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THESIS

The association between Ethnicity, Cannabis use and the Mental Health of Dutch Secondary School Children

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SUMMARY

Objective: In the current study the interaction between ethnicity, cannabis use and mental health problems was examined. Expected was that participants immigrants would report more mental health problems than their Dutch native peers. Secondly, it was expected that participants who use or have been using cannabis report more mental health problems than participants who never used cannabis. Furthermore, we expect that immigrants who use or have been using cannabis experience more mental health problems than native participants who use or have been using cannabis and immigrants who have never used cannabis.

Methods: Participants were 11,100 Dutch secondary school children aged 10 to 25 years, who all filled out a questionnaire containing the Strengths and Difficulties Questionnaire (SDQ). This questionnaire assesses psychosocial adjustment of children and adolescents. Ethnicity was determined by country of birth. Cannabis use was divided into three categories, 'never used cannabis', 'used cannabis once in their live' and 'used cannabis in the four weeks prior to the study'. Total SDQ score was used as a measure for experiencing mental health problems.

Results: As expected, both cannabis use and ethnicity were associated with mental health problems. However, an interaction between cannabis use and ethnicity on mental health problems was not found. After controlling for social economic status, severe life events, use of hard drugs and alcohol and smoking, ethnicity was no longer associated with mental health problems. The influence of cannabis use remained. Again, no interaction was found.

Conclusion: Immigrants status is not an independent risk factor for development of mental health problems. The association for ethnicity with mental health problems is mediated by severe life events.

INTRODUCTION

Since the 60's of the previous century, Western Europe has been overwhelmed with immigrants of non-Western countries. Aside from war refugees, a large amount of the immigrants where brought to Europe, due to the large amount of work available. Between 1964 en 1979, a total of 342,900 immigrants came to the Netherlands, most of them being from Moroccan or Turkish origin (Nicolaas, Sprangers & Witvliet, 2003). Although these labourers were supposed to stay only temporarily, many of them stayed in their host countries. Furthermore, the reunification with family members brought many women and children to Western Europe. As a consequence, there are large ethnic minorities in many European Countries (Junger & Polder, 1992). According to the Dutch Central Bureau of Statistics [CBS] (2012), on the first of January 2010, 3,359,603 immigrants where living in the Netherlands. Of these immigrants, 55,3% where from non-Western origin. Only 56,8% of the non-Western immigrants where actually born abroad. The remaining 43,2% where born in the Netherlands, but have at least one parent of non Dutch origin. These individuals are considered second generation immigrants.

Ethnicity and mental health problems

Recent studies show that the risk of developing schizophrenia is between two and four times more likely in immigrants from Africa and the Caribbean than in the indigenous white British population. These rates have persisted into the second and third generations (Hutchinson & Haassen, 2004). The incidence rate of schizophrenia in residents of South East London has doubled over the last three decades (Boydell et al., 2003), which could be explained by the high incidence rates among African and Caribbean immigrants in this area (Hutchinson & Haasen, 2004). Several other studies have reported a higher than average incidence of schizophrenia and other psychotic disorders for immigrant ethnic groups in Western Europe (Hutchinson & Haasen, 2004; Fearon, et al., 2006; Veling, et al., 2006). This high incidence is reported for Surinamese and Dutch Antillean immigrants, as well as for migrants from Turkey and Morocco (Selten, et al., 2001; Selten, Slaets & Kahn, 1997). A possible explanation for this high incidence might be the experience of adverse social experiences, such as discrimination and exclusion. Veling, Hoek, and Machkenbach (2008) took a closer look at this phenomenon. They investigated the association of perceived discrimination and first episode schizophrenia among immigrants from Surinam, Morocco, Turkey and the Netherlands-Antilles. Participants existed of immigrants making first contact with a physician for a psychotic disorder and received a diagnosis within the schizophrenia spectrum. No significant differences in rate of perceived discrimination between non-western immigrants who made first contact with a physician compared with their siblings or the general hospital control group were found. Therefore, perceived discrimination does not seem to influence the first episode of schizophrenia. In one of their following researches, Veling, Hoek, Wiersma and Mackenbach (2010) investigated the association of ethnic identity and the risk of schizophrenia among immigrants from Surinam, Morocco, Turkey and the Netherlands-Antilles. Ethnic identity was determined by a questionnaire. Participants were assigned to different identity categories depending on their score on the questionnaire. A person who identifies him- or herself with the own ethnic group, as well as with the larger society is considered to have an integrated identity. A

