A Comparison of Excessive Drinking, Binge Drinking and Alcohol Dependence in Ethnic Minority Groups in the Netherlands: The HELIUS Study

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Keywords

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Abstract

Background: The Dutch multi-ethnic Healthy Life in an Urban Setting study recently showed that alcohol consumption was lower in ethnic minority groups than those of Dutch origin, but that binge drinking in drinkers of Turkish and Moroccan origin was relatively high. The aim of the current study is to examine factors that may contribute to the differences in drinking patterns and how they relate to the relationship between drinking patterns and alcohol dependence (AD) across ethnic groups. **Methods:** The rate of last year alcohol use, alcohol use patterns and AD was assessed in 4,635 Dutch, 4,317 Moroccan, 4,036 Turkish, 2,459 Ghanaian, 4,426 African Surinamese and 3,357 South-Asian Surinamese participants (both men and women) born in Amsterdam, the Netherlands. **Results:** Compared to the Dutch, the prevalence of (regular) drinking is substantially lower in all

ethnic minority groups and regular drinkers among most ethnic minority groups have a lower adjusted risk to develop binge drinking and AD than the Dutch. For the prevalence of regular drinking, the ethnic differences are bigger than for the prevalence of current drinking. However, regular drinkers of Moroccan origin have a risk similar to the Dutch to develop binge drinking and AD; a finding that could not be explained by group differences in age, sex, religiosity, perceived discrimination, depression or guilt feelings about drinking. **Discussion:** The prevalence data show that current drinking is lower and that regular drinking is much lower in ethnic minorities and – with the exception of those of Moroccan origin – ethnic minority regular drinkers also have a significant lower risk to develop binge drinking or AD than regular drinkers of Dutch origin. This implies that the magnitude of problematic alcohol use is substantially smaller in ethnic minorities than in the ethnic Dutch population of Amsterdam. Unfortunately, no explanation was found for the special risk situation of regular drinkers of Moroccan origin.

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Introduction

In the United States, ethnic minority status and ethnic discrimination are associated with an increased prevalence of smoking and drinking [1–5] and increased levels of alcohol consumption [3, 4, 6–8]. Europe is becoming increasingly ethnically diverse and official reports indicate that ethnic minority groups experience discrimination [9, 10] in different settings, for example, jobs and housing [11]. However, very little is known about drinking patterns and the presence of alcohol dependence (AD) in ethnic minorities compared to the native population in Europe, including the Netherlands.

In a recent study from the Netherlands it was shown that the association between perceived ethnic discrimination (PED) and alcohol consumption considerably varied by ethnicity. A possible explanation is that different ethnic minority groups might use different strategies to cope with discrimination [12]. Similarly, Dotinga et al. [13, 14] reported that compared to Turks, Moroccans living in the Netherlands showed a higher rate of both alcohol use (+72%) and excessive alcohol use (15.4 vs. 5.3%, respectively). Ethnic differences in religiosity are also associated with differences in (heavy or excessive) drinking and AD [15, 16]. In addition, it has been shown that the probability of negative consequences (e.g., suicide, ER admission) of drinking are associated with the general level of drinking in a (sub) culture and the level of cultural stigmatization of alcohol use [17, 18]. This means that not only the prevalence of drinking may differ by culture or ethnic origin, but also the prevalence of heavy or excessive drinking among drinkers, the negative consequences of (excessive) drinking and thus the prevalence of AD (e.g., [19, 20]). Finally, the persistence of heavy drinking and AD may differ by ethnicities, which – in turn – affect the prevalence of these problems [21–23]. However, in many of these studies, samples were small, non-representative and control for confounders (e.g., discrimination, religiosity) was limited and therefore many of the observed ethnic differences in alcohol use patterns and AD need to be replicated in larger studies with a better control of potential confounders.

In contrast to the study of Visser et al. [12] who investigated cross-ethnic differences in the association of PED with smoking and alcohol consumption, the current study focusses on cross-ethnic differences in the association of excessive drinking and binge drinking with AD and possible explanations for these differences. Like the study of Visser et al. [12], the current study uses large, representative samples of different ethnic groups from a

clearly defined geographic region (Amsterdam, the Netherlands). The aim of this study was to (1) examine the relationship between alcohol use, excessive drinking, binge drinking and AD in regular drinkers; (2) identify the (potential confounding) factors associated with these ethnic differences in alcohol use patterns and AD (including sociodemographic characteristics, perceived discrimination, religiosity, migration generation, and depression); (3), examine factors that may contribute to ethnic differences in the relationship between drinking patterns and AD in regular drinkers and (4) explain potential differences between ethnic minorities in the risk of regular drinkers to develop AD.

Methods

Study Population

We used baseline data from the Healthy Life in an Urban Setting (HELIUS) study, a large, multi-ethnic cohort study in Amsterdam, the Netherlands [24, 25]. In brief, subjects (18–70 years) were randomly sampled, stratified by ethnicity. Data were collected between 2011 and 2015. The study protocol was approved by the Medical Ethical Review Board, and all participants provided written informed consent. At baseline, 55% of those invited were contacted, either by response card or after a home visit by an ethnically matched interviewer (contact rate ranged from 46 to 62% between ethnic groups). Of those contacted, about 50% agreed to participate (participation rate ranged from 41 to 61%) [25]. As such, the response rate in the HELIUS study is 28%.

For the current study, we used baseline data of all participants with available questionnaire data ($n = 23,942$). We included all participants with a Dutch ($n = 4,635$), Moroccan ($n = 4,317$), Turkish ($n = 4,036$), Ghanaian ($n = 2,459$), African Surinamese ($n = 4,426$) and South-Asian Surinamese ($n = 3,357$) origin. We excluded participants with a Javanese Surinamese origin ($n = 250$), Surinamese participants of other/unknown ethnic origin ($n = 286$), and participants with another/unknown ethnic origin ($n = 50$), because these groups were too small for the current analyses. Furthermore, 126 participants with missing data on alcohol use were excluded. The initial total sample for this study therefore consisted of 23,230 participants (9,875 males and 13,355 females; Table 1 for samples sizes per ethnic group). Further analyses on excessive drinking, binge drinking and AD were conducted on a subsample of 7,790 regular drinkers only (4,238 males and 3,552 females; Table 2 for samples sizes per ethnic group). In an attempt to explain differences in the risk to develop AD among regular drinkers between the different ethnic minority groups, a final analysis of Alcohol Use Disorder Identification Test (AUDIT) item scores (see below) was performed in 2,092 regular drinkers with AD (1,480 males and 612 females).

