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**Alcohol consumption among first- and second-generation immigrant and native adolescents in 23 countries: Testing the importance of origin and receiving country alcohol prevalence rates**

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4 **adolescents in 23 countries: Testing the importance of origin and receiving country alcohol**  
5 **prevalence rates**  
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10 Running head: Immigration and Alcohol Consumption  
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53 **Conflict of interest statement:** None to declare.  
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## Abstract

**Introduction and Aims.** This internationally comparative study examines differences in alcohol consumption between first- and second-generation immigrant and native adolescents. We also investigate to what extent origin and receiving country alcohol per capita consumption rates (APCC) and proportions of heavy episodic drinkers (HED) are associated with immigrant adolescents' alcohol consumption. **Design and Methods.** We used cross-sectional survey data from the 2013/14 Health Behaviour in School-aged Children study. Applying multilevel regression analyses, we investigated the lifetime frequency of alcohol use and drunkenness in 69842 13- to 15-year-olds in 23 receiving countries, with immigrants from over 130 origin countries (82% natives, 6% first-generation immigrants, 12% second-generation immigrants). **Results.** The lifetime frequency of alcohol use was higher among natives than among first- and second-generation immigrants, while no differences were found between the latter two. Lifetime drunkenness was more frequent among first-generation immigrants than among natives and second-generation immigrants. Higher origin country APCC and HED were associated with more frequent lifetime alcohol use and drunkenness among immigrant adolescents. Cross-level interactions revealed that for lifetime frequency of alcohol use, the origin country HED effects were stronger for first- than for second-generation immigrant adolescents. Further, especially for first-generation immigrants, a higher receiving country HED was related to lower lifetime frequencies of alcohol use and drunkenness. **Conclusions.** Our results suggest differences in lifetime frequencies of alcohol use and drunkenness between natives and first- and second-generation immigrant adolescents. Origin country APCC and HED seem to affect immigrant adolescents' alcohol consumption differently than receiving country APCC and HED.

**Key words:** alcohol consumption, adolescents, immigrants, origin and receiving country alcohol prevalence rates.

## Introduction

Adolescent alcohol consumption is common in most European countries, yet drinking patterns vary greatly between and within countries [1]. Studies have found differences in alcohol consumption between native and immigrant adolescents. However, findings concerning the direction of the association between alcohol consumption and immigrant status are mixed [2-5]. Walsh and colleagues [4], for instance, found that first-generation immigrant adolescents from the Former Soviet Union and first- and second-generation Ethiopian immigrants reported higher levels of binge drinking and drunkenness than their Israeli counterparts. On the contrary, another study [3] found no differences in alcohol consumption between immigrant adolescents from a variety of origin countries and natives in Switzerland. These inconsistent findings might be attributed to the fact that studies have focused on different immigrant populations from different origin countries, in different receiving countries and from a variety of immigrant generations (first, second and later) [4,6-8]. Cross-national research comparing the alcohol consumption of native adolescents and immigrant adolescents from different origin countries is scarce.

Social norms and values concerning alcohol consumption differ considerably across nations/cultures [9] and are mirrored by national differences in alcohol consumption [10]. These norms and values are likely to influence individual alcohol consumption [11]. As adolescent immigrants straddle two cultural contexts, that of their origin and receiving country [12], national alcohol prevalence rates in both their origin and receiving country may shape their alcohol consumption. However, differences in alcohol consumption between first- and second-generation immigrant adolescents may also occur. According to Convergence Theory [e.g. 2, 4], alcohol consumption of second-generation immigrants will more strongly resemble that of natives than that of first-generation immigrants. This behavioural drift across immigrant generations has been attributed to greater contact with the receiving culture, which increases the likelihood of adopting normative behaviours of the receiving society and diminishes the influence of the origin country. In line with this, some studies found greater similarities to native adolescents' alcohol consumption among second-generation than among first-generation immigrants [4,8]. Svensson and Hagquist [8], for instance, found that compared to first-generation immigrant adolescents from low-drinking origin countries, their second-generation counterparts showed higher levels of alcohol consumption, resembling the consumption of the Swedish population.

To our knowledge, the current study is the first large-scale cross-national study among representative samples of adolescents to examine: (i) differences in alcohol consumption between first- and second-generation immigrant and native adolescents across multiple receiving countries; and (ii) to what extent origin and receiving country alcohol prevalence rates are associated with the alcohol consumption of first- and second-generation immigrant adolescents. Gaining knowledge on these associations adds to existing theories on the importance of origin and receiving country-level alcohol prevalence rates for immigrant adolescents' alcohol consumption and can help to identify groups of adolescents that are at risk of (frequent) alcohol consumption.

Based on empirical research and the above theory, we hypothesise that compared to first-generation immigrant adolescents, second-generation immigrant adolescents will show a pattern of alcohol consumption that is more similar to native adolescents (Hypothesis 1). Additionally, we hypothesise that higher alcohol prevalence rates in immigrant adolescents' origin and receiving countries will relate to more frequent adolescent alcohol consumption (Hypothesis 2). We further hypothesise a stronger influence of origin country alcohol prevalence rates on the alcohol consumption of first-generation than second-generation immigrant adolescents and a stronger influence of receiving country alcohol prevalence rates on the alcohol consumption of second-generation than first-generation immigrant adolescents (Hypothesis 3).