strong ethnic identity, but a weak association with the national identity is considered a separated identity. An assimilated identity exists when a person gives up their ethnic identity, but has a strong national identity. Individuals who identify themselves neither with the own ethnic group, nor with the larger society is considered to have a marginalised identity. Results show that immigrants who developed schizophrenia identify themselves less often and less positive with the own ethnic group in comparison with their siblings and general hospital controls. Furthermore, participants who were diagnosed with schizophrenia had more often had an assimilated or marginalised identity. Veiling et al concluded that it may be that negative association with the own ethnic group is a risk factor for schizophrenia in immigrants. Marginalisation and assimilation have been consistently associated with low self-esteem and poor mental health (Tajfel & Turner, 2001; Balls Organista, Organista & Kurasaki, 2003). It is possible that most of the second generation immigrants in the Netherlands will have a less strong association with the country of origin of their parents, although they feel not completely accepted as a native in their home countries. Abouguendia and Noels (2001) found that this was the case with South-Asian people who immigrated to Canada. They stated that acculturation process of second generation immigrants is not comparable with the acculturation process of their parents.

Cannabis use and mental health problems

Another matter that has been associated with a higher risk of schizophrenia and other mental problems is the use of cannabis (Richardson, 2010; De Graaf, et al., 2010; Schubart, et al., 2010). In Europe, 33% of the adolescents have used cannabis at least once in their life according to the European Monitoring Centre for Drugs and Drug Addiction [EMCDDA] (2011). Several studies show that especially young onset of cannabis use is associated with various mental problems such as depression, anxiety disorders, mania and psychosis (Richardson, 2010; De Graaf, et al., 2010). Schubart et al., (2010) also found that early and heavy uses of cannabis are associated with subclinical symptoms of psychosis. Early use of cannabis is especially associated with positive symptoms such as hallucinations, whereas heavy use is particularly associated with negative symptoms and depression. This is in agreement with an earlier study by Schubart, et al. (2009), which showed that using cannabis before the age of 12 years was associated with a much higher chance on experiencing distressing psychotic symptoms. They also found a dose dependent association between cannabis use and psychotic symptoms. A study by Hollis et al (2008) found that adolescents with a high genetic risk for schizophrenia and attention deficit/hyperactivity disorder are particularly vulnerable for mental health problems associated with cannabis use. In contrast, Monshouwer, et al. (2006) found that cannabis use was linked to externalising problems, such as delinquent and aggressive behaviour, but not to internalising problems, such as withdrawn behaviour, somatic complaints and depression. These links became stronger with an increase in frequency of use.

Hypotheses

In this study the interaction between ethnicity, cannabis use and mental health problems is explored. Both first and second generation immigrants participated in this study. Since previous studies in the United Kingdom have shown the incidence rate of schizophrenia is high among immigrants compared

to non-immigrants, the first hypothesis states that immigrants in the current study will report more mental health problems than their Dutch native peers. As mentioned earlier, cannabis use is considered to be a risk factor for mental illness. Therefore, the association between cannabis use and the existence of mental problems, will be examined in an immigrant population. The second hypothesis is that participants who use or have been using cannabis are expected to report more mental health problems than participants who never used cannabis. Furthermore, since immigrants seem to be at higher risk for schizophrenia and other psychotic disorders, it would be interesting to investigate whether immigrants who use cannabis experience more mental health problems than native Dutch citizens. Hence, the third and last hypothesis is that immigrants who use or have been using cannabis will experience more mental health problems than native participants who use or have been using cannabis and immigrants who have never used cannabis.

METHODS

Data collection

Cross-sectional data was gathered by the Municipal Health Service in the middle of the Netherlands (Geestelijke Gezondheidszorg, GGD Midden Nederland). During school year 2007-2008, students of forty secondary schools in the middle of the Netherlands were asked to fill out a survey questionnaire. The questionnaire contained questions about demographic data, lifestyle, substance use, traumatic life events, informal care giving, leisure time, behaviour, and school experiences.

Participants

Participants in this study were Dutch secondary school children in the age of 10 to 25 years, with an average age of 14.2 years (SD = 1.59). In total, 11533 children participated. Of these children 50.2% (N = 5792) were male and 49.8% (N = 5741) were female. Participants had different levels of education, namely special needs education (LWOO), preparatory secondary vocational education (VMBO), senior general secondary education (HAVO), and pre-university education (VWO). Level of education was dichotomized in 'LWOO/VMBO' (50.5%, N = 5829) and 'HAVO/VWO' (47.1, N = 5435). Some participants did not fill in their educational level. For these participants, level of education was classified as 'Missing' (2.4%, N = 273). See table 1 for an overview of the participants.