Variables

Ethnicity

Ethnicity was defined according to country of birth of the participants as well as that of his or her parents which is currently the most widely accepted and most valid assessment of ethnicity in the

Table 1. The prevalence of alcohol use in the last 12 months, by ethnicity

	Dutch, <i>n</i> (%)	South Asian Surinamese, <i>n</i> (%)	African Surinamese, <i>n</i> (%)	Ghanaian, <i>n</i> (%)	Turkish, <i>n</i> (%)	Moroccan, <i>n</i> (%)	Total, <i>n</i> (%)
<i>All</i> , <i>n</i>	4,635	3,357	4,426	2,459	4,036	4,317	23,230
No drinking	419 (9.0)	1,496 (44.6)	1,391 (31.4)	1,308 (53.2)	3,137 (77.7)	3,996 (92.6)	11,747 (50.6)
Current drinking, %	91.0	55.4	68.6	46.8	22.3	7.4	49.4
Occasional drinking	444 (9.6)	819 (24.4)	1,325 (29.9)	536 (21.8)	423 (10.5)	146 (3.4)	3,693 (15.9)
Regular drinking	3,772 (81.4)	1,042 (31.0)	1,710 (38.6)	615 (25.0)	476 (11.8)	175 (4.1)	7,790 (33.5)
<i>Men</i> , <i>n</i>	2,128	1,556	1,790	951	1,817	1,633	9,875
No drinking	137 (6.4)	524 (33.7)	385 (21.5)	447 (47.0)	1,200 (66.0)	1,412 (86.5)	4,105 (41.6)
Occasional drinking	161 (7.6)	361 (23.2)	475 (26.5)	167 (17.6)	270 (14.9)	98 (6.0)	1,532 (15.5)
Regular drinking	1,830 (86.0)	671 (43.1)	930 (52.0)	337 (35.4)	347 (19.1)	123 (7.5)	4,238 (42.9)
<i>Women</i> , <i>n</i>	2,507	1,801	2,636	1,508	2,219	2,684	13,355
No drinking	282 (11.2)	972 (54.0)	1,006 (38.2)	861 (57.1)	1,937 (87.3)	2,584 (96.3)	7,642 (57.2)
Occasional drinking	283 (11.3)	458 (25.4)	850 (32.2)	369 (24.5)	153 (6.9)	48 (1.8)	2,161 (16.2)
Regular drinking	1,942 (77.5)	371 (20.6)	780 (29.6)	278 (18.4)	129 (5.8)	52 (1.9)	3,552 (26.6)

No drinking: no alcohol use; current drinking: using alcohol in the last 12 months; occasional drinking: alcohol use monthly or less; regular drinking: alcohol use at least twice a month.

Table 2. Prevalence of ED, BD and AD and their mutual ratio's among regular drinkers, by ethnicity

	Dutch, <i>n</i> (%)	South Asian Surinamese, <i>n</i> (%)	African Surinamese, <i>n</i> (%)	Ghanaian, <i>n</i> (%)	Turkish, <i>n</i> (%)	Moroccan, <i>n</i> (%)	Total, <i>n</i> (%)
<i>All</i> , <i>n</i>	3,772	1,042	1,710	615	476	175	7,790
ED	754 (20.0)	118 (11.3)	179 (10.5)	42 (6.8)	43 (9.0)	16 (9.1)	1,152 (14.8)
BD	1,394 (37.0)	309 (29.8)	398 (23.4)	168 (27.5)	173 (36.7)	94 (53.7)	2,536 (32.7)
AD	1,164 (30.9)	269 (25.9)	290 (17.1)	140 (23.1)	144 (30.6)	85 (48.9)	2,092 (27.0)
ED among AD	531 (45.6)	92 (34.2)	115 (39.7)	33 (23.6)	40 (27.8)	12 (14.1)	823 (39.3)
AD among ED	531 (70.6)	92 (78.6)	115 (65.3)	33 (78.6)	40 (93.0)	12 (80.0)	823 (71.9)
BD among AD	969 (83.2)	203 (76.0)	216 (74.5)	93 (66.9)	116 (80.6)	76 (89.4)	1,673 (80.1)
AD among BD	969 (69.6)	203 (66.1)	216 (54.8)	93 (56.4)	116 (67.1)	76 (81.7)	1,673 (66.3)
<i>Males</i> , <i>n</i>	1,830	671	930	337	347	123	4,238
ED	494 (27.0)	102 (15.2)	146 (15.7)	29 (8.6)	41 (11.8)	13 (10.6)	825 (19.5)
BD	903 (49.4)	253 (37.8)	295 (32.0)	110 (32.7)	155 (45.1)	75 (61.0)	1,791 (42.4)
AD	740 (40.5)	230 (34.3)	216 (23.4)	93 (27.7)	130 (37.8)	71 (58.2)	1,480 (35.1)
ED among AD	366 (49.5)	82 (35.7)	90 (41.7)	24 (25.8)	39 (30.0)	10 (14.1)	611 (41.3)
AD among ED	366 (74.2)	82 (80.4)	90 (62.9)	24 (82.8)	39 (95.1)	10 (83.3)	611 (74.5)
BD among AD	652 (88.1)	177 (77.3)	165 (76.4)	61 (66.3)	107 (82.3)	64 (90.1)	1,226 (82.9)
AD among BD	652 (72.3)	177 (70.0)	165 (56.5)	61 (55.5)	107 (69.0)	64 (86.5)	1,226 (68.6)
<i>Females</i> , <i>n</i>	1,942	371	780	278	129	52	3,552
ED	260 (13.4)	16 (4.3)	33 (4.2)	13 (4.7)	2 (1.6)	3 (5.8)	327 (9.2)
BD	491 (25.3)	56 (15.3)	103 (13.3)	58 (21.1)	18 (14.1)	19 (36.5)	745 (21.1)
AD	424 (21.9)	39 (10.6)	74 (9.6)	47 (17.5)	14 (11.0)	14 (26.9)	612 (17.4)
ED among AD	165 (38.9)	10 (25.6)	25 (33.8)	9 (19.1)	1 (7.1)	2 (14.3)	212 (34.6)
AD among ED	165 (63.7)	10 (66.7)	25 (75.8)	9 (69.2)	1 (50.0)	2 (66.7)	212 (65.2)
BD among AD	317 (74.8)	26 (68.4)	51 (68.9)	32 (68.1)	9 (64.3)	12 (85.7)	447 (73.2)
AD among BD	317 (64.7)	26 (48.1)	51 (50.0)	32 (58.2)	9 (50.0)	12 (63.2)	447 (60.6)

