable/Do not know"-responses were coded as missing values.

#### **4.4.2 Outcomes**

In Study II, III, and IV, drinking status, longitudinal drinking status, and the age of onset were examined. These three constructs were derived as separate measures using the same question: "Have you ever drunk alcohol? (Do not

count beverages below 2.8%, such as light beer or weak cider)". This item were taken from the Swedish Council for Information on Alcohol and Other Drugs national school surveys [242]. Note that the age of onset is used as an exposure in Study IV. The four possible response options were: (1) "No", (2) "Yes, during the past 30 days", (3) "Yes, during the past 12 months", and (4) "Yes, more than 12 months ago".

In Study II, the response options (0) "No" and (1) "Yes, during the past 12 months" were applied as drinking status. In Study III, cross-combinations of the two data points were utilized for longitudinal drinking status based on past year drinking status, resulting in four separate combinations: "Abstainers" (non-drinking at both T1 and T2), "Later drinkers" (non-drinking at T1, drinking at T2), "Early drinkers" (drinking at both T1 and T2), and "Ex-drinkers" (drinking at T1 and non-drinking at T2). In Study IV, two data points were used, and reports of the past year drinking at both baseline and follow-up were coded: (1) "Early drinking onset" while non-drinking at baseline and past year drinking at follow-up were coded: (0) "Late drinking onset". Persistent non-drinkers and ex-drinkers who had stopped drinking after baseline were coded as missing values in Study IV.

In Study I and IV, drinking frequency was examined. In Study IV, drinking frequency constitutes one-third of the AUDIT-C and risky drinking measures (described in detail later in the text). Drinking frequency was measured at baseline with the question: "How often do you drink alcohol?". This item comes from the Alcohol Use Disorders Identification Test (26). The five possible response options were: (1) "Never", (2) "About one time a month", (3) "2-4 times a month", (4) "2-3 times per week", and (5) "4 or more times a week". An annual drinking frequency was created based on the response options multiplied by an estimation of what it could result in over the course of a year: (0) "Never", (12) "About one time a month", (36) "2-4 times a month", (130) "2-3 times per

week", and (208) "4 or more times a week".

In Study I, heavy drinking frequency was examined. This frequency was measured at baseline with the question: "How often do you drink six such 'drinks' or more on the same occasion?" This item is from the Alcohol Use Disorders Identification Test (26). The question was followed by an illustration of the amount of different types of beverage that would equal one standard drink: 50 cl low-alcohol beer, 33 cl strong beer, one glass of wine, and 4 cl of spirits. The five possible response options were: (1) "Never", (2) "More seldom than once a month", (3) "Every month", (4) "Every week", and (5) "Daily or almost every day". An annual heavy drinking frequency was created based on the response options multiplied by an estimation of what it could result in over the course of a year: (0) "Never", (6) "More seldom than once a month", (12) "Every month", (52) "Every week", and (260) "Daily or almost every day".

In Study IV, AUDIT-C was examined. AUDIT-C was measured at the follow-up (T2) using three questions capturing alcohol consumption. These three items come from the Alcohol Use Disorders Identification Test (AUDIT) [243]. Drinking frequency and heavy drinking frequency have been described in detail previously in the text. The third part of the AUDIT-C measure was drinking quantity and was measured with the question: "How many 'drinks' (see example below) do you approximately drink when you drink alcohol?". An illustration of the amount of various alcoholic beverages that would equal one standard drink was used to help respondents answer the questions: 50 cl low-alcohol beer, 33 cl strong beer, 1 glass of wine, and 4 cl of spirit. The values of the three variables were subtracted by one so that each variable ranged from 0-4. A composite sum score scale (0-12) for AUDIT-C was created from drinking frequency, heavy drinking frequency, and drinking quantity.

In Study IV, risky drinking was examined. Risky drinking was measured at follow-up using the same items as AUDIT-C and was created from the AUDIT-C sum

scale with a cut-off of four points. This resulted in 0–3 points indicating (0) “Non-risky drinking”, and 4–12 points indicating (1) “Risky drinking”.

In Study IV, binge drinking was examined. Binge drinking monthly or more often was measured at follow-up using the item for heavy drinking frequency in the AUDIT-C instrument. A binary variable was created, resulting in (0) for “Never”, and “More seldom than once a month”, a (1) for “Every month”, “Every week”, and “Daily or almost every day”.

#### **4.4.3 Covariates**

In Study I-IV, sex at birth was examined. Sex was derived from the participants’ Personal Identity Numbers reported at baseline. This number is assigned at birth or upon immigration to Sweden and is listed in the Swedish population register. The second-to-last digit specifies the assigned biological sex, with an odd digit for boys and an even digit for girls. A binary variable was created, resulting in (0) for girls, and (1) for boys.

In Study II, three dimensions of parenting were examined. Parenting was measured at baseline with the question: “How well do the following statements apply to you?”. Six items were used to capture three dimensions: parents’ rules, control, and support. For parents’ rules, the two items were: (a) “My parent/parents have firm rules for what I can do at home” and (b) “My parent/parents have firm rules for what I can do outside home”. For parents’ control, the two items were: (c) “My parent/parents are aware of whom I am with during the evenings” and (d) “My parent/parents know where I am during the evenings”. For parents’ support, the two items were: “I can easily receive warmth and care from my mother and/or father” and “I can easily receive emotional support from my mother and/or father”. The five possible response options were: (1) “Almost always”, (2) “Often”, (3) “Sometimes”, (4) “Seldom”, and (5) “Almost never”. As the response options were in reversed order, the order was converted to facilitate interpretation so that a higher value indicated more involved parenting. After this, three composite mean score scales were

created for each dimension. The internal consistency and inter-item reliability were good to excellent, with Cronbach Alphas of 0.74–0.88.

In Study II and III, economic disadvantage was examined. Economic disadvantage was measured at baseline with three questions: (a) "If you suddenly needed 200 SEK by tomorrow, to for example go to the cinema, could you afford it yourself?", (b) "Think back on the past 12 months. Has It happened that you have been unable to purchase something that you wanted to have and others your age have because you could not afford it?", and (c) "Think back on the past 12 months. Has it happened that you have been unable to join your friends on something because you could not afford it?" The four possible response options were: (1) "Yes", (2) "No", (3) "Do not know", and (4) "Do not want to answer". The response option "No" on the first item, and "Yes" on the two other items indicated an economic disadvantage. The two response options, "Do not know", and "Do not want to answer", were coded as missing values. Then, a composite mean score scale was created. The internal consistency and inter-item reliability was acceptable, with a Cronbach Alpha of 0.62.

In Study III and IV, parents' alcohol problems/alcohol problems among parents were examined. These problems were measured at baseline with the statement: "Here follows some questions about your parents and alcohol" using six items from the Children of Alcoholics Screening Test (CAST-6) [244]. The two possible response options were: (1) "Yes" and (0) "No". A composite sum score scale (0–6) for parents' alcohol problems was created, with an affirmative response on each variable indicating one point. The internal consistency and inter-item reliability was excellent, with a Cronbach Alpha of 0.84.

In Study IV, impulsivity, sensation-seeking, and aggressivity were examined. They were measured at baseline with the question: "How well do the following

statements apply to you?" The three items for Impulsivity were: "I often do things impulsively without thinking in advance", "I try to avoid difficult tasks", and "I do what I feel like, without considering whether it is good or bad in the longer term". Four of the six items for Sensation-seeking came from the Brief Sensation-Seeking Scale (BSSS-4) [245, 246], and two came from other tested items [247]. The two items for aggressivity were: "It's quite easy for me to get angry", and "When I get angry, I have a hard time not screaming, slamming doors and such". The five possible response options were: (1) "Not at all", (2) "Quite badly", (3) "Neither nor", (4) "Quite well", and (5) "Completely correct". Three composite mean score scales were created for each trait. The internal consistency and inter-item reliability were acceptable to excellent, with a Cronbach Alpha of 0.62 for impulsivity, 0.88 for sensation-seeking and 0.70 for aggressivity.

In Study IV, conduct problems and hyperactivity were examined. These were measured at baseline with the question: "How do the following statements correspond with how you are as a person?" The question was followed by five statements for each concept from the instrument The Strengths and Difficulties Questionnaire [240] for 11-17-year-olds. The three possible response options were: (1) "Not correct", (2) "Partly correct", and (3) "Absolutely correct". The values of each variable were subtracted by one, so that the "Not correct"-response was equal to zero. After this, two separate composite sum score scales (0-10) for conduct problems and hyperactivity were created. This instrument has been tested on this sample and these results are reported elsewhere [241].

In Study IV, parents' permissiveness of drunkenness was examined. Parents' permissiveness of drunkenness was measured for each parent at baseline with the question: "What do you think your mother's/father's reaction would be if you did the following?" The question was followed by the statement: "Drinking until you are drunk". The five possible response options were: (1) "She/He would

absolutely not allow it", (2) "She/He would try to stop it", (3) "She/He would not care", (4) "She/He would accept it", and (5) "Do not know". The "Do not know"-responses were coded as missing values. After this, a composite sum score scale (0-4) was created, combining both parents' permissiveness of drunkenness. The internal consistency and inter-item reliability was good, with a Cronbach Alpha of 0.80.