Table 1: *Subdivision of participants by gender, age, and level of education.*

Variable	Measure	Total Population	
		N	Percent
Gender	**Male**	5729	50.2
	Female	5741	49.8
Age (years)	**10**	2	0.0
	11	36	0.3
	12	1794	15.2
	13	2574	22.3
	14	2610	22.3
	15	2094	18.2
	16	1438	12.5
	17	752	6.5
	18	202	1.8
	19	20	0.2
	20	1	0.0
	21	1	0.0
	24	3	0.0
	25	6	0.1
Level of Education	**LWOO**	589	5.1
	VMBO	1802	15.6
	HAVO	3434	29.8
	VWO	5435	47.1
	Missing	273	2.4
Total		11533	100

Strengths and Difficulties Questionnaire

The Strengths and Difficulties Questionnaire (SDQ), existing of 25 items, was part of the questionnaire and used to determine mental health problems. If filled in properly, the sum score of these items provides an insight into a person's mental wellbeing (Widenfelt, Goedhart, Treffers & Goodman, 2003). The items of the SDQ are subdivided in five subscales with five items each: 'Emotional Symptoms', 'Conduct Problems', 'Hyperactivity/Inattention', 'Peer Problems', and 'Prosocial Behaviour'. Summing the first four subscale scores generates the Total Difficulties Score (TDS) and provides a continuous variable, existing of both internalising and externalising problems. Since the Prosocial Behaviour scale does not reflect problematic behaviour, the score on this subscale is not included in the TDS. In this study, the Dutch version of the SDQ was used. The reliability and validity of the Dutch SDQ are well documented. The reliability of the SDQ in total is $\alpha = 0.70$. When comparing the total SDQ with the total Youth Self Report, a correlation of .70 was found. This indicates that the concurrent validity of the SDQ is strong (Goodman, Ford, Simmons, Gatward, & Meltzer, 2000; Widenfelt et al, 2003).

Ethnicity

Ethnicity was assessed using country of birth as a measure. Participants had to choose between several options, namely 'the Netherlands', 'Surinam/the Dutch Antilles/Aruba', 'Morocco', 'Turkey', or 'Other, namely..'. Of the participants 81.1% (N = 9358) was born in the Netherlands, 2.8% (N = 318) was born in Surinam/the Dutch Antilles/Aruba, 2.5% (N = 294) was born in Turkey, 3.5% (N = 408) was born in Morocco, and 10.0% (N = 1155) was born in another country. It is possible that some of the native Dutch participants have parents who were born abroad, which should classify them as second generation immigrants. However, in this study these participants are considered Dutch, since data on country of birth of the parents was missing.

Cannabis use

To measure substance abuse, the questionnaire contained questions about the use of cannabis, use of alcohol, smoking, and use of hard drugs. Of great importance for this study were the questions about cannabis. Cannabis use was established in various manners. The questionnaire contained a question about the frequency of cannabis use and the amount of cannabis used during a certain period of time. Participants were asked how often they had used cannabis during their life and how often they had used cannabis the past four weeks. For this study, a categorical variable was conducted which contained three categories, namely "Never used cannabis", "Used cannabis at some point" and "Used cannabis in the previous four weeks". Out of all the participants, 84.5% (N = 9848) never used cannabis. Of the participants who used cannabis, 7.7% (N = 892) used cannabis at a certain moment in their life, but did not use cannabis the past four weeks. In the four weeks prior to the survey, 6.2% (N = 715) of the participants used cannabis. Data on cannabis use was missing for 0.7% (N = 78) of the participants.

Confounding factors

The experience of severe life events can be of influence on the TDS (Flouri & Tzavidis, 2008). In this questionnaire participants were asked whether they ever had to deal with such an event, and whether

they were still experiencing difficulties as a result of the event(s). Examples of such events are the death of a loved one, violence or abuse by a parent or another adult, problems with money by self or parents, and mental illness of a family member. Of the participants, 5.8% (N = 666) never experienced a severe life event. The other part of the participants, 94.2% experienced at least one severe life event, however 72.9% (N = 8408) reported not to experience difficulties. The remaining 21.3% (N = 2459) still experiences difficulties as a result of the event(s).

Socioeconomic Status (SES) is another factor that can be of influence on the TDS (Buchanan & Ritchie, 2010). Participants were asked to fill in the four numbers of their zip code. In March of 2007 the Dutch minister of Living, Districts and Integration (Wonen, Wijken en Integratie), Ella Vogelaar, gave notice of a list consisting of 40 districts, containing 83 zip codes. These areas were classified as problematic and in need of investment to deal with the ever increasing social, physical and economic problems (KEI, 2011). In this study, the 83 zip codes were used to asses whether participants lived in disadvantaged neighbourhoods or not. Of the participants 1.4% (N = 160) lived in a problematic area and 1.7% (N = 192) did not fill in their zip code. The remaining 96,9% (N = 11181) lived in regular areas.