ED: at least 3–4 glasses of alcohol per day, at least 4 times per week; BD: at least 6 glasses of alcohol per occasion, at least once a month; AD: AUDIT sum score $\geq$ 8.

ED, excessive drinking; BD, binge drinking; AD, alcohol dependent; AUDIT, Alcohol Use Disorder Identification Test.

Netherlands [26]. Specifically, a participant was considered of non-Dutch ethnicity if either of the following criteria was fulfilled: (1) born outside the Netherlands and at least 1 parent born outside the Netherlands (i.e., first generation); or (2) born in the Netherlands, but at least 1 parent born outside the Netherlands (i.e., second generation). Participants of Surinamese origin were further subdivided (through self-reported ethnicity) into the following subgroups: African, South-Asian, Javanese or other/unknown Surinamese origin.

Alcohol Use (Time Frame of Last 12 Months Applies to All)

For alcohol use prevalence, we used data from the following question regarding alcoholic drinking in the past 12 months: “How often do you have a drink that contains alcohol” with the following answer categories: not in the past 12 months, but have done so before this, never, once or less monthly, 2–4 times monthly, 2–3 times weekly, 4 times or more weekly. Occasional drinking was defined as drinking alcohol monthly or less; regular drinking was defined as drinking alcohol at least twice a month. Excessive drinking was determined by asking how often 1 drinks alcoholic beverages in combination with how many glasses 1 drinks on a typical day of drinking. Drinking of alcoholic beverages “at least 4 times a week” combined with “at least 3–4 glasses per day” was considered excessive drinking (y/n). The cut-offs for excessive drinking were based on the Netherlands Mental Health Survey and Incidence Study-2 [27]. This measure does not necessarily include binge drinking. Therefore, binge drinking was defined as the consumption of 6 or more drinks per occasion at least once a month, and determined by asking how often do you drink 6 or more glasses per occasion? The 5 answer categories were as follows: never, less than monthly, monthly, weekly, and daily or almost daily.

Alcohol Dependence

AD was determined by the AUDIT-10 [28], which consists of ten questions (e.g., “how often during the last year have you failed to do what was normally expected from you because of drinking”). The sum score varied from 0 to 40, with a score ≥ 8 for determining AD [28, 29]. If only 1 item was missing, the mean score of the other nine items was used to substitute the missing item. If more than 1 item was missing, the AUDIT was not calculated and considered missing. A lower cut-off for women (i.e., score ≥ 6) did not affect the results. Special attention in the analysis was dedicated to item 7 of the AUDIT-10 about feelings of guilt and remorse related to alcohol abuse. The AUDIT is a screening instrument, and thus provides a proxy for AD or alcohol use disorder.

Covariates

Sociodemographic information was obtained by questionnaire and included age, sex and marital status (3 categories: never married; married/living with a partner; divorced/widowed). Other characteristics that were used as covariates in the regression analyses were educational level, employment status, religiosity, PED, migration generation, and depressed mood. Educational level was defined as the highest level of education completed, either in the Netherlands or in the country of origin: no education or elementary education; lower vocational or lower secondary education; intermediate vocational or intermediate/higher secondary education; and higher vocational education or university. For employment status we used the following categories: employed;

unemployed (seeking work/in welfare); not in the labour force. With regard to religiosity, participants were asked whether they were raised religiously and whether they are practicing a specific religion. Four categories of religiosity were derived: non-religious; raised religiously, currently non-religious; currently religious, non-practicing (i.e., has not visited a place of worship in the past 6 months); currently practicing religious. PED was conceptualized as the day-to-day experiences of unfair treatment (both overt and subtle) because of ethnic background [30]. For further details about PED assessment see Ikram et al. [9]. Finally, depressed mood was measured using the Patient Health Questionnaire-9 with a cut-off score of 10.

Statistical Analyses

Ethnic group differences in alcohol use, excessive drinking, binge drinking and AD were examined using chi-square and Fisher Exact tests. In logistic regression analyses, ORs were calculated for excessive drinking, binge drinking and AD by ethnicity, with the Dutch sample serving as the reference group. Five models were explored in the regression analyses. Model 1 was the unadjusted model. In model 2, we adjusted for sex (total sample only) and age, in model 3 we additionally adjusted for marital status, educational level and employment status. In the Dutch subgroup, migration generation was not applicable and very few of were religious or PED. We therefore excluded Dutch participants and made drinkers of Moroccan origin the reference group in model 4 with additional adjustment for religiosity, migration generation and PED. In model 5 (again without the Dutch participants and participants of Moroccan origin as the reference group), we additionally adjusted for depressed mood. To reduce the number of parameters in the analyses, multi-categorical covariates were transformed into binary variables according to the coding schedule depicted by the square brackets ([0] and [1]) in Tables 3 and 4. All statistical analyses were performed using IBM SPSS Statistics version 25.