## Methods

### *Data and Participants*

The 2013/14 Health Behaviour in School-aged Children (HBSC) study was carried out in 41 countries in Europe, Canada and Israel. The HBSC study uses a standardised stratified sampling method in all countries to recruit comparable and representative samples. An international research protocol ensured consistency in survey instruments, data collection and procedures, and country-specific ethical requirements were followed [13]. In this survey, a subset of 23 countries collected data on participants' and their parents' origin country and participants' immigrant generation. In order to have a more homogeneous sample with regard to age and due to low levels of alcohol consumption among the youngest age category (age range between 10.5 and 12.5 years), we excluded individuals belonging to this group [ $n = 40375$ ] from an initial sample of 122804 adolescents across these 23 countries. We further removed individuals with missing

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3 data on study variables, such as immigrant generation [ $n = 4054$ ], alcohol consumption [ $n =$   
4 2366], and/or family affluence [ $n = 6167$ ]. For immigrant generation, there were no significant  
5 differences between included and excluded cases with regard to gender ( $\chi^2(1) = 0.44, P = 0.51$ )  
6 and age ( $\chi^2(1) = 0.41, P = 0.53$ ). For family affluence and the two dependent variables, missing  
7 cases were more prevalent for boys than girls (family affluence:  $\chi^2(1) = 125.44, P < 0.001$ ;  
8 alcohol use:  $\chi^2(1) = 31.46, P < 0.001$ ; drunkenness:  $\chi^2(1) = 56.57, P < 0.001$ ). We found age  
9 differences between included and excluded cases for alcohol use and family affluence. For  
10 alcohol use there were more missing cases among 15-year-olds ( $\chi^2(1) = 118.19, P < 0.001$ ),  
11 whereas for family affluence, there were more missing cases among 13-year-olds ( $\chi^2(1) = 28.51,$   
12  $P < 0.001$ ). Although the percentages of missing values on immigrant generation (4.9 %) and on  
13 family affluence (7.5 %) are relatively high, the process of multiple imputation (based mostly on  
14 variables that are already in the model as predictors) would have only led to a strengthening of  
15 the current estimates. The final sample consisted of 69842 adolescents (51% girls; age range  
16 between 12.6 and 16.5 years ( $M = 14.56, SD = 1.05$ )).  
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28 Overall, 82% of the respondents were natives, 6% were first-generation immigrants, and  
29 12% were second-generation immigrants. Immigrant adolescents originated from more than 130  
30 different countries. Table 1 shows the percentages of natives and first- and second-generation  
31 immigrants per receiving country.  
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37 [Table 1 about here]  
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#### 41 *Measures*

42 **Dependent variables.** Two indicators of alcohol consumption — frequency of alcohol use and  
43 frequency of drunkenness — were assessed using a lifetime recall period [14-15]. As the sample  
44 consists of young adolescents and their alcohol consumption is rather low, we did not include a  
45 shorter recall period (e.g. 30 days). Self-reported adolescent alcohol consumption is reliable and  
46 valid [16-18]. *Lifetime frequency of alcohol use* was measured by the number of days  
47 adolescents had drunk alcohol in their lifetime (0 = ‘Never’, 1 = ‘1-2 days’, 2 = ‘3-5 days’, 3 =  
48 ‘6-9 days’, 4 = ‘10-19 days’, 5 = ‘20-29 days’, 6 = ‘30 days or more’). *Lifetime frequency of*  
49 *drunkenness* was measured by the number of occasions during their lifetime adolescents had  
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3 drunk so much alcohol that they were really drunk (0 = 'No, never', 1 = 'Yes, once', 2 = 'Yes, 2-  
4 3 times', 3 = 'Yes, 4-10 times', 4 = 'Yes, more than 10 times').

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7 **Independent variable.** To determine *immigrant generation*, adolescents were asked  
8 where they themselves, their mother and their father were born. If adolescents and both their  
9 parents were born in the survey country, they were considered natives. If adolescents were born  
10 abroad, they were considered first-generation immigrants. If they were born in the survey  
11 country and at least one of their parents was born abroad, they were considered second-  
12 generation immigrants. Research has found good validity in adolescent reports of their own and  
13 their parents' country of birth [19].

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15 We defined immigrant adolescents' origin country by their mothers' country of birth [c.f.  
16 20] on the basis that familial cultural socialisation of young adolescents is more strongly  
17 influenced by their mothers than by their fathers [e.g. 21]. Only if the mother's country of birth  
18 was unknown [ $n = 3$ ] or if she was born in the survey country [ $n = 3709$ ], we used the father's  
19 country of birth to indicate adolescents' origin country. In each national HBSC survey,  
20 adolescents chose from a list of two to six countries of birth or indicated whether they and/or  
21 their parents were born in 'another country'. In 12 of the 23 countries, adolescents could specify  
22 in which 'other country' they or their parents were born. Therefore, in these 12 survey countries,  
23 we could determine the origin country of most of the immigrant adolescents. In the remaining 11  
24 survey countries, we could only define the adolescents' origin countries for those countries that  
25 were listed on the survey. Adolescents whose origin country could not be determined were  
26 excluded in stage two of the analyses (see below) as their origin country's alcohol prevalence  
27 rates could not be assessed.