In Study IV, drinking and drunkenness among friends were examined. These were measured at baseline with the question: "How many of your friends do you believe...". The question was followed by the statements: "Drink alcohol (beer, cider, alcopop, wine, spirit) and "Get drunk". The five possible response options were: (1) "None", (2) "Few", (3) "Some", (4) "Most", and (5) "All". The values for each variable were subtracted by one, so that the "None"-response was equal to zero. A composite mean score scale (0-4) for drinking and drunkenness among friends was created. The internal consistency and inter-item reliability was excellent with a Cronbach Alpha of 0.92.

#### **4.5 Statistics**

The statistical methods chosen to analyze the data in each of the studies were, on the one hand, based on the nature of the research question stated in each study, and on the other hand, chosen to fit the structure of the available data source.

In all four studies, information on the variables of interest in the dataset was initially acquired by employing a measure of the central point. This was used to gain summarized knowledge of data into a single central value representing the entire distribution of different subgroups studied. As Likert scales were mainly used in the survey and outliers were generally absent, mean values were used as the average in the first analytic step in all four studies. In cases with only a binary variation, as in the absence or presence of an attribute, prevalence rates (%) were also used. In order to obtain the spread and variance from the central value, a 95% confidence interval was used as the measure to estimate the



precision and degree of certainty in all studies. P-values were also used to assess the significance of differences between groups.

In determining significant group differences, Mann-Whitney U, and *t*-tests were used for numerical data and Chi-squared tests were used for categorical data. Study-specific methods were also used. For example, confirmatory factors analysis was used in Study I to test and validate different models of drinking motives, and absolute (T2-T1) and relative (%) change over time was examined in Study III.

To ensure that the measures used in each study were independent and that no multicollinearity was present, this was tested using Spearman correlation or Pearson correlation. The included studies used two different regression analyses: linear and logistic regression models. The choice between the two was made depending on the data structure, i.e., the number of values of the outcome variable of interest, and on whether the focus of the research question was to examine the presence or absence of an attribute, or if the degree of an attribute was the main interest. For all regression models, a clustered standard error was applied. As the sampling procedure was made on a random selection of schools and not of individuals, responses from participants at the same school may be more alike and correlated. Consequently, that would narrow the spread and variance in estimates of the attributes of interest. This was adjusted for by controlling for a variable containing the different schools. In the first and the last study, R-squared (and pseudo R<sup>2</sup>) was used to estimate how much the different statistical models could explain the variation in the outcome variable. This was also used to examine the relative contribution of different variables in explaining outcomes. To further some analysis, additional interaction terms were used to explore if associations found were altered and, thus more or less valid for different subgroups when combined with other factors.

#### **4.6 Ethical considerations**

There are many ethical aspects to consider when conducting research. For this project, one of the most urgent issues was related to the safety, interest, and integrity of the research subjects. To guarantee that the participants did not feel obliged to take part, the study was described to them in a cover letter on the first page of the questionnaire to enable them to make an informed decision. Written informed consent was necessary for study participation. The baseline questionnaire was completed under exam-like conditions to ensure that students could not see each other's responses. The front sheet contained the consent form, and their identity was kept separate from the questionnaire and submitted in with a different envelope.

Information on the possibility of revoking their consent at any time was provided in written text, along with information on whom to contact to do so. Participants who wished to withdraw from the study were not obliged to give their reasons.

This research project has been carried out with the best intentions. However, potential risks have been identified. First, it was necessary to consider how the research project's data collection process may have affected the research subjects. One risk identified in the included studies is the risk of provoking emotional reactions or reflections upon distressing topics. The questionnaire used contained questions on mental health, abuse and addiction, victimization, bullying, violence, and criminal activities. This is sensitive information which may evoke memories of traumatic experiences among some individuals. This might cause discomfort, emotional and mental harm. For this reason, contact details for various organizations that support young people were provided on the last page of the questionnaire.

The benefit of conducting this research is increased knowledge and improved ability to identify vulnerable groups of adolescents in need of support and by

extension, reduce alcohol-related harm with potential gains for society at large.

Another ethical issue related to this data is the use of individuals' Personal Identity Numbers. As each number is unique, access to this number would make it easy to identify the study participants, which may entail a risk of leakage of sensitive personal information and introduce bias in the analysis process. The Principal Investigator pseudonymized the data when the database was put together to safeguard participants' identity, respect their privacy, and protect their confidentiality. Code Numbers replaced the Personal Identity Numbers, and the code key that linked them together was kept carefully separated and securely stored under the protection of the Principal investigator. This means that information acquired from the participants during this research project was not singled out, attributed, and tracked back to the identity of the individual responding to the questionnaire. Beyond the Principal Investigator, this applies to all team members involved in the research of this project, as encoded data were used. Data were only shared among colleagues conducting research within the Futura01 project. To prevent leaks of personal data, unauthorized individuals getting access to data, or any breach of the integrity of study participants, identifiable data were physically separated and stored in a vault. The pseudonymized data sets were not stored directly on the computer. Instead, all files were stored behind secure digital shelters.

During the writing process, the ethical implications of language use were kept in mind. This meant consideration of the portrayal of groups of adolescents. More specifically, this involved avoiding stigmatizing, trivializing, and degrading terms. Quantifications of individuals behaviors, conditions, and attitudes are simplifications that do not fully capture the complexity of reality. The risk is that simplification leads to overgeneralization. These generalizations can exaggerate differences between people and result in stereotyping. Person-centered language has been applied where possible, and one-dimensional

portraits have been addressed and nuanced to avoid defining persons based on single traits.

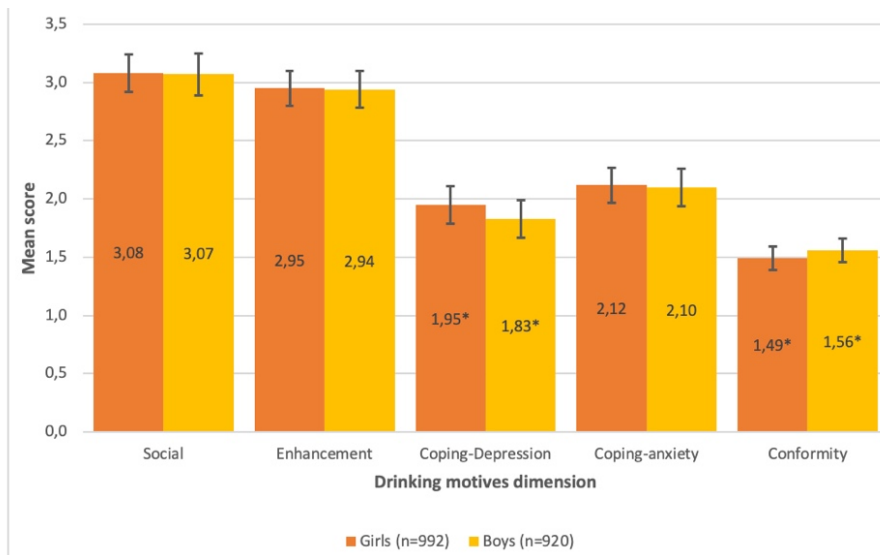
According to Swedish law, all data collected during a research project shall be archived in an orderly fashion [248]. All data must be archived for at least ten years after the completed research. This research project and all included studies have received ethical approval from the Regional Ethical Review Board in Stockholm (Dnr 2017/103-31/5).

## 5 RESULTS

In the chapter that follows, the overall findings of the studies conducted within this research project are presented.

### 5.1 Summary statistics of cross-sectional findings

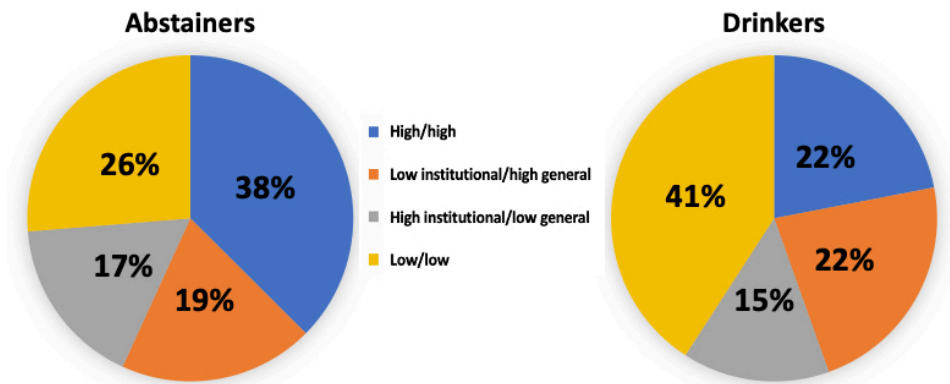
Descriptive explorations of the motivation behind drinking from Study I are shown in Figure 6. Adolescents aged 15/16 were shown to primarily be socially motivated, as social motives were the most common driving force. Enhancement motives followed closely as the second most frequently reported motivation for engaging in alcohol use. The three remaining motives were shown to be markedly less common. However, the coping-anxiety motive was revealed to be in third place, followed by the coping-depression motive. The least common among the examined motives was found to be conformity motives. Girls were slightly more likely to score higher on coping-depression motives, whereas boys reported somewhat higher on conformity motives.