Results

Patterns of Drinking across Different Ethnic Groups

Table 1 shows that the highest rates of current drinking and regular drinking were observed in the Dutch participants (91.0 and 81.4% respectively) with relatively low rates of occasional drinking (9.6%). Much lower rates of current drinking and regular drinking were observed in all ethnic minority groups, especially in the 2 ethnic minority groups with a predominant Muslim background: Turks with rates of 22.3 and 11.8% and Moroccans with rates of 7.4 and 4.1% for current drinking and regular drinking respectively. In addition to the expected lower prevalence of current drinking in ethnic groups, we found an even bigger difference between the Dutch and ethnic groups in the prevalence of regular drinking (cf. Table 1). The figures about current drinking confirm those previously found by Visser et al. [12]. As expected, and related

Table 3. Demographic characteristics of regular drinkers

	Dutch	South Asian Surinamese	African Surinamese	Ghanaian	Turkish	Moroccan	Total
<i>All, n</i>	3,772	1,042	1,71	615	476	175	7,790
Age, years, mean $\pm$ SD	46.0 $\pm$ 4.0	44.5 $\pm$ 13.0	47.2 $\pm$ 2.7	46.4 $\pm$ 0.0	41.0 $\pm$ 11.3	36.9 $\pm$ 11.2	45.6 $\pm$ 13.2
Marital status, %							
Never married [0]	31.7	38.5	53.3	30.1	31.6	53.1	37.7
Married/living with a partner [1]	59.5	43.2	30.4	39.1	50.8	34.3	48.3
Divorced/widowed [0]	8.8	18.3	16.3	30.8	17.5	12.6	14.1
Educational level, %							
No/elementary only [1]	2.4	12.5	4.9	25.3	17.8	11.4	7.2
Lower vocational/lower secondary [1]	11.5	32.1	36.4	43.6	22.7	20.6	23.1
Intermediate vocational/intermediate or higher secondary [0]	20.5	29.4	35.4	25.0	26.9	33.1	26.0
Higher vocational/university [0]	65.6	26.0	23.2	6.1	32.6	34.9	43.6
Employment status, %							
Not in labour force [0]	19.3	17.7	17.8	11.9	14.9	11.4	17.7
Unemployed [0]	5.3	16.1	17.9	25.8	16.4	27.4	12.3
Employed [1]	75.4	66.2	64.2	62.3	68.7	61.1	70.0
<i>Men, n</i>	1,830	671	930	337	347	123	4,238
Age, years, mean $\pm$ SD	46.9 $\pm$ 13.7	44.5 $\pm$ 13.4	48.1 $\pm$ 12.9	48.3 $\pm$ 10.0	42.1 $\pm$ 11.2	39.9 $\pm$ 10.8	46.3 $\pm$ 13.1
Marital status, %							
Never married [0]	28.5	38.7	51.7	23.9	27.5	45.5	35.2
Married/living with a partner [1]	65.0	46.1	34.9	48.1	57.1	39.8	52.7
Divorced/widowed [0]	6.5	15.2	13.4	28.1	15.4	14.6	12.1
Educational level, %							
No/elementary only [1]	2.9	12.6	5.8	14.8	22.1	13.8	7.9
Lower vocational/lower secondary [1]	11.8	33.1	42.4	50.9	28.2	23.6	26.6
Intermediate vocational/intermediate or higher secondary [0]	22.1	30.7	33.9	27.4	25.3	32.5	27.0
Higher vocational/university [0]	63.2	23.7	18.0	6.9	24.4	30.1	38.5
Employment status, %							
Not in labour force [0]	18.2	15.3	16.9	8.5	12.3	9.8	16.0
Unemployed [0]	5.7	17.2	20.0	19.9	18.4	30.1	13.5
Employed [1]	76.1	67.5	63.1	71.6	69.3	60.2	70.5
<i>Women, n</i>	1,942	371	780	278	129	52	3,552
Age, years, mean $\pm$ SD	45.1 $\pm$ 14.2	44.4 $\pm$ 12.5	46.2 $\pm$ 12.2	44.2 $\pm$ 9.5	38.3 $\pm$ 11.2	29.8 $\pm$ 8.9	44.7 $\pm$ 13.3
Marital status, %							
Never married [0]	34.7	38.3	55.2	37.7	42.6	71.2	40.6
Married/living with a partner [1]	54.3	37.8	25.1	28.3	34.1	21.2	42.9
Divorced/widowed [0]	11.0	23.9	19.7	34.1	23.3	7.7	16.5
Educational level, %							
No/elementary only [1]	2.0	12.4	3.9	38.1	6.3	5.8	6.5
Lower vocational/lower secondary [1]	11.2	30.3	29.4	34.8	7.8	13.5	18.9
Intermediate vocational/intermediate or higher secondary [0]	19.0	27.0	37.3	22.0	31.3	34.6	24.8
Higher vocational/university [0]	67.8	30.3	29.4	5.1	54.7	46.2	49.8
Employment status, %							
Not in labour force [0]	20.3	22.0	18.9	16.1	21.9	15.4	19.8
Unemployed [0]	5.0	14.1	15.5	33.0	10.9	21.2	10.9
Employed [1]	74.7	63.9	65.6	50.9	67.2	63.5	69.3

to the Muslim background, full abstinence from drinking alcohol was high across participants of Turkish and Moroccan origin (77.7 and 92.6%, respectively), whereas in the 3 other ethnic minority groups the rate of non-drinkers was moderate, but consistently higher than in the

Dutch origin group. Overall, women were less likely to consume alcohol than men. Especially, very few women of Turkish and Moroccan origin were occasional or regular drinkers (1.8–6.9%).