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29 Two **country-level independent variables** on national alcohol prevalence rates were  
30 included from the World Health Organization's (2014) Global Status Report on Alcohol and  
31 Health [22]. *Alcohol per capita consumption (APCC)* was measured in litres of pure alcohol per  
32 person (aged  $\geq 15$ ) per year, recorded between 2008 and 2010 in combination with an estimate of  
33 unrecorded per capita (aged  $\geq 15$ ) alcohol consumption in 2010 [22, p. 28]. The APCC across  
34 receiving countries ranged from 2.80 litres in Israel to 16.80 litres in the Republic of Moldova.  
35 Across origin countries, the APCC was lowest in Libya and Pakistan (0.10 litres) and highest in  
36 Belarus (17.50 litres). The original APCC values have been rescaled by dividing them by 10.  
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*Heavy Episodic Drinking* (HED) assessed the proportion of a country's adult population (aged  $\geq 15$ ) that reported drinking heavily at least once a month. Heavy drinking was defined as "60 or more grams of pure alcohol on at least one single occasion at least monthly" [22, p. 34] and was based on surveys carried out between 2006 and 2010. Across receiving countries, HED was lowest in Italy (5%) and highest in Ireland (37%). Across origin countries, it was lowest in Muslim countries such as Bangladesh, Egypt, Iran, Morocco and Syria (0%) and highest in Austria (39%). The original HED values have been rescaled by dividing them by 100.

**Control variables.** Analyses controlled for *age* (assessed in years), *gender* (1 = female; 0 = male), and *socioeconomic status* (SES). SES was measured with the Family Affluence Scale [23]. This scale is comprised of six items on material assets in the family. Respondents' answers were summed into a scale in which higher values indicated higher family affluence. We estimated SES by comparing the individuals' summary scores on the Family Affluence Scale to all other scores in their respective country or region using a proportional rank [1].

### *Statistical analysis*

All analyses were conducted using SPSS 24.0. We used listwise deletion to deal with missing data and conducted multilevel regression analyses based on maximum likelihood estimation. In stage one of the analyses, we tested differences in alcohol consumption between first- and second-generation immigrant and native adolescents [ $n = 69842$ ], using data with a two-level structure. At the individual level, effects of immigrant generation, age, gender, and socioeconomic status on adolescent alcohol use and drunkenness frequencies were tested. Individuals are clustered within receiving countries, which form the second level of analysis. Even though six percent of the variance in lifetime frequency of alcohol use and four percent of the variance in lifetime frequency of drunkenness stem from differences among schools, we could not account for cluster sampling design effects at the school level, due to model nonconvergence.

First, random intercept models were fitted for the dependent variables to examine whether variance exists at the level of the receiving countries. In all models within this stage, the dependent variables were only allowed to vary across receiving countries as including origin country variation is problematic because for natives the origin and receiving country are equal. Secondly, to determine differences in alcohol consumption between natives, first-generation

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3 immigrants and second-generation immigrants, we included fixed effects of immigrant  
4 generation and the control variables (centred around their means) (test of Hypothesis 1). In this  
5 model, we allowed effects of immigrant generation to vary across receiving countries to identify  
6 possible cross-country differences in the effect of immigration on alcohol consumption.  
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10 In stage two of the analyses, we excluded natives, as we compared first- and second-  
11 generation immigrants. We also excluded individuals whose origin country we did not know [ $n =$   
12 3229] and individuals for whom we did not have information about their origin country's alcohol  
13 prevalence rates (APCC and HED) [ $n = 162$ ]. This resulted in a sample size of 9078 immigrant  
14 adolescents. To test whether first- and second-generation immigrants are affected differently by  
15 origin and receiving country alcohol prevalence rates, we used data with a non-hierarchical four-  
16 level structure. Besides including variables on the individual level (immigrant generation,  
17 gender, age, and socioeconomic status), we included APCC and HED on two country levels in  
18 the models: the receiving and origin country level. As the receiving country level and the origin  
19 country level are not clustered within one another, we rely on cross-classified models, treating  
20 the two country levels as parallel levels. Additionally, we controlled for the fact that individuals  
21 are grouped into immigrant communities. An immigrant community is a group of immigrants  
22 who come from the same origin country and live in the same receiving country [for earlier  
23 research studying immigrant community effects see e.g. 24]. We first fitted random intercept  
24 models to determine whether the dependent variables differed across receiving and origin  
25 countries as well as across immigrant communities. Next, to test Hypothesis 2, we entered  
26 immigrant generation, the control variables (centred around their means), and the country level  
27 variables APCC and HED for origin and receiving countries (also centred around their means) to  
28 the models. First, we examined APCC and HED separately (Model 1 and 2), subsequently in a  
29 joined model (Model 3), to gain insight in the independence of the effects of APCC and HED.  
30 Finally, we tested cross-level interactions between immigrant generation and the country level  
31 variables to determine whether APCC (origin/receiving) and HED (origin/receiving) affected  
32 first-generation immigrants differently than second-generation immigrants (test of Hypothesis 3).  
33 Again, we first entered interactions between immigrant generation and APCC origin/receiving  
34 and HED origin/receiving in separate models (Model 4 and 5), and then tested them  
35 simultaneously (Model 6).  
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## Results

### *Differences in alcohol use and drunkenness between first- and second-generation immigrant and native adolescents*

The random intercept models showed significant variance in both dependent variables across receiving countries. Five percent of the total variance of lifetime frequency of alcohol use and three percent of the total variance of lifetime frequency of drunkenness could be accounted for by country level effects. The model with fixed effects of immigrant generation (when controlling for age, gender and SES) showed that first- and second-generation immigrants' lifetime frequency of alcohol use is lower than that of native adolescents (Table 2). First- and second-generation immigrants did not differ in lifetime frequency of alcohol use (not reported in Table 2). For lifetime drunkenness, first-generation immigrant adolescents reported a significantly higher lifetime frequency of drunkenness than both second-generation immigrants (not reported in Table 2) and natives. No differences between second-generation immigrants and natives were found.