**Figure 6.** Mean values and 95% confidence intervals of each drinking motive scale for girls and boys. \*Indicates a significant difference.

In Study II, 38.4% were drinking, and 61.6% abstained at baseline when the study participants were aged 15/16. In cross-sectional examinations of trust related to drinking status at age 15/16, systematic differences were found. Adolescents who had been drinking during the past year attained lower levels of general and institutional trust than those who abstained from alcohol. There were significant differences in trust by drinking status on nine out of ten indicators across the two dimensions. Among the abstainers, 46% had low institutional trust, while the corresponding prevalence among drinkers was 63%. As for low general trust, 43 % of the abstainers reported this, versus 55% among the drinkers. In the cross-comparison of the two trust dimensions (see Figure 7), abstainers scored higher on both forms of trust, while alcohol users scored lower on both. The combination of low institutional and high general trust was more common among drinking adolescents. In contrast, abstainers were overrepresented in the high institutional-low general trust combination. No sex differences were found in how trust and drinking were related. With respect to covariates, abstainers were shown to have significantly higher parental control and support, self-rated health, and school satisfaction than the drinkers.

Conversely, economic disadvantages were more common among the drinking group of adolescents.



**Figure 7.** Relative comparison of different trust combinations by drinking status.

### 5.2 Correlations with drinking at age 15/16

Results from Study I on associations between drinking motives and alcohol use are shown in Table 3. Social motives were cross-sectionally shown to be positively linked to both drinking frequency and heavy drinking frequency. Enhancement motives were also positively related to both these indicators of drinking. For drinking frequency, the strength of associations with social and enchantment was at parity, as the confidence intervals of their estimates overlapped. However, of all five motives, enhancement had the strongest association with heavy drinking frequency. It surpassed the strength of social motives, which were second most strongly motive associated with this drinking indicator. Coping–depression motives also had positive associations with drinking frequency and heavy drinking frequency. The strength of coping–depression motives was third in the rank order of positive links. In contrast, conformity motives had negative associations with drinking frequency and heavy drinking frequency.

No associations were found for coping–anxiety motives, and no interactions with sex were found for any association. The five drinking motives together

explain 26% and 27% of the variation in drinking frequency and heavy drinking frequency, respectively.

The two examined dimensions of trust in Study II were shown to be closely related to adolescents drinking status (see Table 3). Both general and institutional trust were found to be correlates of past-year drinking. Higher reported scores on the trust indicators were found to be associated with a lower probability of drinking. Comparing the two trust dimensions, institutional trust had a consistently stronger negative link with drinking. These relationships were robust, as they remained after controlling for a range of covariates.

Among the covariates, economic disadvantages increased the probability of drinking, while sex (boys), self-rated health, and parental control decreased the probability. Adolescents with a high degree of economic disadvantage had an increased probability of drinking. In contrast, boys and those with high self-rated health and high parental control had a lowered probability of drinking.

The associations between trust and drinking were also found to be moderated by three factors. Interaction analysis showed that *parental control* and *parental support* modified the link with institutional trust, and *school satisfaction* modified the connection with general trust. When combined with the trust indicators, high scores on any of these three factors decreased the probability of drinking. For example, the probability of drinking among those with high trust was lowered further if they also had high school satisfaction or high parental support/control.

**Table 3.** The direction of associations between different factors and indicators of drinking at baseline (age 15/16).

	Drinking frequency	Heavy drinking frequency	Past year drinking
Social motives	↑	↑	
Enhancement motives	↑	↑	
Coping–depression motives	↑	↑	
Coping–anxiety motives			
Conformity motives	↓	↓	
General trust			↓
Institutional trust			↓
Boys			↓
Parental rules			
Parental control			↓
Parental support			
Self-rated health			↓
School satisfaction			
Economic disadvantage			↑

Notes: ↑=significant positive association, ↓=significant negative association.

### 5.3 Summary statistics of longitudinal findings

In Study III, abstainers, early drinkers, and later drinkers each comprised about one-third of the whole sample, while ex-drinkers only comprised 3 % of the sample. The prevalence of past-year drinking at T2 follow-up was 69.2% (early drinkers+late drinkers).

In investigations of factors predicting drinking status over time, a range of psychosocial factors were sought out. This included mental health and social factors at age 15/16 in predictions of drinking status over time from age 15/16 to 17/18. A summary of mean differences between drinking groups at baseline and follow-up is shown in Table 4.

Observations revealed that adolescents who abstained from alcohol and started drinking at a later age had better general health and school enjoyment at age 15/16 compared to those who began drinking at an earlier age. Abstainers and later drinkers also had fewer psychosomatic problems and used less psychiatric medication than early drinkers at this age. As for social aspects, early drinkers were the group with better friendship satisfaction and fewer peer problems compared to abstainers and later drinkers. Adolescents who stopped



drinking during the study period, the ex-drinkers, were also found to have more peer problems at age 15/16 than early drinkers. The opposite was seen regarding satisfaction with the relationship to parents and prosocial ability, as abstainers and later drinkers scored higher than early drinkers.

At age 17/18, two years after baseline, the differences in general health were equalized as the groups of abstainers and later drinkers experienced a more extensive impairment than the early drinking group. Psychosomatic problems remained most among the early drinkers, and least among abstainers, while later drinkers and ex-drinkers scored between these groups. However, with regard to change, the later drinkers had the greatest increase in psychosomatic problems, followed by the abstainers, while psychosomatic issues were largely unchanged among early drinkers and ex-drinkers. Abstainers experienced the smallest increase in school satisfaction, and early drinkers experienced the greatest increase. The group with the highest school satisfaction at age 17/18 were later drinkers.

The two non-drinking groups at age 17/18 had increased their peer relationship problems the most, and these groups now also experienced the most peer problems, while the two drinking groups experienced the least. The two groups that were not drinking at age 15/16 experienced the smallest increase in prosocial ability, and abstainers reported a lower level at age 17/18 compared to early drinkers. Abstainers continued to have the lowest friendship satisfaction, and early drinkers continued to report high satisfaction with friends. The relationship with parents worsened most for later drinkers, the group that started to drink, while it improved for ex-drinkers, the group that stopped drinking. At age 17/18, ex-drinkers and abstainers had higher satisfaction with parent relationships than early drinkers, and later drinkers had better relationship satisfaction with their fathers than early drinkers. Overall, this implies that drinking is related to a poorer relationship with parents and that starting to drink early in life is even more detrimental to this relationship.

**Table 4.** T1 and T2 characteristics by longitudinal drinking status.

Psychosocial characteristics at age 15/16 and age 17/18	Abstainers	Later drinkers	REF: early drinkers	Ex-drinkers
General health T1	+	+		
Psychosomatic problems T1	-	-		
Psychiatric medication T1	-	-		
School enjoyment T1	+	+		
Emotional problems T1				
Peer relationship problems T1	+	+		+
Prosocial ability T1	+	+		
Friendships satisfaction T1	-	-		
Satisfaction with relation to mother T1	+	+		
Satisfaction with relation to father T1	+	+		
General health T2				
Psychosomatic problems T2	-	-		-
Psychiatric medication T2	-	-		
School enjoyment T2		+		
Emotional problems T2				
Peer relationship problems T2	+			+
Prosocial ability T2	-			
Friendships satisfaction T2	-			
Satisfaction with relation to mother T2	+			+
Satisfaction with relation to father T2	+	+		+

*Notes: +/- Indicates significantly higher/lower mean scores than early drinkers.*

My final study 4. evaluated whether the age of drinking onset had any longitudinal impact on alcohol use at age 17/18. The age of drinking onset was shown to be strongly related to drinking habits. On all three indicators of alcohol use at age 17/18, the early-onset group scored higher than the late-onset group, as shown in Table 5. AUDIT-C scores were higher, and the prevalence of risky drinking and binge drinking monthly or more often were considerably higher among the group that started to drink earlier. Differences in covariates were also found (see Table 5). Sensation-seeking, impulsivity, and aggressivity were more common among the group with early onset. Peer problems were more common among those with late onset, while those with early onset had more conduct problems and hyperactivity. Alcohol-related indicators of the social environment showed that the early onset group had parents who were more permissive of drunkenness. This group also reported more alcohol problems among parents and higher levels of drinking and drunkenness among friends.

**Table 5.** Characteristics by age of drinking onset.

<b>Psychosocial characteristics at age 15/16 and age 17/18</b>	<b>Late onset</b>	<b>Early onset</b>
AUDIT-C score T2	-	+
Risky drinking T2	-	+
Binge drinking monthly or more often T2	-	+
Sex at birth (boy) T1		
Sensation-seeking T1	-	+
Impulsivity T1	-	+
Aggressiveness T1	-	+
Emotional symptoms T1		
Peer problems T1	+	-
Conduct problems T1	-	+
Hyperactivity T1	-	+
Parents' permissiveness of drunkenness T1	-	+
Alcohol problems among parents T1	-	+
Drinking and drunkenness among friends T1	-	+

*Notes: +/- Indicates significantly higher/lower mean scores when comparing the two drinking groups with different onset.*

#### **5.4 Predictors of drinking from age 15 to 18**

The directions of significant longitudinal associations related to drinking status throughout age 15–18 and drinking outcomes at age 17/18 are displayed in Table 6.