Table 4. Religiosity, migration generation, perceived discrimination and depressed mood in regular drinkers, by ethnicity

	Dutch	South Asian Surinamese	African Surinamese	Ghanaian	Turkish	Moroccan	Total
<i>All, n</i>	3,772	1,042	1,710	615	476	175	7,790
Religiosity, %							
Non-religious [0]	55.9	12.9	13.4	2.9	16.3	1.1	33.2
Raised religiously, currently non-religious [0]	33.0	15.9	16.4	14.9	17.0	18.4	24.5
Currently religious, non-practicing [0]	4.1	32.2	29.5	4.8	28.0	44.3	15.8
Currently practicing religious [1]	7.0	39.0	40.7	77.4	38.7	36.2	26.5
Migration, %							
First-generation migrant [1]	NA	71.4	80.4	96.4	65.1	54.9	40.0
Second-generation migrant [0]	NA	28.6	19.6	3.6	34.9	45.1	11.6
Perceived ethnic discrimination score, mean $\pm$ SD	1.1 $\pm$ 0.3	2.0 $\pm$ 0.8	2.1 $\pm$ 0.8	2.0 $\pm$ 0.8	1.9 $\pm$ 0.7	2.0 $\pm$ 0.7	1.6 $\pm$ 0.7
Depressed mood (PHQ-9 10+), %	5.9	16.3	9.8	10.2	21.4	27.4	9.9
<i>Men, n</i>	1,830	671	930	337	347	123	4,238
Religiosity, %							
Non-religious [0]	56.1	12.6	14.3	3.1	12.6	0.8	30.9
Raised religiously, currently non-religious [0]	33.6	16.2	18.4	17.1	15.0	15.6	24.2
Currently religious, non-practicing [0]	3.8	29.7	29.7	5.2	25.7	38.5	16.4
Currently practicing religious [1]	6.5	41.4	37.6	74.6	46.7	45.1	28.5
Migration, %							
First-generation migrant [1]	NA	72.3	82.0	96.7	68.9	65.0	44.7
Second-generation migrant [0]	NA	27.7	18.0	3.3	31.1	35.0	12.2
Perceived ethnic discrimination score, mean $\pm$ SD	1.1 $\pm$ 0.3	2.0 $\pm$ 0.8	2.2 $\pm$ 0.8	2.0 $\pm$ 0.8	2.0 $\pm$ 0.7	2.1 $\pm$ 0.8	1.7 $\pm$ 0.8
Depressed mood (PHQ-9 10+), %	4.8	14.1	6.3	8.7	20.7	24.4	8.8
<i>Women, n</i>	1,942	371	780	278	129	52	3,552
Religiosity, %							
Non-religious [0]	55.6	13.4	12.4	2.7	26.2	1.9	36.1
Raised religiously, currently non-religious [0]	32.5	15.3	14.0	12.1	22.2	25.0	24.7
Currently religious, non-practicing [0]	4.4	36.7	29.2	4.3	34.1	57.7	15.1
Currently practicing religious [1]	7.4	34.5	44.5	80.9	17.5	15.4	24.2
Migration, %							
First-generation migrant [1]	NA	69.8	78.3	96.0	55.0	30.8	34.5
Second-generation migrant [0]	NA	30.2	21.7	4.0	45.0	69.2	10.9
Perceived ethnic discrimination score, mean $\pm$ SD	1.1 $\pm$ 0.3	1.9 $\pm$ 0.7	2.0 $\pm$ 0.7	1.9 $\pm$ 0.8	1.7 $\pm$ 0.6	1.7 $\pm$ 0.5	1.5 $\pm$ 0.7
Depressed mood (PHQ-9 10+), %	7.0	20.3	13.9	12.1	23.3	34.6	11.3

PHQ-9, Patient Health Questionnaire-9; NA, not applicable.

Relationship between Alcohol Use, Excessive Drinking, Binge Drinking and AD

Considering that the differences between the regular drinking Dutch and the ethnic groups are bigger for regular drinking than for current drinking, we further focussed on regular drinkers. The prevalence rates of excessive drinking, binge drinking and AD among regular drinkers are depicted in Table 2. Rates of excessive drinking among regular drinkers were consistently lower in all 5 ethnic minority groups compared to the Dutch (6.8–11.3 vs. 20.0%, respectively). Similarly, the rates of both binge drinking and AD among regular drinkers of Surinamese, Ghanaian and Turkish origin

were also lower than the Dutch, but regular drinkers of Moroccan origin showed a 1.5–1.6 times higher rate than those of Dutch origin for both binge drinking and AD. Table 2 further shows that the proportion of excessive drinkers (14–46%) is lower than the proportion of binge drinkers (67–89%) among alcohol dependent subjects.

Confounding of the Relation between Ethnicity with Alcohol Use Patterns and AD

Participants of Moroccan origin showed some demographic characteristics deviant from the other 5 ethnic subgroups studied as they were relatively young, more

frequently unemployed, relatively highly educated (except as compared with the Dutch), and more often single (never married; cf. Table 3). Furthermore, of all ethnic minority groups, those of Moroccan origin showed the highest prevalence of depressed mood, were in general more religious, and were more often a second-generation migrant (cf. Table 4). Given these group differences, adjusted risk ratios need to be calculated using different models with different sets of (potential) confounders.

Table 5 depicts the results of the unadjusted (model 1) and adjusted (models 2–5) analyses. All 5 ethnic minority groups show significantly lower rates of excessive drinking in regular drinkers compared to regular drinkers of Dutch origin (ORs <1.00), independent of adjustment for potential confounders (model 2–3) and with no significant differences among the different ethnic minorities (models 4–5). Similarly, but with the exception of those of Moroccan origin, regular drinkers belonging to ethnic minority groups also show significantly lower rates of both binge drinking and AD compared to regular drinkers of Dutch origin (ORs <1.00). With respect to binge drinking and AD, regular drinkers of Moroccan origin (men not women) show a higher rate than the Dutch, but the difference was no longer statistically significant after adjustment for confounders (ORs not significantly different from 1.00 in models 3–5).