For the two outcomes, differences between both first- and second-generation immigrants and natives varied across countries (Table 2). Only for lifetime frequency of drunkenness did differences between first-generation immigrants and their second-generation counterparts vary across countries (not reported in Table 2).

[Table 2 about here]

### *Associations between origin and receiving country APCC and HED and immigrant adolescents' alcohol use and drunkenness*

For both outcomes, the random intercept model showed significant variance at the individual level, the immigrant community level, and the origin and receiving country levels. Tables 3 and 4 show the lifetime frequency of alcohol use and drunkenness among first- and second-generation immigrants, predicted by the four country level variables when controlling for age, gender and SES. When added to the models separately, origin country APCC and HED positively related to adolescent lifetime frequency of alcohol use and drunkenness (Model 1 and 2, Table 3 and 4). When the four country level predictors were analysed simultaneously, only higher APCC in the origin countries was associated with a higher lifetime frequency of both

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3 outcomes (Model 3, Table 3 and 4). In none of these three models were receiving country APCC  
4 and HED associated with lifetime frequency of alcohol use or drunkenness.  
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7 For lifetime frequency of alcohol use, we found a positive cross-level interaction between  
8 immigrant generation and origin country HED, both in the separate and in the combined model  
9 (Model 5 and 6, Table 3). This indicates a stronger positive effect of origin country HED on the  
10 lifetime frequency of alcohol use for first- than for second-generation immigrant adolescents. For  
11 both outcomes, we found a negative significant interaction between immigrant generation and  
12 receiving country HED, both in the separate and combined models (Model 5 and 6, Table 3 and  
13 4). These interactions revealed that for first-generation immigrant adolescents, a higher receiving  
14 country HED is more strongly associated with a lower lifetime frequency of alcohol use and  
15 drunkenness than for second-generation immigrants. The cross-level interactions that are  
16 statistically significant in Model 6 are illustrated graphically in Figure 1, 2 and 3. In each of  
17 these figures we have shown the relationships between HED and the predicted outcomes for  
18 first- and second-generation immigrants separately. We used the minimum and maximum  
19 observed HED values to show the real range of the effect of HED on the predicted outcomes.  
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32 [Table 3 and 4 about here]

33 [Figure 1, 2, and 3 about here]  
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### 37 Discussion

38 This large-scale internationally comparative study of representative samples of adolescents  
39 enabled us to thoroughly study the contributions of immigrant generation (first vs. second) and  
40 origin and receiving country alcohol prevalence rates on immigrant adolescents' alcohol  
41 consumption. In contrast with previous studies that showed higher levels of risk behaviours, such  
42 as bullying and violence among immigrant adolescents in Europe [25], the lower lifetime  
43 frequency of alcohol use among first- and second-generation immigrant adolescents as compared  
44 with their native peers is noteworthy. Results from the current study, indicative of a dominant  
45 role of origin country alcohol consumption rates on immigrant adolescent alcohol consumption,  
46 suggest that the low lifetime frequency of alcohol use may be partly due to the influence of  
47 cultural norms and values on alcohol consumption. In addition, only for lifetime frequency of  
48 drunkenness, did our findings confirm the first hypothesis (suggesting that second-generation  
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3 immigrants display alcohol consumption frequencies more similar to those of natives than first-  
4 generation immigrants do). This supports Convergence Theory, i.e. that second-generation  
5 immigrants have adapted more to the receiving country's habits of getting drunk. The higher  
6 lifetime frequency of drunkenness among first-generation immigrants (than among both their  
7 second-generation and native peers) highlights the vulnerability of first-generation immigrant  
8 adolescents to getting drunk. Drunkenness, as opposed to general alcohol use, may be a  
9 manifestation of immigration-related difficulties and stressors that are associated with feelings of  
10 rejection, a lack of belonging, difficulties in identity formation, and/or a disadvantageous  
11 socioeconomic position [26].

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19 Our findings did not fully support our second hypothesis, that immigrant adolescents are  
20 influenced by both origin and receiving country alcohol prevalence rates. Our results rather  
21 indicate that for immigrant adolescents' alcohol consumption (both lifetime frequency of alcohol  
22 use and drunkenness), alcohol prevalence rates in the origin country are stronger predictors than  
23 those in the receiving country. These findings suggest that immigrant adolescents' socialisation  
24 concerning alcohol consumption is strongly influenced by their parents and the alcohol drinking  
25 behaviour in their parents' origin country. Given the centrality of the influence of friends and  
26 peers in adolescent alcohol consumption [27], this finding is surprising. It emphasises the pivotal  
27 role of family culture and intergenerational relations [12], particularly as a potentially protective  
28 factor in the case of immigrant adolescents' alcohol consumption.

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37 One of the origin country associations was found to be stronger for first- than for second-  
38 generation immigrant adolescents, which was partly in line with our last hypothesis. For lifetime  
39 frequency of alcohol use, a stronger effect of origin country proportions of heavy episodic  
40 drinkers was found for first- than for second-generation immigrant adolescents. This supports the  
41 hypothesis that first-generation immigrants are more strongly influenced by drinking behaviours  
42 in their origin country than second-generation immigrants.