Many psychosocial factors were predictors of drinking status from mid-to-late adolescence. In Study III, psychosomatic problems and friendship satisfaction were shown to be negatively associated with abstainers and later drinkers, whereas psychiatric medication was only negatively linked with later drinkers. Peer relationship problems were positively associated with all three groups that were compared with early drinkers. Abstainers were most strongly linked to an increased probability of peer problems, followed by ex-drinkers and later drinkers. Emotional symptoms, prosocial ability, and satisfaction with the relationships to mother and father were related to an increased probability of being an abstainer or later drinker. School satisfaction was shown only to be associated with an increased probability of adolescents abstaining from alcohol use.

A few factors also proved to be predictors of change between the ages of 15/16 and 17/18. The significant associations described below are set in relation to the development of these factors for the reference group of early drinkers. Larger increases in psychosomatic problems were associated with abstainers and later drinkers. Increased relationship satisfaction with the father was related to being an ex-drinker. The opposing direction of association was found for prosocial ability as smaller increases compared to early drinkers were shown for abstainers and later drinkers. Smaller increases in use of psychiatric medication were associated with the group of ex-drinkers. Decreases in peer relationship problems and setbacks in the satisfaction of the relationship with the mother during the study period were linked to reports of initiating later drinking.

In the study of the timing of initiating drinking, the age of drinking onset was consistently found to be associated with all three indicators of alcohol use (see Table 6). In Study IV, the early onset of drinking predicted higher AUDIT-C scores and a higher probability of risky drinking and binge drinking monthly or more often compared with the later age of drinking onset. The crude model of the age of drinking onset explained 2.9% of the variation in monthly binge drinking, 4.5% of risky drinking, and 8% of the variation in AUDIT-C scores. The variation explained by the adjusted model was 6.8% for binge drinking monthly, 8.5% for risky drinking, and 15.1% for the AUDIT-C scores. As shown in Table 6, many of the explanatory factors were also found to be significantly positively related with all three drinking outcomes at follow-up: Boys, sensation-seeking, parents' permissiveness of drunkenness, and drinking and drunkenness among friends. Conduct problems were only significantly positively related with AUDIT-C. Negative associations with the three outcomes were only shown for peer problems. No interaction effect on any association was found for any of the included covariates.

**Table 6.** Predictors at baseline and their direction of influence on indicators of drinking from age 15/16 to 17/18.

	Abstainers	Later drinkers	Ex-drinkers	AUDIT-C	Risky drinking	Binge drinking monthly
General health						
Psychosomatic problems	↓	↓				
Psychiatric medication		↓				
School enjoyment	↑					
Emotional symptoms	↑	↑				
Peer relationship problems	↑	↑	↑	↓	↓	↓
Prosocial ability	↑	↑				
Friendship satisfaction	↓	↓				
Satisfaction with relation to mother	↑	↑				
Satisfaction with relation to father	↑	↑				
Age of onset (early)				↑	↑	↑
Sex (male)				↑	↑	↑
Sensation-seeking				↑	↑	↑
Impulsivity						
Aggressiveness						
Conduct problems				↑		
Hyperactivity						
Parents permissiveness of drunkenness				↑	↑	↑
Alcohol problems among parents						
Drinking and drunkenness among friends				↑	↑	↑

*Notes: Early drinkers were used as the reference group in comparison with abstainers, later drinkers, and ex-drinkers. ↑=significant positive association, ↓=significant negative association.*

## 6 DISCUSSION

This thesis sought to provide knowledge about drinking during mid-to-late adolescence. The overarching aim was to improve the understanding of contemporary adolescent drinkers and non-drinkers in Sweden. By conducting empirical studies on drinking motives, trust, psychosocial factors, age of drinking onset, and their association with alcohol use, this research project contributes new insights to this field of research.

In the following chapter, I first summarize the main findings of the included studies. Then, I discuss the results in relation to theoretical concepts presented in the background chapter. After this, I will discuss the methodical considerations related to the research that has been conducted. This will be followed by a reflection on implications, alongside a few suggestions for possible future research, and finally, I will present a few overall conclusions. More detailed discussions of the specific results of each study and their relation to previous research are found in the respective papers.

### 6.1 Main findings

In Study I, we observed that adolescents aged 15/16 drink for a variety of reasons and that the motives behind drinking are associated with both how often they drink and how often they drink heavily. These findings are vital, as drinking motives are claimed to be the most proximal determinant of adolescent drinking [172, 249], and evidence on this scale has not previously been available for the Swedish context. The proximity of drinking motives is supported by our results showing that these factors alone explained almost 30% of the variation in drinking. Social and enchantment motives were most strongly linked to both outcomes. The importance of these two motives for adolescent drinking corroborates the international evidence [170]. However, the strong association between enhancement motives and drinking frequency stands in contrast to earlier studies. Further, only minimal sex differences were found in the prevalence of drinking motives, and no difference by sex was found in associations between motives and alcohol use. This differs somewhat

from international results showing that conformity motives are more common among boys, along with social and enhancement motives, whereas coping motives are more common among girls [250]. These sex differences seem to increase with age [250].

Study II found clear evidence of associations between two dimensions of trust and drinking status among adolescents aged 15/16. Both general trust and institutional trust were associated with abstaining from alcohol. The preexisting evidence on general trust and drinking was inconsistent, but the bulk of studies also showed such a relationship [188–190, 192]. However, results on the link between institutional trust and adolescent drinking were non-existent until this study. In addition, we found that institutional trust was more strongly related to drinking than general trust. This fact, combined with the novel approach of employing cross-combined dimensions of trust, is a considerable contribution to this field of research. Sub-findings in this study also showed that boys had a lower probability of being drinkers than girls. Parental control and self-rated health were also protective factors for past-year drinking, whilst economic disadvantage was a risk factor for this outcome. Further analyses including interaction terms showed that high levels of school satisfaction, parental control, and parental support modified the links between trust and drinking. That is to say, high scores on these three factors protected against use of alcohol even among adolescents with low trust.

Study III examined longitudinal associations between ten psychosocial factors and four drinking status groups (abstainers/early drinkers/late drinkers/ex-drinkers) from age 15/16 to age 17/18. Our results show that nine of these factors significantly differentiated drinking status over time. Compared to the consistently alcohol-using group of early drinkers, the other three groups were better off at baseline in terms of psychosomatic problems, use of psychiatric medication, school enjoyment, prosocial ability, and parental relationship satisfaction. At the same time, early drinkers had fewer peer relationship

problems, higher friendship satisfaction, and fewer emotional symptoms than the other groups. The differences in these factors were greatest between early drinkers and abstainers. Likewise, other studies have observed that individuals who drink tend to have better friendships, while non-drinkers have worse friendships [199, 202]. The better mental health among mid-adolescent non-drinkers also corresponds with results in previous research [162]. Furthermore, school satisfaction stood out as the sole factor that differentiated between abstainers and later drinkers, suggesting that better school satisfaction at age 15/16 may predict continued abstaining after two years. Overall, early drinking was related to worse mental health and worse relationships with parents but better relationships with friends. Among the four groups, abstainers had the best mental health and relationships with parents, while they also had the worst friend relationships.

In Study IV, we examined whether the age of drinking onset (age 15/16 vs 17/18) was related to drinking habits at age 17/18. These longitudinal analyses were conducted on three different outcomes of alcohol use and with control for 11 covariates. The results showed that an early drinking onset predicted higher AUDIT-C scores and a higher probability of risky and binge drinking. These results align with other longitudinal studies on this topic [216], but they contrast with studies where the association disappeared when controlling for conduct problems [217]. This was not the case in our study: the relationship persisted even when conduct problems were considered. Moreover, early onset of binge drinking predicted subsequent binge drinking, whereas early onset of drinking did not predict subsequent binge drinking when the influence of early-onset binge drinking was adjusted for. Sub-findings of the other explanatory factors at baseline showed that adolescents with early drinking onset had higher levels of sensation-seeking, impulsivity, aggressiveness, conduct problems, hyperactivity, parents who were permissive of drunkenness, alcohol problems among parents, and drinking and drunkenness among friends. By contrast, those with late drinking onset had more peer problems. All in all, we conclude



that early drinking seems to be a clear risk factor for subsequent drinking in late adolescence.

To summarize, Study I and Study IV show that drinking motives and the age of onset are important for the frequency and volume of alcohol consumed in adolescence. Furthermore, Study II and Study III demonstrate that general and institutional trust, along with psychosocial factors capturing mental health and social relationships, are factors strongly related to drinking status (drinker/non-drinker) among adolescents.

## **6.2 Conceptual considerations**

Below, the results will be viewed in a broader context of four theoretical discussion points that tie the findings to central topics in the field of research on adolescent drinking.

### **6.2.1 The social nature of drinking**

A general conclusion that can be drawn from this thesis is that the social component is a core element in adolescent drinking. The field of substance use operates in an open system where humans react, adjust, and change their behaviors in response to their environment. Coexistence, interpersonal aspects, and interaction with other individuals are embedded in how adolescents relate to alcohol use.