Differences between Ethnic Minorities in the Risk to Develop AD

We further explored why male regular drinkers of Moroccan origin have a similar risk of developing AD compared to their Dutch peers, whereas regular drinkers in the other 4 ethnic minority groups (men and women) showed a significantly lower risk for AD, we performed a sub-analysis using the response to item 7 of the AUDIT-10 (“feeling of guilt or remorse”) since male regular drinking of Moroccan origin with AD scored relatively high on this item: Moroccans 1.8 ± 1.5 ; $n = 71$; Dutch 1.0 ± 1.0 ; $n = 740$; South Asian Surinamese 1.0 ± 1.2 ; $n = 230$; African Surinamese 1.0 ± 1.3 ; $n = 216$; Ghanaians 1.3 ± 1.4 ; $n = 93$; Turks 1.2 ± 1.4 ; $n = 130$ ($p < 0.001$). After exclusion of this item from the AUDIT sum score (leaving a cut-off score of 7 instead of 8 for AD), an additional regression analysis was performed with males from all ethnic groups and using the covariates of model 3 (age, marital status, educational level and employment status). Results from this analysis suggested that the risk of developing AD (without guilt/remorse as an AD crite-

rior) among male regular drinkers of Moroccan origin is still similar to that among their Dutch peers, but significantly higher than among the other 4 ethnic minority groups: OR compared to Dutch: South Asian Surinamese 0.61 (0.50–0.74), African Surinamese 0.41 (0.34–0.49), Ghanaians 0.46 (0.35–0.60), Turks 0.62 (0.48–0.80), Moroccans 1.29 (0.88–1.9); Nagelkerke $R^2 = 0.078$. A subsequent analysis with additional adjustment for religiosity, migration generation, PED and depressed mood (similar to model 5) still indicated a higher risk of developing AD among males of Moroccan origin compared to the other ethnic minority groups: OR compared to Moroccans: South-Asian Surinamese 0.48 (0.32–0.72), African Surinamese 0.31 (0.21–0.47), Ghanaians 0.37 (0.24–0.59), Turks 0.49 (0.31–0.76; Nagelkerke $R^2 = 0.101$). The AUDIT-item “feelings of guilt” proved to be the only item on which Moroccans scored differently from all other ethnic groups. However, excluding the item “feeling of guilt or remorse” therefore did not change the general results.

Discussion

The current study shows that compared to the Dutch, the prevalence of current drinking and regular drinking is substantially lower in the 5 ethnic minority groups studied in Amsterdam. It appeared that the differences between the Dutch and the ethnic groups with respect to the prevalence of regular drinking are considerably bigger than for current drinking. Focussing on regular drinkers, we extended the previous findings of Visser et al. [12] obtained in current drinkers.

Except for those of Moroccan origin, regular drinkers among ethnic minority groups have a much lower risk to develop problematic alcohol use, including binge drinking and AD. With respect to AD, similar results have been previously obtained in current drinkers [12]. These differences remain after controlling for potential confounders. Remarkably, regular drinkers of Moroccan origin have a risk to develop AD similar to their Dutch peers; a finding that could not be explained by ethnic group differences in important variables like group differences in age, sex, religiosity, perceived discrimination, depression and/or guilt feelings about drinking.

Members of the ethnic minority groups in Amsterdam, in particular people of Turkish and Moroccan origin, are not only more often teetotallers but are even less frequently regular drinkers than those of Dutch origin. In addition, the prevalence of occasional and regular