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48 With respect to receiving country alcohol prevalence rates, we found that especially for  
49 first-generation immigrant adolescents, higher proportions of heavy episodic drinkers in the  
50 receiving country were associated with lower lifetime frequencies of alcohol use and  
51 drunkenness. This finding suggests that especially first-generation immigrant adolescents may  
52 tend to reject behavioural norms regarding adult heavy episodic drinking in the receiving  
53 country. Parents of first-generation immigrants might be stricter with their children in countries  
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3 with high proportions of heavy episodic drinkers to prevent them from adapting to the receiving  
4 country's relatively excessive alcohol drinking culture. Parents of second-generation immigrant  
5 adolescents might perceive the receiving country's high proportions of heavy episodic drinkers  
6 as less alarming as they may be more used to local norms. This finding resembles other studies  
7 that have found parents of first-generation immigrants to be less permissive and more  
8 authoritative in their parenting styles than parents of second-generation immigrant adolescents  
9 [e.g. 28].  
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### 16 17 18 *Limitations*

19 Four limitations of our study should be noted. First, considering the age of the adolescents, their  
20 alcohol consumption was rather low, which may make our results difficult to compare with older  
21 age groups. Replicating the study on older adolescents or young adults would be helpful. Second,  
22 the HBSC study did not assess the age at migration of first-generation immigrant adolescents.  
23 This information could have helped us to determine whether first-generation immigrants were  
24 old enough when they left their origin country to have learned about or experienced their origin  
25 country's alcohol consumption culture. Therefore, we cannot rule out the possibility that  
26 similarities between first- and second-generation immigrant adolescents were due to the fact that  
27 many first-generation immigrant adolescents migrated at a young age. However, the observed  
28 differences between first- and second-generation immigrant adolescents (for instance regarding  
29 the effect of HED of receiving countries on immigrant adolescents' alcohol consumption)  
30 suggest that this was not a major limitation of our study.  
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40 Third, our sample was diverse and included immigrants from more than 130 origin  
41 countries with large differences in alcohol prevalence rates. Although this could be seen as a  
42 strength, it also means that some immigrant adolescents originated from countries with extreme  
43 alcohol drinking cultures. Alcohol consumption in Muslim countries, for instance, is minimal,  
44 which may have influenced our results strongly. Therefore, future studies should differentiate  
45 between immigrants from Muslim and non-Muslim countries or countries with high and low  
46 alcohol prevalence rates.  
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53 Fourth, although our definition of immigrant adolescents' origin country was based on  
54 accepted conventions [21], alternative definitions could also have been used. Despite the  
55 prominence of maternal cultural socialisation, the origin culture of immigrant fathers is also  
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3 likely to have an impact on adolescents with non-immigrant mothers. Therefore, we used the  
4 father's country of birth when the mother's was unknown or equal to the survey country. Future  
5 studies may want to explore whether the use of different definitions of immigrant adolescents'  
6 origin country influences the outcomes.  
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## 10 11 12 **Conclusion**

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14 While immigrant adolescents were found to show lower lifetime frequencies of alcohol use than  
15 native adolescents, results also highlight the vulnerability of first-generation immigrant  
16 adolescents for drunkenness. The latter finding might reflect higher levels of immigration-related  
17 (di)stress and suggests that interventions that aim to reduce drunkenness among adolescents  
18 should especially take first-generation immigrants into consideration. However, further research  
19 is needed to understand the causes of the relatively high frequency of drunkenness among first-  
20 generation immigrant adolescents.  
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27 The finding that origin country alcohol prevalence rates influence both first- and second-  
28 generation immigrant adolescents more strongly than those of the receiving country, indicates  
29 that Convergence Theory is not sufficient to understand differences between immigrant  
30 adolescents who belong to different generations. The same is true for the lack of differences in  
31 the lifetime frequency of alcohol use between first- and second-generation immigrants. This  
32 emphasises the important role of intergenerational relations and the potentially protective role  
33 that parents and the parental origin country culture can play in limiting immigrant adolescent  
34 alcohol consumption. Future research is warranted to investigate whether our results can be  
35 replicated in older age groups while differentiating between immigrants from a variety of origin  
36 countries.  
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**Table 1.** Percentages of natives, first-generation and second-generation immigrants across receiving countries

Country	Native	First-generation	Second-generation	Total N
Albania	94.2	5.4	0.3	3174
Belgium (Flemish)	77.3	7.7	15.0	2514
Belgium (Walloon)	64.4	11.4	24.0	3284
Bulgaria	96.7	1.3	2.0	2910
Croatia	74.7	3.6	21.7	3166
Denmark	81.0	5.3	13.8	2283
Estonia	83.8	2.0	14.1	2516
Finland	91.2	2.8	6.0	3638
Germany	72.2	4.9	22.9	3927
Greece	79.9	5.9	14.2	2603
Iceland	88.9	6.0	5.1	5877
Ireland	72.2	13.6	14.2	2621
Israel	65.0	6.3	28.6	1751
Italy	88.0	4.3	7.7	2493
Luxembourg	36.1	20.8	43.1	1823
Moldova	92.6	1.9	5.5	3010
The Netherlands	77.2	4.3	18.5	2561
Romania	95.8	2.2	1.9	2323
Scotland	89.2	5.5	5.2	3441
Slovenia	83.1	4.7	12.1	3097
Spain	80.1	9.5	10.4	5068
Ukraine	87.5	1.4	11.1	2769
Wales	91.1	3.7	5.2	2993
Total	82.1	5.7	12.1	69842