In Study I, we observed that social motives were the most common motivation behind drinking among both girls and boys, in accordance with international evidence on this issue [170, 251]. We also find that external motivation sources had great importance for drinking frequency in both directions. In Study II, trust in other people, i.e., general trust and institutional trust – a social product of human civilization – were also associated with adolescents abstaining from drinking.

Other social factors such as parental control, school enjoyment, and economic disadvantage were related to drinking status. In Study III, relationship satisfaction with parents and friends had clear links to drinking status, where drinking symbolized a shift from family to peers, reflecting the natural reorientation typical of this life phase [51, 52]. The association between drinking status and peer problems in the same study further accentuates this inclination.

We know from previous studies that parenting characteristics play an important role in non-drinking among 15/16-year-olds, for example, with parental attitudes toward offspring drinking being strongly associated with abstaining from alcohol [252, 253]. In Study IV, empirical data on social factors were not primarily explored. However, differences in alcohol problems and permissiveness of drunkenness among parents and in drinking and drunkenness among friends were observed by age of onset. Previous studies shows that mid-adolescents with parents who have alcohol problems also run a greater risk of having psychosocial issues [254, 255]. A possible mechanism behind why early drinking onset influences subsequent alcohol use is that the early age of starting to drink might affect relationships, social status, and engagement with risk-takers [210–212].

This reasoning on the social importance of drinking is in line with Problem Behavior Theory, whereby drinking is understood as a key feature in the socialization process of approaching adulthood [18, 58, 232]. Adolescents who start drinking reflect a social behavior they have learned from observations of adults around them, and are perceived as normal. The symbolic and inherent social function of starting to drink is suggested to be, for instance, to express independence from parents, gain peer acceptance, develop or maintain social relationships, declare opposition to societal rules, and signal adult status [18, 61]. Adolescents face a dilemma concerning alcohol because they must choose

between the risk of social isolation from friends by abstaining and the risk of harming their health by drinking [256].

A striking inconsistency to this stress on the social forces of drinking is the conceptualization and understanding of alcohol use that is laid out, bottom-up, by the adolescents themselves. Contemporary qualitative studies repeatedly report that adolescent narratives foremost describe drinking as a matter of personal responsibility and individual choice in avoiding current and future risks [11, 22, 228, 234, 235]. When these adolescents ignore the interpersonal and societal factors that influence drinking, they understand drinking as a question of individual morality and self-control. The perception that adolescents resist allowing negative social forces such as peer pressure to determine their alcohol use is further supported by our finding in Study I, where conformity was the least commonly reported motive to drink.

The streams of thought in the discourse outlined above have, by scholars, been attributed to neoliberal ideology promoting competition, performance, productivity, entrepreneurship, and achievement among individuals [11, 22, 236, 257]. A restrictive approach to alcohol is argued to be aligned with a general doctrine of self-discipline, self-improvement, and self-care involving related behaviors, such as diet and physical activity, to create a healthy lifestyle to maximize one's value in a future labor market [257]. In addition, this perspective among more recent cohorts of adolescents has been suggested as a possible cause for the decline in young people drinking [22, 234, 257]. Let us remind ourselves that society's interpretation of alcohol shapes our perspective on alcohol use at a given point in time [91]. This may apply to both adolescents' sense-making of the drinking phenomenon, and to our attempts at scholarly explanations of what underlies adolescents' views.

The complex paradox is that – if it is true that alcohol use is individualized in recent cohorts and possibly caused by contemporary neoliberal ideology –

then the individualizing perspective appears also to be a social product of cultural and political discourses in society. Our personal views are not formed in isolation, as they are influenced by ideologies prevalent in society. Even though we may think our views on drinking are unbiased, they are strongly influenced by social factors, ranging from ideas circulating in broader society to those circulating in the narrower context of close relationships. This applies regardless of whether we individualize or “societify” drinking. For this reason, it is important that researchers communicate their findings broadly so that people have an opportunity to evaluate their beliefs in light of the available evidence.

The bottom line of this section is that we found considerable evidence that adolescent drinking is a highly social phenomenon and that this fits with prominent theories within this field of research. This is followed by the caveat that this perspective may not be recognized in today’s adolescents’ own narratives on alcohol consumption, but that such narratives likely also are a social product.

### **6.2.2 The relative psychosocial role of drinking status**

Jessor [17] defined problem behavior as deviation from the conventional norm based on, for example, someone’s age or life stage [17]. This means that behavioral normality and behavioral deviance are relative and may shift by context. This relative, rather than absolute principle, has also been observed in our data.

Psychosocial differences by drinking status detected in our longitudinal study were not observed in cross-sectional analyses using the same population sample [196]. The cross-sectional non-drinkers at age 15/16 consisted of both persistent abstainers and those who eventually would have started drinking at age 17/18. In Study III, these two sub-groups were found to have some differences in their psychosocial profiles when examined longitudinally. Similarly, cross-sectional drinkers at age 15/16 contained both persistent

drinkers and those who stopped drinking later on. Although they cross-sectionally were treated as one group [196], their psychosocial profiles were revealed to be a bit different at both time points when studied over time. Examples of such differences will be described later in the text. The point is that diversity within groups may not always be made visible from one data point in cross-sectional surveys.

The consequence of this key result is that a categorical comprehension of adolescent drinking, in terms of drinkers vs non-drinkers, overlooks these hidden differences. In the worst case, this may render misperceptions built on false dichotomies that hide underlying heterogeneity. Despite the downsides of drinking that we observed, we also found psychosocial benefits that argue against polarized thinking and a clear-cut dichotomic view on drinking. To circumvent such limitations in the understanding of adolescent drinking, one should consider the drinker's age and the prevalence of drinking in that age group, as these aspects may reveal nuances and diversity. Such aspects will be described in the following paragraphs.

Study III found that the psychosocial profile across groups of drinkers and non-drinkers was not the same. Adolescents with the same drinking status may appear to be the same group, but we found that drinking status over time revealed that such groups had somewhat different psychosocial compositions. The meaning of drinking status was dependent on the age at which drinking was initiated, and the meaning of non-drinking status depended on whether they were persistent abstainers or ex-drinkers. The specific age when alcohol is used/not used during adolescence may reveal differences in groups of drinkers/non-drinkers.

The two groups that drank at T1 (early drinkers/ex-drinkers) appeared homogeneous at age 15/16, but for example, they differed in terms of problems with peer relationships, which only became visible when drinking status over

time was considered. The same was true for the two non-drinking T1 groups (abstainers/late drinkers), who likewise demonstrated differences in peer problems, although their drinking status had not yet diverged. A similar variation was found at T2 after shifts in drinking status. The two drinking groups at T2 (early drinkers/late drinkers) had apparent differences in psychosomatic problems and school enjoyment at T2, although both were groups of drinkers. The two non-drinking groups at T2 (abstainers/ex-drinkers) had differences in friendship satisfaction at T2 with slight overlap. Seemingly similar groups may also differ on unobservable factors.

The relevance of considering pluralism in the group of drinkers was also evident in Study IV. Early drinkers are a selected group that differs from those who transition to drinking at a later point. Early drinkers have different psychosocial profiles than most adolescents who start in later years. This suggests that psychosocial factors play a role in determining the age of drinking onset. The adolescents with an earlier onset were characterized by a higher degree of risk factors for alcohol use. This suggests that early drinking is due to unequal exposure to psychosocial risk factors.

Compared to adolescents with later drinking onset, those with an early onset had a higher degree of alcohol problems among parents, drunkenness permissiveness among parents, drinking and drunkenness among friends, and higher scores on personality risk factors for alcohol use, such as conduct problems, hyperactivity, impulsivity, sensation-seeking, and aggressiveness. Likewise, early drinkers were shown to be a vulnerable group in Study III, as they had the least favorable situation, both mentally and socially, on all risk factors except friendship indicators. The multitude of risk factors visible among those drinking early fits well with the understanding that problems appear as clusters, forming a sort of syndrome or coherent lifestyle [16-18].

Not only does age play a vital role in association with drinking status: drinking prevalence rates may also be essential to consider. This has, for example, been shown in studies where those not following the mainstream drinking status behavior in adolescence had worse mental health [62] or in recent studies exploring signs of normalization of non-drinking, given the decline in young people's alcohol use [196, 258–260]. The age of drinking onset has increased among more recent cohorts of adolescents [4, 261, 262], i.e., the average age at which they start to drink is higher today. One hypothesis is that the more common non-drinking becomes, the better the psychosocial status of non-drinkers also becomes [195]. However, it has been pointed out that abstaining from alcohol in adolescence is not exclusively positive [256]. Therefore, not drinking can also be a risk factor for negative outcomes.

In Study III and Study IV, the prevalence of past-year drinking from age 15/16 to age 17/18 increased from about 40% to 70%, meaning that drinking became a normative behavior in Sweden during this age span. When excluding abstainers and ex-drinkers and only considering drinkers at age 17/18, about half had an early onset, at or before age 15/16, and the other half had a late onset after age 15/16 but prior to age 17/18. The differences in psychosocial factors found between groups with different drinking statuses may possibly reflect how common the drinking status being studied is. Associations may depend on prevalence, meaning that psychosocial consequences, and who is likely to engage in a behavior, may depend on how widespread a behavior is.