Table 5. ORs (95% CI) for ED, BD and AD in regular drinkers

	Dutch	South Asian Surinamese	African Surinamese	Ghanaian	Turkish	Moroccan	Nagelkerke R ²
<i>All, n</i>	3,772	1,042	1,710	615	476	175	
ED							
Model 1	1	0.51 (0.41–0.63)	0.47 (0.39–0.56)	0.32 (0.23–0.44)	0.39 (0.28–0.54)	0.40 (0.24–0.68)	0.037
Model 2	1	0.46 (0.37–0.57)	0.41 (0.34–0.50)	0.28 (0.20–0.39)	0.37 (0.26–0.52)	0.43 (0.25–0.73)	0.120
Model 3	1	0.43 (0.34–0.54)	0.37 (0.31–0.45)	0.26 (0.18–0.37)	0.35 (0.25–0.49)	0.38 (0.23–0.66)	0.126
Model 4	–	1.21 (0.68–2.14)	1.04 (0.60–1.83)	0.72 (0.38–1.35)	0.97 (0.52–1.81)	1	0.107
Model 5	–	1.25 (0.71–2.22)	1.12 (0.63–1.97)	0.76 (0.40–1.44)	0.98 (0.52–1.84)	1	0.109
BD							
Model 1	1	0.73 (0.63–0.85)	0.52 (0.46–0.59)	0.63 (0.52–0.77)	0.99 (0.81–1.21)	2.00 (1.47–2.71)	0.027
Model 2	1	0.55 (0.47–0.64)	0.48 (0.42–0.55)	0.57 (0.47–0.71)	0.62 (0.50–0.77)	1.19 (0.87–1.64)	0.161
Model 3	1	0.45 (0.38–0.54)	0.39 (0.33–0.45)	0.43 (0.34–0.53)	0.52 (0.42–0.65)	1.01 (0.73–1.40)	0.173
Model 4	–	0.39 (0.28–0.55)	0.30 (0.22–0.42)	0.36 (0.24–0.52)	0.50 (0.34–0.72)	1	0.136
Model 5	–	0.41 (0.29–0.57)	0.32 (0.23–0.46)	0.38 (0.26–0.56)	0.50 (0.35–0.73)	1	0.139
AD							
Model 1	1	0.78 (0.66–0.91)	0.46 (0.40–0.53)	0.66 (0.53–0.81)	0.98 (0.79–1.21)	2.14 (1.58–2.91)	0.032
Model 2	1	0.62 (0.53–0.73)	0.43 (0.37–0.50)	0.61 (0.49–0.75)	0.68 (0.55–0.85)	1.46 (1.06–2.00)	0.116
Model 3	1	0.51 (0.43–0.61)	0.34 (0.29–0.40)	0.47 (0.37–0.59)	0.59 (0.47–0.74)	1.20 (0.87–1.66)	0.133
Model 4	–	0.39 (0.28–0.56)	0.24 (0.17–0.35)	0.37 (0.25–0.54)	0.47 (0.32–0.69)	1	0.160
Model 5	–	0.42 (0.29–0.60)	0.28 (0.19–0.40)	0.42 (0.28–0.62)	0.48 (0.33–0.71)	1	0.172
<i>Men, n</i>	1,830	671	930	337	347	123	
ED							
Model 1	1	0.49 (0.39–0.62)	0.51 (0.41–0.62)	0.26 (0.18–0.39)	0.35 (0.25–0.50)	0.32 (0.18–0.58)	0.048
Model 2	1	0.52 (0.41–0.66)	0.48 (0.39–0.59)	0.25 (0.17–0.38)	0.42 (0.29–0.60)	0.40 (0.22–0.73)	0.086
Model 3	1	0.46 (0.35–0.59)	0.41 (0.32–0.51)	0.22 (0.14–0.33)	0.37 (0.26–0.54)	0.35 (0.19–0.63)	0.095
Model 4	–	1.42 (0.76–2.66)	1.22 (0.66–2.28)	0.67 (0.33–1.37)	1.15 (0.59–2.28)	1	0.068
Model 5	–	1.47 (0.78–2.77)	1.31 (0.70–2.46)	0.71 (0.34–1.45)	1.16 (0.59–2.30)	1	0.070
BD							
Model 1	1	0.64 (0.53–0.77)	0.49 (0.41–0.58)	0.49 (0.38–0.63)	0.85 (0.67–1.08)	1.64 (1.13–2.39)	0.036
Model 2	1	0.58 (0.48–0.70)	0.49 (0.42–0.59)	0.50 (0.39–0.65)	0.72 (0.57–0.92)	1.34 (0.92–1.97)	0.084
Model 3	1	0.49 (0.40–0.59)	0.40 (0.33–0.48)	0.39 (0.30–0.51)	0.61 (0.47–0.78)	1.15 (0.78–1.70)	0.096
Model 4	–	0.40 (0.26–0.59)	0.29 (0.20–0.44)	0.31 (0.20–0.48)	0.54 (0.35–0.83)	1	0.059
Model 5	–	0.41 (0.27–0.62)	0.32 (0.21–0.48)	0.33 (0.21–0.52)	0.54 (0.35–0.83)	1	0.066
AD, n							
Model 1	1	0.77 (0.64–0.92)	0.45 (0.37–0.54)	0.55 (0.42–0.72)	0.90 (0.70–1.14)	2.09 (1.43–3.03)	0.039
Model 2	1	0.72 (0.60–0.87)	0.45 (0.38–0.55)	0.57 (0.43–0.74)	0.80 (0.62–1.02)	1.80 (1.23–2.62)	0.064
Model 3	1	0.59 (0.48–0.72)	0.35 (0.29–0.43)	0.44 (0.34–0.58)	0.66 (0.51–0.85)	1.46 (0.99–2.15)	0.084
Model 4	–	0.38 (0.26–0.58)	0.21 (0.14–0.32)	0.29 (0.18–0.46)	0.46 (0.30–0.72)	1	0.108
Model 5	–	0.40 (0.27–0.61)	0.24 (0.16–0.36)	0.32 (0.20–0.51)	0.46 (0.29–0.72)	1	0.123
<i>Women</i>	1,942	371	780	278	129	52	
ED							
Model 1	1	0.28 (0.17–0.48)	0.29 (0.20–0.42)	0.36 (0.21–0.65)	0.10 (0.03–0.43)	0.39 (0.12–1.27)	0.059
Model 2	1	0.30 (0.17–0.50)	0.28 (0.19–0.41)	0.40 (0.22–0.71)	0.14 (0.03–0.56)	0.73 (0.22–2.39)	0.100
Model 3	1	0.32 (0.19–0.56)	0.29 (0.19–0.42)	0.48 (0.26–0.88)	0.13 (0.03–0.53)	0.67 (0.20–2.22)	0.111
Model 4	–	0.50 (0.13–1.94)	0.45 (0.12–1.68)	0.77 (0.19–3.20)	0.20 (0.03–1.25)	1	0.063
Model 5	–	0.53 (0.13–2.06)	0.49 (0.13–1.85)	0.85 (0.20–3.63)	0.21 (0.03–1.32)	1	0.064
BD							
Model 1	1	0.52 (0.38–0.71)	0.44 (0.35–0.56)	0.75 (0.54–1.05)	0.50 (0.30–0.83)	1.69 (0.95–2.99)	0.032
Model 2	1	0.49 (0.36–0.68)	0.46 (0.36–0.58)	0.75 (0.54–1.06)	0.36 (0.22–0.61)	0.88 (0.49–1.59)	0.124
Model 3	1	0.40 (0.29–0.56)	0.37 (0.29–0.48)	0.51 (0.35–0.74)	0.32 (0.19–0.54)	0.74 (0.40–1.34)	0.138
Model 4	–	0.41 (0.21–0.81)	0.36 (0.19–0.69)	0.52 (0.25–1.08)	0.38 (0.18–0.83)	1	0.076
Model 5	–	0.41 (0.21–0.82)	0.36 (0.19–0.71)	0.53 (0.25–1.12)	0.38 (0.18–0.83)	1	0.076
AD							
Model 1	1	0.41 (0.29–0.59)	0.38 (0.29–0.49)	0.73 (0.51–1.04)	0.45 (0.26–0.80)	1.30 (0.70–2.42)	0.040
Model 2	1	0.40 (0.28–0.57)	0.39 (0.30–0.51)	0.72 (0.51–1.03)	0.38 (0.21–0.66)	0.87 (0.46–1.63)	0.072
Model 3	1	0.36 (0.25–0.52)	0.32 (0.24–0.42)	0.62 (0.42–0.91)	0.33 (0.19–0.59)	0.74 (0.39–1.40)	0.092
Model 4	–	0.44 (0.21–0.91)	0.41 (0.20–0.83)	0.81 (0.37–1.80)	0.44 (0.19–1.03)	1	0.070
Model 5	–	0.48 (0.23–1.00)	0.47 (0.23–0.96)	0.97 (0.43–2.18)	0.46 (0.20–1.09)	1	0.079

In bold: statistically significant OR.