**Table 2.** Unstandardized beta coefficients of alcohol consumption among native, first- and second-generation immigrant adolescents ( $n = 69,842$ )

	Lifetime frequency alcohol use b (SE)	Lifetime frequency drunkenness b (SE)
<i>Coefficients</i>		
Intercept (random)	1.50 (0.10)***	0.47 (0.03)***
<i>Individual level</i>		
First-generation <sup>a</sup>	-0.21 (0.08)*	0.10 (0.04)*
Second-generation <sup>a</sup>	-0.21 (0.07)*	0.01 (0.03)
<i>Control variables</i>		
Age	0.64 (0.01)***	0.26 (0.00)***
Gender <sup>b</sup>	-0.19 (0.01)***	-0.11 (0.01)***
SES	0.41 (0.02)***	0.10 (0.01)***
<i>Random slope variance:</i>		
First generation	0.11 (0.04)**	0.04 (0.01)*
Second generation	0.11 (0.04)**	0.01 (0.01)*
<i>Variances</i>		
Individual level	3.12 (0.02)***	0.81 (0.00)***
Receiving country	0.22 (0.07)**	0.03 (0.01)**

Note: \*\*\* $P < 0.001$ ; \*\* $P < 0.01$ ; \* $P < 0.05$ ; <sup>a</sup>Reference category = natives; <sup>b</sup>Reference category = boys; Models are based on maximum likelihood estimation. SES, socioeconomic status.

**Table 3.** Explaining lifetime alcohol use among immigrants by APCC and HED of receiving and origin countries ( $n = 9078$ )

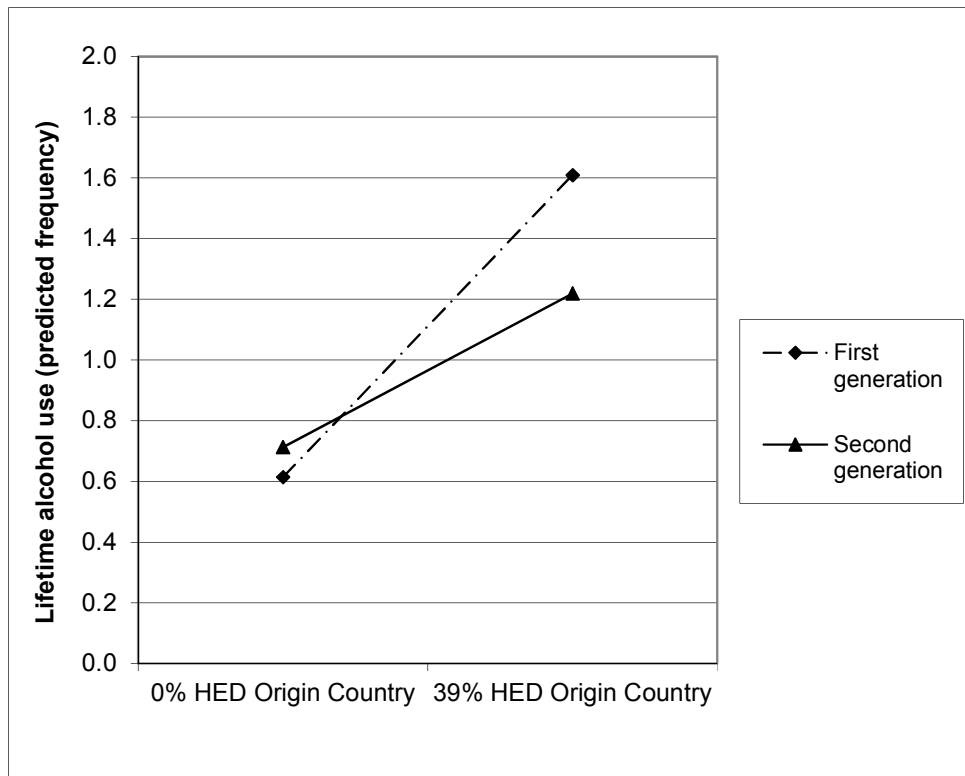
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b(SE)
<i>Coefficients</i>						
Intercept (random)	1.33 (0.09)***	1.31 (0.09)***	1.34 (0.09)***	1.33 (0.09)***	1.30 (0.09)***	1.32 (0.09)***
<i>Individual level</i>						
First-generation <sup>a</sup>	0.00 (0.04)	-0.00 (0.04)	0.00 (0.04)	0.00 (0.04)	0.04 (0.05)	0.05 (0.05)
<i>Control variables</i>						
Age	0.54 (0.02)***	0.54 (0.02)***	0.54 (0.02)***	0.54 (0.02)***	0.54 (0.02)***	0.54 (0.02)***
Gender <sup>b</sup>	-0.15 (0.04)***	-0.15 (0.04)***	-0.15 (0.04)***	-0.15 (0.04)***	-0.15 (0.04)***	-0.15 (0.04)***
SES	0.44 (0.06)***	0.44 (0.06)***	0.44 (0.06)***	0.44 (0.06)***	0.43 (0.06)***	0.43 (0.06)***
<i>Country-level predictors</i>						
APCC Origin	0.52 (0.11)***		0.55 (0.14)***	0.46 (0.12)***		0.63 (0.16)***
APCC Receiving	0.22 (0.32)		0.34 (3.47)	0.23 (0.34)		0.36 (0.37)
HED Origin		1.33 (0.46)**	-0.17 (0.55)		0.53 (0.51)	-1.10 (0.61)
HED Receiving		-0.46 (0.74)	-0.71 (0.79)		0.18 (0.79)	-0.11 (0.82)
First*APCC Origin <sup>a</sup>				0.11 (0.11)		-0.17 (0.14)
First*APCC Receiving <sup>a</sup>				0.00 (0.23)		0.81 (0.23)
First*HED Origin <sup>a</sup>					1.42 (0.42)**	1.81 (0.56)**
First*HED Receiving <sup>a</sup>					-1.26 (0.45)**	-1.30 (0.46)**
<i>Variances</i>						
Individual level	2.81 (0.04)***	2.81 (0.04)***	2.81 (0.04)***	2.81 (0.04)***	2.80 (0.04)***	2.81 (0.04)***
Origin country	0.05 (0.02)*	0.09 (0.03)**	0.05 (0.02)*	0.05 (0.02)*	0.09 (0.03)**	0.05 (0.02)*
Receiving country	0.10 (0.05)*	0.11 (0.05)*	0.11 (0.05)*	0.10 (0.05)*	0.11 (0.05)*	0.11 (0.05)*
Community	0.08 (0.02)***	0.09 (0.03)***	0.08 (0.02)***	0.09 (0.02)***	0.10 (0.03)***	0.09 (0.02)***