On the whole, the share of people drinking and their age at a given point in time and place may determine the psychosocial associations. Therefore, truths about the meaning, normality, and deviance of drinking have a relative role affected by age and prevalence.

### **6.2.3 A temporary or permanent reduction in drinking**

In recent quantitative work on youth drinking [220, 222, 224, 225, 263], a crucial issue has been whether today's youth will drink less in the future compared to

previous generations due to the current decline in adolescent drinking. This issue is not yet resolved and will remain unresolved until it is possible to observe adult drinking behaviors among the more recent cohorts. In our studies, no complete answers can be provided, but given the urgency of the question, attempts can be made based on signs or indications in our findings that point in one direction or another. In this section, the possible scenarios will be discussed.

In Study IV, we examined the influence of age of drinking onset on subsequent alcohol habits. We found that already drinking at the age of 15/16 was associated with increased drinking on several measures, compared to those who did not drink at 15/16 but did so at age 17/18. These associations were tested for a wide range of known psychosocial risk factors for alcohol use, and these covariates did not affect the predictive effect of age of onset. To put it plainly, our results suggest those who start drinking early also drink more than others do.

This finding implies the possibility that early drinking leads to higher future drinking. When you take these results and then add the fact that the age of onset of alcohol consumption has been pushed upwards in recent years [4, 261, 262], a couple of conclusions appear to be within reach.

When an increasing proportion of adolescents postpone their drinking debut, our evidence on the age of onset suggests that this likely will lead to reduced drinking among those who wait to drink. In turn, the reduced drinking among those who waited will presumably be reflected in the drinking rates for the whole population in this age group. The latter assumption is one cornerstone upon which the prevention actions on youth drinking have focused to increase the average age of drinking onset [203]. If this turns out to be correct, it would also support the central premise of generation theory [218, 219] which posits that circumstances during upbringing have lasting impacts on future behaviors.



Furthermore, previous studies have found that restrictive or liberal alcohol policies during adolescence have a lasting impact on a generation's drinking habits as adults [264].

Be this as it may, the evidence is mixed as to whether the lower consumption among more recent birth cohorts is being transferred into adulthood as they grow older [220-227]. Previous studies have not found proof of a universal effect of the non-drinking trend leading to less drinking in young adulthood [223-225, 227]. Nonetheless, studies have also suggested that alcohol consumption among younger cohorts continued to be lower, although by young adulthood it had partly caught up with how older cohorts were drinking [220, 221]. The gap in drinking between older and newer cohorts seems to be narrowing with the transition from adolescence to young adulthood [220, 222]. It is thus pivotal to underscore that it is possible that our findings in Study IV result from a temporary impact. That would mean that early drinking onset leads to more drinking in the short-term but that those with later drinking onset eventually will catch up in the long run.

To conclude, this section has discussed whether the decline in youth drinking may lead to a temporary or permanent reduction in alcohol consumption in light of our empirical findings. Our findings on the importance of age of onset, along with reports of increased age of onset, suggest at least a short-term persistent reduction in drinking. However, other studies point in other directions.

#### **6.2.4 Maturity, time perspective, and contemporary values**

Maturity has been a focus point in recent qualitative work on youth drinking [11, 228, 265], and this section discusses the maturity concept related to our findings.

Study III observed a clear link between relationships and drinking status. Non-drinking was related to indicators of better relationships with parents and

drinking to better relationships with friends and peers. These findings echo the social reorientation process described as typical of this life stage, when a shift from family to friends is expected [51, 52]. That such changes in social interaction during adolescence are related to the initiation to alcohol is also proposed by the Problem Behavior Theory [58]. Becoming independent is an essential developmental milestone in adolescents, and according to Problem Behavior Theory [58], alcohol use is linked to this process. This also resonates with our findings on drinking status and parent/friend patterns.

Fewer adolescents are drinking now than in previous cohorts [1], and according to both Theory of Generations [218, 219] and Psychosocial Acceleration Theory [237, 238], people's conditions and experiences during early life have an impact on how they behave and act later in life. The Psychosocial Acceleration Theory [237, 238] proposes that life strategies can either be fast or slow. Avoiding risk behaviors and delaying independence from parents might suggest a slow life strategy focusing on the future.

The concept of "time perspectives" has also been associated with various health-related behaviors and life outcomes [266-268]. Time perspective has also been shown to be important for understanding adolescents' drinking behavior [269]. Among the different temporal profiles with past, present, and future orientations, it was found that a future orientation was related to less drinking [269]. From this standpoint, drinking can be perceived as a present bias or hyperbolic discounting, a marshmallow test, in choosing between the immediate or the later reward.

Future orientation has also been expressed empirically through health awareness, as reports that drinking is bad for your health are one of the most frequently endorsed reasons for not drinking among young people [270]. Avoiding drinking because it leads to loss of control is one of the most considerable differences in reasons for abstaining between non-drinking and

drinking youth [270]. The fear of losing control echoes the argument made by other researchers about the increased propensity of young people to adopt neoliberal values and behave in accordance with them [257].

The observed risk awareness and self-regulating practices among today's youth have, by other researchers, been attributed to broad societal changes [1, 22, 236, 257, 265]. Possible causes discussed in relation to such major changes are increased individualism, pressure to succeed, economic inequality, youth unemployment, workforce precarity, economic insecurity, school conscientiousness, school work pressure, and the digital revolution [22]. By extension, such changes may have affected more proximal factors that have determined the decline in youth drinking, such as increasingly restrictive alcohol-related rules and attitudes among parents, reductions in face-to-face socializing with friends and unsupervised time with peers, which taken together have made alcohol use a less important element of contemporary adolescents' social life [20].

The human mind's ability to fully grasp how gradual and complex societal steps in a certain direction are intertwined with changing behaviors at a population level is presumably limited. When we observe changed behavior patterns, we tend to label them as inconsistent with certain age expectations, but this is not fruitful if we do not take the trouble to address potential underlying factors. Calling a behavior inconsistent with age expectations can be mistaken as blaming or criticizing young people for acting "wrong" when they are merely adapting to a reality not created by themselves. Instead, we should address the causes of such behavioral shifts. If we believe that shifts in maturity/immaturity drive youth drinking prevalence, perhaps we should then be focusing on how potential drivers of maturity/immaturity are related to alcohol use.

On the one hand, today's adolescents appear more immature than previous generations, as they to a lesser extent engage in adult-like activities, adopting a

slower life strategy and being future-oriented. On the other hand, showing foresight and taking responsibility for their health and well-being early in life by abstaining from alcohol can be considered a very mature behavior. However, there is also room for doubt concerning how conscious and aware individuals are of the reasons why they behave differently from other generations. Maybe it is not primarily their own agency and active choices that make them act the way they do.

Perhaps we are missing the mark when we interpret less engagement in adult activities as a sign of immaturity (prolonged childhood) or precocious mature behavior (premature adulthood). Instead, perhaps the substantial change in Western adolescents' behavior is associated with an increasing share adopting a slower life strategy and being more future-oriented. For illustration, the average age at which people have their first child has been pushed upwards in Sweden (and in other rich nations) during the last decades [271]. This could also be used as an example to illustrate that adults have become more – or less – mature than previous generations. Such interpretations may disregard that changing behaviors likely are adaptations to the environment, for example in response to shifting societal values and demands.

Humans adapt to their environments, and changes in behavior fulfil a purpose. On the one hand, we are observing changes in adolescent behavior that suggest that the psychosocial age among adolescents has shifted over time. On the other hand, we label these behavior changes in terms of maturity or immaturity, while the content in such labels might be outdated. Also, in alcohol research, it is crucial to seek beyond a problem-oriented focus [56]. For this purpose, it is necessary to expand our understanding of adolescent drinking past the top-down concepts of maturity and immaturity. There is a tendency to be misled by a conceptual jingle-jangle fallacy [272] when these two opposing labels are used to describe why fewer adolescents are drinking. The notion that youth substance use was affected by changed maturity, as

indicated by prolonged education, older ages of parenthood, and marriage, was also raised over 20 years ago when drinking had increased and was much more common than today [273]. Thus, maturity appears to be a handy explanation regardless of the direction of development, which perhaps makes its validity questionable.

How a phenomenon is portrayed affects our perceptions of it, proposed by the framing effect [274]. Our perceptions of maturity do perhaps need to change, and what behaviors adulthood consists of may also need to be revised and updated. Who would have guessed that smoking would fall in prevalence over two decades? This development has not been limited to young individuals, as the non-smoking trend also includes the entire general adult population [1, 23, 275, 276]. Smoking has gone from a normalized and glamorous behavior to being stigmatized and marginalized over a short span of time [20, 275, 277]. It is not inconceivable that alcohol use will eventually face the same destiny one day.

### **6.3 Methodological considerations**

There are some things to consider when interpreting the data of the studies on which this thesis is based. Relevant topics include self-reported data, closed-ended questions, non-responders/dropouts, criteria that must be met for causal inference, and the strengths of the data used here.