Model 1: crude model (Dutch = reference group); Model 2: adjusted for gender (total sample only) and age (Dutch = reference group); Model 3: as model 2, but also adjusted for marital status, education and employment (Dutch = reference group); Model 4: as model 3, but also adjusted for religiosity, migration and perceived ethnic discrimination (Dutch omitted, Moroccan = reference group); Model 5: as model 4, but also adjusted for depressed mood (Dutch omitted, Moroccan = reference group).

ED, excessive drinking; BD, binge drinking; AD, alcohol dependence.

drinking is some 3 times higher in the Turkish than in the Moroccan ethnic minority group, but regular drinkers of Moroccan origin show a higher rate of excessive drinking, binge drinking and AD compared to their Turkish peers.

It is of interest that regular drinkers of Moroccan origin have a significantly higher risk to develop binge drinking and AD than regular drinkers in the other 4 ethnic minority groups. At the same time (after adjustment for confounders) regular drinkers of Moroccan origin have a similar risk for binge drinking and AD compared to their Dutch peers. These findings partially confirm previous findings, which showed that the rate of excessive drinking and AD was relatively high among Turkish and Moroccan ethnic minority groups compared to those of Dutch origin [12, 31]. Moreover, Dutch residents of Moroccan origin previously showed a threefold higher excessive alcohol use than their Turkish peers [13, 14].

Typical for people of Moroccan origin is their Muslim belief, which also applies, although to a lesser extent, to those of Turkish origin. For Muslims alcohol use is strictly forbidden and socially unacceptable (haram). In addition, Islamic principles teach preservation and protection of dignity of man, and steering mankind away from harm and destruction [32]. Accordingly, subjects with problematic alcohol use deny and disavow their problem, feel uncomfortable talking about it and are reluctant to seek treatment. On this basis, we hypothesized that alcohol use would lead more rapidly to problematic drinking (and AD) in a Muslim environment as compared with social environments where drinking is the norm (e.g., among the Dutch). Recent data from Iran largely endorse this hypothesis as they showed a high incidence of AUD (1.3%) along with a very low rate of alcohol consumption of 5.7% [33]. No recent Dutch data are available about treatment of AD among specific ethnic minority groups, like Moroccans or Turks, because from 1994 ethnicity in the surveys is collectively stratified as patients with a native, western or non-western immigrant background. The latest figures available about treatment rates of AD across specific ethnic minority groups in the Netherlands are from 1993. Taking the Dutch as reference (the Dutch set as 1.0), the treatment rate of AD in residents of Moroccan origin is 0.7 (corrected for their share in the total population), which is relatively high considering their 12-fold lower prevalence of alcohol consumption [34].

According to our hypothesis, present data show that regular drinkers of Moroccan origin – in contrast to those in other ethnic minorities – have an increased risk to de-

velop AD, but this was not explained by differences in religiosity, migration generation, PED, depressed mood or higher feelings of guilt and remorse around problematic alcohol use. In addition, regular drinkers of Turkish origin showed no higher risk for AD compared to their Dutch peers. Our hypothesis is therefore refuted, and the reason of this discrepancy remains to be resolved.

The current study has both strengths and limitations. The most important strengths are the broad range of different ethnic minorities, the large sample sizes, the use of standardized assessments and the availability of many potential confounders. The study also has some limitations. First, the study was cross-sectional and therefore we refrained from causal statements. Second, non-response was relatively high considering a response rate of 28%. However, non-response analyses have shown that demographic and socioeconomic differences between participants and non-participants were very small [25]. Moreover, all ethnic group comparisons in the current study were controlled for a broad range of potential confounders. Finally, our study only used self-report questionnaires and no data were collected with (semi-) structured interviews or data provided by informants. However, the AUDIT has been shown considerable cross-culturally validity for the diagnosis of AD, including European, African, South-American, and Asian populations (e.g., [35–37]), including studies with a Turkish and an Arabic version of the AUDIT [38, 39]. It should be noted, however, that the high prevalence rates of AD in this (and in other) studies does not necessarily indicate the presence of a high prevalence of chronic alcohol use disorders, since AD in a general population sample shows high rates of (spontaneous) remission (e.g., [40, 41]).

Conclusion

The differences between the Dutch and the ethnic groups with respect to the prevalence of regular drinking are considerably bigger than for current drinking. Based on the prevalence data, we conclude that, compared to the Dutch, the magnitude of problematic alcohol use is smaller in ethnic minorities in Amsterdam than in the ethnic Dutch population in Amsterdam. This includes male participants of Moroccan origin who showed a similar risk as their Dutch peers to become alcohol dependent when they regularly drink, but given their low rate of regular drinking the prevalence of AD is still very low compared to the their Dutch peers (Moroccans: 48.9% AD among

4.1% regular drinkers = 2.0%; Dutch: 30.9% AD among 81.4% regular drinkers = 25.2%). Moreover, the other 4 minority groups were also less often regular drinkers than the Dutch and on top of that they showed a lower risk of AD compared to their Dutch peers. We were unable to provide an explanation for the high risk of regular drinkers of Moroccan origin to develop AD. However, we do know now that these differences are not explained by religiosity, migration generation, PED, depressed mood or higher feelings of guilt and remorse around problematic alcohol use.

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Statement of Ethics

The study protocol was approved by the Medical Ethical Review Board of the Academic Medical Center, University of Amsterdam, Amsterdam, the Netherlands.

Disclosure Statement

All authors declared no conflict of interest.

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Author Contributions

J.G.C.A. was the main investigator and drafted the manuscript and A.B. performed the data analysis. The other co-authors (S.B., M.B.S., A.L., A.H.S., E.M.D., and W.B.) critically commented during drafting of the manuscript.

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