Note: \*\*\* $P < 0.001$ ; \*\* $P < 0.01$ ; \* $P < 0.05$ ; <sup>a</sup>Reference category = second-generation immigrants; <sup>b</sup>Reference category = boys; Models are based on maximum likelihood estimation; beta coefficients are unstandardised. APCC, alcohol per capita consumption rates; HED, heavy episodic drinking; SES, socioeconomic status.

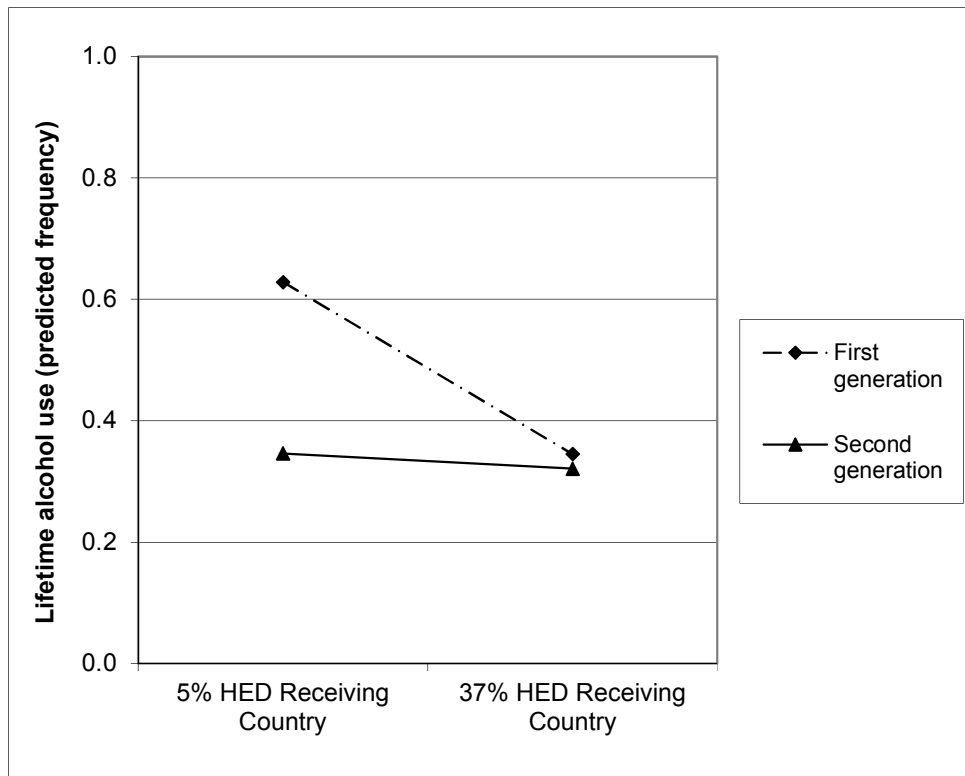
**Table 4.** Explaining lifetime drunkenness among immigrants by APCC and HED in receiving and origin countries ( $n = 9078$ )