#### **6.3.1 Self-reported data**

Questionnaires are an efficient method to acquire detailed personal information from large groups. The potential disadvantage of this sort of data is that it may introduce different forms of response biases that can call into question both respondents' honesty and their general ability to assess, remember, and report correctly. The level of awareness among study participants is not guaranteed to be high, and their perception may not always reflect reality. For example, people may report falsely, although they believe it is correct.

One potential cause of bias is social desirability, which makes people respond in ways perceived as socially acceptable, resulting in over-reports of “good” and under-reports of “bad” behaviors [278]. This potential bias can also influence interview studies. We attempted to minimize the type of impression management discussed here by informing the participants that the data would be pseudonymized, and that the consent form where they provided identifying information would be kept separate from the questionnaire. The use of validated instruments is also a way to ensure more reliable answers. The questions asked also remained unchanged throughout the two data collections, thus keeping potential inaccuracies constant across the whole study period and allowing comparisons.

Self-reported drinking is usually under-reported [279, 280], with surveys capturing about half of the total consumption as estimated by combining registered sales and the unregistered imports [281]. The self-reported consumption may be lower than the estimated total consumption for several reasons: for example, heavy drinkers are often underrepresented in surveys, and it is generally difficult for people to accurately remember and estimate their intake of food and drinks.

This is not necessarily the case when it comes to adolescents, with studies showing that self-reported drinking in adolescence has been found valid and reliable [282]. Subjective measures, such as self-perceived drunkenness, have been shown to be highly correlated with objective measures, such as blood alcohol concentration level [283]. In a multi-national European study, 97% of the 16-year-old students reported having responded honestly to questions about alcohol use [284]. However, this response may have also been dishonest. In general, asking people about their drinking habits may not accurately capture the correct consumption, as surveys seem to underestimate drinking [285, 286]. Despite this limitation, surveys are a reliable method as long as this

underestimation is relatively consistent across all groups. Then, underreporting heavy drinkers would still have higher actual consumption than underreporting light drinkers. Studies on Swedish adolescents do verify that two key instruments (AUDIT/DMQ-R) used in our studies were perceived as easy, relevant, acceptable, and suitable [287].

### **6.3.2 Closed-ended questions**

The questionnaire contained both closed-ended and open-ended items, but for the research included in this thesis, only closed-ended questions were utilized. In the case of adolescent drinking, structured closed-ended questions are found to be better suited when asking about sensitive topics [288]. At the same time, unstructured open-ended questions have the benefit of eliciting unexpected responses [288]. Closed-ended questions with fixed answers on Likert scales also have the advantage of minimizing outliers and thus avoid introducing bias in data due to extreme responses.

### **6.3.3 Non-responders and dropouts**

Another thing to consider when doing research based on general population surveys for alcohol is non-responders. The most vulnerable groups, who have more problems than others, are generally underrepresented as survey participants and may consume alcohol more than the average in the general population [289]. This raises questions about the representativeness of research results based on surveys. This problem also applies to the data we used, as those individuals who were not present at school the day the survey was carried out, for example due to truancy, likely also had more problems and drank more heavily than others. A consequence of this is that the estimates we found might be underestimated.

Internal and external dropouts also affected the research in this thesis. Internal dropouts (missing values) occur when study participants skip answering questions. This was managed by using complete case analytical samples. i.e., only participants with valid answers on all variables in each study were included in the analyses. The benefit of this approach is that it safeguards that

associations found not are artefacts of including a different number of participants for each variable used. The different models in each study thus include the same number of observations. The drawback is that there may be differences between analytical and full samples. This possibility was also specifically tested in our studies.

In Study II, no differences between the analytic and the excluded sample were found in regard to past-year drinking. However, in Study III, respondents with invalid answers were shown to have more difficulties with their social relationships and their mental health than those who answered all questions (Table A1 in Study III). The potential bias of excluding those who skipped questions was considered low since the prevalence of missing values within variables was all under 5%. As the analytic sample with complete cases differed only slightly from the full sample containing both complete and incomplete cases, it is unlikely that it affected the patterns and directions of results that we found.

External dropouts affect longitudinal studies and may lead to attrition bias [290]. This happens in research projects over time, as not all baseline subjects continue to participate on every occasion for data collection. This leads to an increased selection of people inclined to answer surveys, which often elevates the proportion of respondents who are doing well and having fewer problems [291, 292]. This gradually increasing homogenization of the sample risks impairing the representativeness. The insight into and understanding of this skewness and the consequence of such bias can be improved by conducting a sensitivity analysis, comparing participants who dropped out with those who continued. This was tested in both longitudinal studies within this thesis. It was found that those more likely to drop out were boys, drinkers, and those scoring higher on sensation-seeking, impulsivity, and aggressivity. Users of psychiatric medication, and those scoring lower on emotional problems and prosocial ability were also overrepresented among study dropouts. Additionally, those



with higher satisfaction with parents and friends were also more likely to drop out of the study. However, the participation rate at follow-up was very good (72.4%, 4018/5549), therefore the external drop-out does not give major cause for concern about selection bias.

#### **6.3.4 Holdbacks for causality**

The first two studies in this thesis build on cross-sectional data. Data that only cover one point in time are not suited for empirical claims on cause and effect because the direction of any effects may go both ways. There may be valid theoretical reasons or empirical evidence from other studies that justify assumptions on a specific order in a sequence of events. However, we also do not know when an attribute emerged prior to the baseline.

A shortcoming with few data points when examining alcohol use is that drinking status fluctuates, and someone's drinking status may have changed shortly before or after completing the questionnaire. This might be especially true for adolescents experimenting with drinking and who not yet have established regular drinking habits. Previous studies have shown a lack of consistency over time in self-reported drinking status [293]. In Study III, when drinking status over time was considered, we also observed variation beyond simple "drinkers vs. non-drinkers" categories. This helped us gain a more nuanced understanding of drinking behavior than what we could get with just one data point.

In evaluations of associations between two factors, other possible factors can be the actual cause of a specific outcome. This means that more distal factors can be confused as causes when more proximal factors are not controlled for. Because of this, it is necessary to adjust statistical analyses for other possible influencing factors. In the studies of this thesis, relevant factors have been taken into account, but there is, of course, a limit to the accessibility – and number – of factors it is possible to control for. For this reason, we cannot rule out that unmeasured factors may affect the associations found in our studies.

Complex relationships may require that entire causal chains with mediating factors are mapped properly to fully understand why certain events occur. For example, causal diagrams, so-called DAGs (directed acyclic graphs) are used in epidemiology to understand causal relations among variables [294].

### **6.3.5 Data advantages**

There are several strengths to the data used for the research behind this thesis. The large and random national sample means that our findings should be generalizable to the broader population of Swedish adolescents (born in 2001). Our study subjects consisted of both boys and girls and the response rate was reasonably high (81.9% at T1/72.4% at T2). The study population at baseline were adolescents turning 16 years old during the year of the data collection. Our baseline sample covered approximately 6.1% of all 15/16-year-olds born in Sweden in 2001 (5,549/91,466) [295]. In 2017, 89,409 of all 16-year-olds in Sweden had also been born in Sweden, and 18,146 were born abroad. Our baseline sample consisted of 5.2% of the total population of this age group (5,549/107,555) [296]. This covers a large part of this population, so our results are likely representative of the target population.

The procedure for collecting data in Futura01 [297] mirrored that of the annual school survey conducted by The Swedish Council for Information on Alcohol and Other Drugs [298]. Some items in the annual national school surveys were also used in Futura01. Comparisons show that various estimated prevalences were roughly equivalent between the two surveys regarding lifetime non-drinking (57.1% vs. 54.0%), past year drinking (38.3% vs. 39.8%), heavy drinking (7.1% vs. 7.8%), illicit substance use (4.7% vs. 4.9%), past year smoking (20.6% vs. 19.9%), past year smokeless tobacco use (15.0% vs. 14.9%) and share of female respondents (50.3% vs. 49.3%) [297]. These similarities give us confidence that the Futura01 results are reliable. Participating schools did not significantly differ from non-participating schools regarding the proportion of parents with advanced education or foreign background, nor the students'

grade point average [297]. The ratio of students from different counties also matched well with the general distribution across the country.

The drinking measures used are clearly a strength of the conducted studies. Drinking status was measured using an item from Sweden's annual national school surveys, which is one of the longest-running surveys on alcohol use among adolescents in the world [242]. The alcohol consumption was measured using three items of the Alcohol Use Disorders Identification Test (AUDIT) [243], capturing drinking frequency, binge drinking frequency, and drinking quantity. In Study I, factor analysis was applied to test the validity of different factor models with the five-factor model of drinking motives showing the best model fit. In Study II, we used measures that captured both a horizontal and a vertical dimension of trust. Cross-combinations of these dimensions were also explored. These two novel approaches have not previously been studied in their relation to alcohol use. In Study III and Study IV, we used items from the well validated "Strengths and Difficulties Questionnaire" [240] to measure emotional symptoms, peer problems, prosocial ability, conduct problems, and hyperactivity.

The prospective longitudinal design for the data collection is another advantage, as it allowed us to examine changes in different attributes and development across adolescents, and increased the possibility for causal inference. An extensive list of variables made it possible to explore a variety of risk/protective factors, covariates, and several outcomes. Additionally, both novel items and validated instruments were covered in the questionnaire.