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
<i>Coefficients</i>						
Intercept (random)	0.49 (0.04)***	0.49 (0.04)***	0.49 (0.04)***	0.49 (0.04)***	0.48 (0.04)***	0.48 (0.04)***
<i>Individual level</i>						
First-generation <sup>a</sup>	0.07 (0.02)**	0.07 (0.02)**	0.07 (0.02)**	0.07 (0.02)**	0.09 (0.02)***	0.09 (0.02)***
<i>Control variables</i>						
Age	0.24 (0.01)***	0.24 (0.01)***	0.24 (0.01)***	0.24 (0.01)***	0.24 (0.01)***	0.24 (0.01)***
Gender <sup>b</sup>	-0.08 (0.02)***	-0.08 (0.02)***	-0.08 (0.02)***	-0.08 (0.02)***	-0.08 (0.02)***	-0.08 (0.02)***
SES	0.10 (0.03)**	0.10 (0.03)**	0.10 (0.03)**	0.10 (0.03)**	0.10 (0.03)**	0.10 (0.03)**
<i>Country-level predictors</i>						
APCC Origin	0.20 (0.04)***		0.19 (0.06)**	0.19 (0.05)**		0.18 (0.07)**
APCC Receiving	0.14 (1.55)		0.24 (0.16)	0.12 (0.17)		0.21 (0.17)
HED Origin		0.56 (0.19)**	0.03 (0.22)		0.47 (0.22)*	-0.02 (0.26)
HED Receiving		-0.44 (0.36)	-0.65 (0.37)		-0.19 (0.37)	-0.40 (0.37)
First*APCC Origin <sup>a</sup>				0.02 (0.05)		0.02 (0.07)
First*APCC Receiving <sup>a</sup>				0.04 (0.12)		0.10 (0.12)
First*HED Origin <sup>a</sup>					0.13 (0.22)	0.06 (0.29)
First*HED Receiving <sup>a</sup>					-0.56 (0.24)*	-0.61 (0.24)*
<i>Variances</i>						
Individual level	0.80 (0.01)***	0.80 (0.01)***	0.80 (0.01)***	0.80 (0.01)***	0.80 (0.01)***	0.80 (0.01)***
Origin country	0.00 (0.00)	0.01 (0.00)*	0.00 (0.00)	0.00 (0.00)	0.01 (0.00)	0.00 (0.00)
Receiving country	0.03 (0.01)*	0.03 (0.01)*	0.02 (0.01)*	0.03 (0.01)*	0.02 (0.01)	0.02 (0.01)
Community	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)*

Note: \*\*\* $P < 0.001$ ; \*\* $P < 0.01$ ; \* $P < 0.05$ ; <sup>a</sup>Reference category = second-generation immigrants; <sup>b</sup>Reference category = boys; Models are based on maximum likelihood estimation; beta coefficients are unstandardised. APCC, alcohol per capita consumption rates; HED, heavy episodic drinking; SES, socioeconomic status.

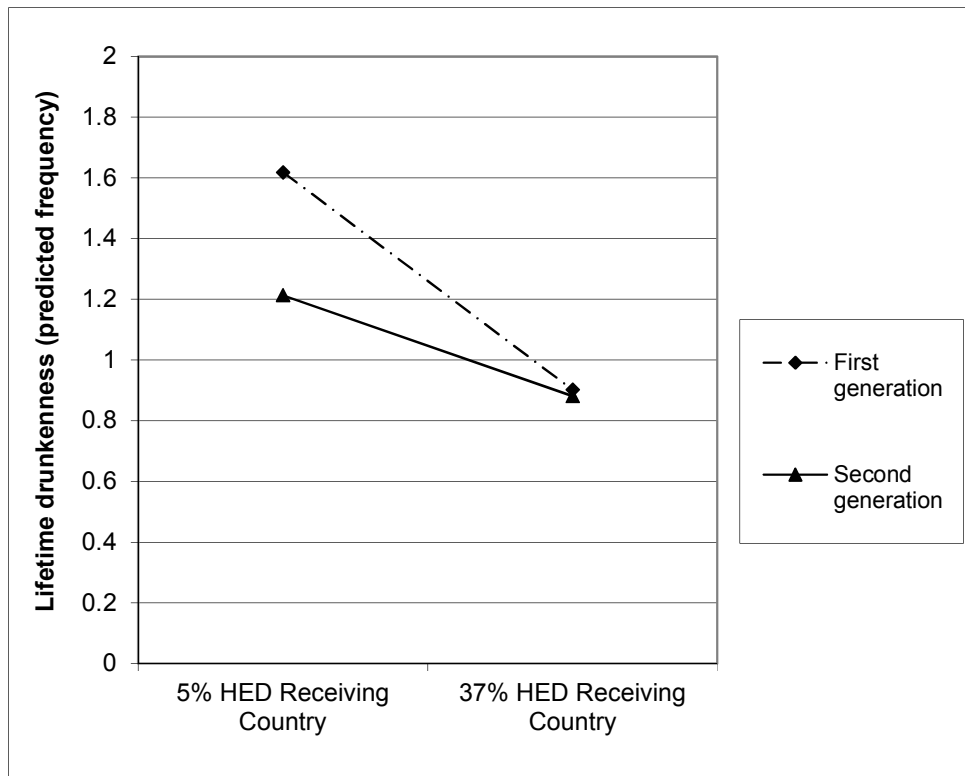


**Figure 1.** Difference between first- and second-generation immigrants in the impact of origin country HED on lifetime frequency of alcohol use ( $n = 9078$ ). Note: Predicted frequencies were estimated based on Model 6 (Table 3). Effects for the minimum and maximum observed HED values are shown. HED, heavy episodic drinking.



**Figure 2.** Difference between first- and second-generation immigrants in the impact of receiving country HED on lifetime frequency of alcohol use (n = 9078). Note: Predicted frequencies were estimated based on Model 6 (Table 3). Effects for the minimum and maximum observed HED values are shown. HED, heavy episodic drinking.





**Figure 3.** Difference between first- and second-generation immigrants in the impact of receiving country HED on lifetime frequency drunkenness ( $n = 9078$ ). Note: Predicted frequencies were estimated based on Model 6 (Table 4). Effects for the minimum and maximum observed HED values are shown. HED, heavy episodic drinking.