#### **6.4 Implications**

This thesis has produced new knowledge on alcohol use in the general population of Swedish adolescents. These findings can be used in practical, clinical, and public health efforts to reduce alcohol consumption and increase well-being among youth.

The dominating individual motivation behind drinking was social and enhancement motives. One thing to learn from this is that adolescents have a strong need to socialize with other people and engage in fun and exciting activities, and alcohol is a potential means to achieve that. This is crucial to consider when planning prevention efforts directed at reducing youth drinking. We must remind ourselves that behaviors are expressions of needs, wants, and desires. Alcohol prevention also denies adolescents the positive outcomes they achieve from drinking and may thus be met with resistance. The social, pleasure, or coping benefits that may come with drinking need to be provided by substitutes. The urge remains even if we try to change the behavior. If the adolescent perspective is not considered, all good intentions of wanting to protect them from harm might go lost. The drives behind the inappropriate behavior need to be addressed and satisfied for successful prevention of that behavior. Thus, to reduce alcohol use, drinking must be replaced with healthier activities that make it easier to abstain from alcohol.

Restriction, discipline, and obedience may temporarily prevent a behavior, but they fail to address the underlying driving force. Showing warmth to adolescents is key to preventing drinking, whereas being harsh and strict without being warm increases the risk [153, 299, 300]. Adolescents aged 15/16 emphasize that emotional closeness and open dialogue with parents are important aspects of the decision not to drink alcohol [259]. In relationships where parents are close, supportive, and monitoring, the adolescents underscore that they care about their parents' opinions on alcohol use, and do not want to lose their parents' trust by drinking alcohol [259]. In a study using the same sample as used in this thesis, the most common reason for not drinking was that their parents disapproved of them using alcohol [270]. Connecting with and guiding adolescents and emphasizing health-related behaviors seems to be the better option in attempts to prevent underage drinking.

An important and partially novel finding was that general and institutional trust was associated with adolescents' alcohol use. The influence of interpersonal factors and social relationships on drinking behaviors is well established in previous research [152–156]. To this body of research, we add our findings on how institutional trust is related to adolescent drinking. Parenting and socioeconomic equality are two suggested factors driving trust [180, 181, 186, 187]. In Study II, we found that parents of drinkers were less supportive and had lower awareness of their offspring's doings. Adolescents who were drinking also reported a less favorable economic situation than non-drinkers in the same study. Negative factors tend to accumulate, and it is therefore common to observe that problems are grouped together in clusters (16–18). Also, in study II–III, multiple problems were shown to be aligned with drinking at an early age. It is possible that both low trust and drinking at an early age are part of a cluster of features that affect vulnerable groups, who are worse off in society. To facilitate trust and reduce youth drinking, public health policies should consider focusing on parenting practices and promoting equality.

The findings presented in this thesis clearly show that early drinking is associated with less favorable psychosocial conditions. This identifies early drinkers as a vulnerable group that may be especially susceptible to the detrimental effects of drinking alcohol. The direction of the effect could not be established with certainty, but the results point out that the differences in psychosocial situations across drinking status existed before the age of 15/16. This implies two things. First, psychosocially vulnerable youth appear to be inclined to start drinking early, rather than early drinking leading to an immediate psychosocial vulnerability at this age. This might be due to unequal exposure to early risk factors, as starting to drink seemed not to be the main driver of psychosocial differences. Second, prevention initiatives should be implemented before age 15/16 and should target individuals with worse mental health and less satisfactory relationships with parents. From a social inequality

perspective, it is essential to reach adolescents with multiple disadvantages through preventive endeavors.

Further findings laid out in the result chapter highlight the urgency of targeting early drinkers. Adolescents with an early drinking onset have been shown to have worse psychosocial conditions and drink more than others later in life. The increased drinking among those with early onset is also universal despite any differences in psychosocial factors. To reduce youth drinking and its related harms, it is critical to postpone the age of onset and prolong the non-drinking time span throughout adolescence.

## **6.5 Future directions**

This section offers proposals to further the knowledge acquired by the studies in this thesis. A few suggestions that build upon each study are given for future research.

The endorsement of drinking motives among young people has shown to be internationally consistent: social motives are most common, followed by enhancement, coping, and conformity motives [170, 251]. This consistency across contexts with different drinking cultures and prevalence supports the validity of the four-factor model, but also that future studies should perhaps focus on developing models that can further expand the current findings. Within the established motives, there might exist subcategories that are more or less important for alcohol consumption. If it were possible to identify these, it would increase our understanding of the active component within each drinking motive.

In the Nordic context, progress can be made through closer examination of the demonstrated importance of enhancement motives for alcohol use, by verifying and replicating our findings, comparing findings cross-nationally, and probing for even more detail if there is found to be a specific enhancement proneness in Nordic drinking cultures.

We found clear and strong associations between general and institutional trust and adolescent drinking. This corroborates previous studies showing the importance of trust for other health-related factors [182–185]. What remains less clear is the pathways through which these two dimensions of trust are linked with alcohol use. Empirical and theoretical work is warranted to better understand the mechanisms behind such relationships. The determinants of adolescents' general and institutional trust also require further examination. The suggested protective aspects of trust carry a potentially unexploited asset to consider in preventing youth drinking. Future research is recommended to explore this further.

The differences in profiles and psychosocial compositions we found across drinking status over two years warrant the inclusion of more age groups in forthcoming longitudinal work on this topic. Learning how the social connotations of different types of drinking status develop throughout adolescence and young adulthood in parallel with changes in drinking prevalence, and potentially increased pressure to drink, would improve our understanding of the cost-benefit trade-off with drinking at a young age. For instance: (1) Will later drinkers and abstainers be shown to psychosocially diverge more over time if they are observed over longer periods of time with maintained differences in drinking status? (2) Will non-drinking be a continuous risk factor for indicators of impaired relationships with friends at later ages or will increasing age foster sober communities that provide strong ties with friends? (3) What will the trajectories and position of the tiny group of ex-drinkers be over time? Will they relapse and merge into the group of drinkers, or will they close the gap to the continuous abstainer groups? In summary, how mental health and social relationships are distributed and develop across groups with different drinking statuses requires further examination. By extending the scope of our work, more age groups could be included at younger or older ages that span over longer periods.

The age of drinking onset is a robust predictor of subsequent alcohol use. An early onset at age 15/16 was a risk factor for indicators of higher alcohol consumption at age 17/18. Thus, early drinking seems to lead to more drinking, even though today's young people to a lesser extent drink early [1] and the average age of drinking onset is pushed upwards [4, 261, 262]. A possible explanation could be that the age of onset has a relative rather than an absolute meaning. That would mean that the effect would be relative to the comparison group, rather than absolute to a specific age when drinking is initiated. If so, starting to drink earlier than others may be associated with increased drinking regardless of the specific age of onset.

It could be tested whether increased drinking is driven by chronological age of onset, or by relative age of onset in relation to the group of comparison. Forthcoming longitudinal studies could include diverse measures of the age of onset, and several groups with varying age of onset. Extending to three groups – early/mid/late drinking onset – would make it possible to see if the difference between early onset and middle onset is similar to the one between middle onset and late onset. Further research is also needed to determine whether the impact of age of onset is permanent or if there is an “aging out effect”. That would imply that the effects of age of drinking onset only are present close in time, and are eventually lost as adolescents grow older.



## 7 CONCLUSIONS

This thesis has sought to add to the previous knowledge about alcohol consumption in mid-to-late adolescence. New aspects related to adolescent drinking in Sweden have been examined cross-sectionally, and longitudinal patterns of youth-drinking-related psychosocial factors and age of onset have been explored.

To summarize the key conclusions: the primary motivation for mid-adolescents' drinking involved social and pleasure motives. The likelihood of reporting these motives was also associated with how often alcohol was consumed. General trust and institutional trust were shown to be linked with drinking status in mid-adolescents. This suggests that high trust is protective and low trust is risky concerning alcohol use, and the combination of general and institutional trust may strengthen or weaken such links. Social and mental health aspects were found to be aligned with drinking status from mid to late adolescence. Abstainers had better mental health and parental relationships; early drinkers had better bonds with peers, whereas they also had worse mental health. Overall, drinking and non-drinking status in both mid and late adolescence pointed to following such a pattern in relationships and mental health.

Across the study findings, it can be concluded that consuming alcohol at the age of 15/16 is related to having several problems simultaneously. This problem cluster includes factors related to parents, such as lower relationship satisfaction and control, and more alcohol problems. Moreover, poorer mental health, higher economic disadvantage, and elevated levels of conduct problems, aggressiveness, impulsivity, and hyperactivity was more apparent among those drinking at an early age. In addition, an early drinking onset in mid-adolescence was found to predict higher levels of alcohol use compared to

those who started to drink in late adolescence. The associations between age of onset and subsequent consumption were robust and universal, as no risk factors for alcohol use were found to affect this association.

The combined findings of this thesis suggest that the probability of being an adolescent drinker is increased among those drinking for pleasure or social reasons, who have low general and institutional trust, impaired mental health, and poor parental relationships, and have close bonds with friends. Moreover, if drinking also taken up at an early age, it will likely also result in higher consumption in late adolescence.

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