Another confounding factor is the use of substances. Since, several studies (Boys, et al., 2003; Ravens-Sieberer, et al., 2008; Degenhardt, Hall and Lynsky 2001) showed that the use of alcohol, hard drugs and tobacco is associated with mental health, the use of alcohol, hard drugs and smoking were also considered as confounding factors in this study. Regarding the use of alcohol, 42.2% (N = 4872) of the participants never drank alcohol, 15.85 (N = 222) drank alcohol at some point in their life, and 41.9% (N = 4837) drank alcohol in the four weeks prior to the survey. Hard drugs had never been used by 96.9% (N = 11174) of the participants. Of the participants who did use hard drugs, 1.2% (N = 137) used during the four weeks prior to the survey. The remaining participants (1.9%, N = 222) used hard drugs at one point in their life, but not in the four weeks prior to the survey. Smoking was classified as either currently not smoking (83.4%, N = 9615) or smoking (16.2%, N = 1863). For 0.5% (N = 55) data on smoking was missing.

Data analysis

The results of the questionnaire were collected in a dataset and were analysed using the Statistical Package for the Social Sciences (SPSS), version 15.0 (SPSS Inc., Chicago IL). When exploring the data, results of the Kolmogorow-Smirnov Tests showed that the analyzed sample was not normally distributed. However, because of the sample size in this study (N = 11533), the violation of this assumption should not cause any major problems (Pallant, 2001). To explore the possible association between ethnicity, cannabis use and mental wellbeing (e.g. score on the SDQ questionnaire), a two-way between-groups analysis of variance (ANOVA) was conducted. Furthermore, an analysis of covariance (ANCOVA) was conducted to explore the alleged association between ethnicity, cannabis use and mental wellbeing when controlled for possible confounding factors (e.g. age, gender, level of education, social economic status, severe life events and other substance use). An analysis of correlation was conducted to make sure the confounding factors did not correlated too strongly with one another.

RESULTS

A two-way between groups analysis of variance was conducted to explore the association between ethnicity, cannabis use and the existence of mental problems, as measured by the Strengths and Difficulties Questionnaire (SDQ). The results of Levene's Test of Equality of Error Variances showed that the homogeneity of variance assumption was violated. Because of this violation, the level of significance was set at a higher rate, namely $\alpha = .010$.

Table 2 shows a statistically significant main effect for ethnicity on SDQ score ($F (4, 11276) = 3.828$, $p = .004$), however the effect size was small (eta squared = .001). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the Dutch group ($M = 9.68$, $SD = 4.98$) did not differ significantly from one of the other groups. The Surinam/Dutch Antilles/Aruba group ($M = 9.64$, $SD = 4.66$) did not differ significantly from any of the other groups either. However, the Turkish group ($N = 10.44$, $SD = 4.98$) differed significantly from the Moroccan group ($M = 9.11$, $SD = 4.63$; $p = .003$). Furthermore, the Moroccan group differed significantly from the Other group ($M = 10.15$, $SD = 5.04$; $p = .002$). For an overview see Figure 1.

Table 2 also shows that the main effect for cannabis use on SDQ score was significant as well ($F (2, 11276) = 59.035$, $p = .000$), however the effect size was small (eta squared = .010). Post-hoc comparisons indicated that the mean score for the participants who never used cannabis ($N = 9.34$, $SD = 4.75$) was significantly different from both the group who used cannabis at one point in their life ($N = 11.35$, $SD = 4.92$; $p = .000$) and from the group who used cannabis in the past four weeks ($N = 13.15$, $SD = 5.59$; $p = .000$). For an overview of all the mean scores, see Table 3, Figure 1 and Figure 2. For an overview of post-hoc comparisons see Table 4 and Table 5.

The interaction between cannabis use and ethnicity on SDQ score did not reach statistical significance ($F (8, 11276) = 1.853$, $p = .063$), as showed in Table 2.

Table 2: *Analysis of Variance for Ethnicity, Cannabis use and Ethnicity*Cannabis use on SDQ score.*

	df	F	P
Etnicity	4	3.828	.004*
Cannabis use	2	59.035	.000*
Ethnicity * Cannabis	8	1.853	.063
Total	11276		

*** p < 0.01**

Table 3: *Mean sum score on SDQ for Ethnicity, set out against Cannabis use.*

Ethnicity	Cannabis use	Mean	SD	N
Dutch	**Never**	9.32	4.786	7942
	Lifetime	11.34	4.883	717
	Last 4 weeks	12.93	5.422	523
	Total	9.68	4.972	9182
Surinam/ Dutch Antilles/ Aruba	**Never**	9.14	4.375	249
	Lifetime	10.21	4.601	33
	Last 4 weeks	13.52	5.480	27
	Total	9.64	4.658	309
Turkish	**Never**	10.03	4.649	264
	Lifetime	13.57	7.111	14
	Last 4 weeks	15.54	5.125	13
	Total	10.44	4.975	291
Moroccan	**Never**	8.90	4.484	376
	Lifetime	16.86	3.421	5
	Last 4 weeks	14.25	5.651	8
	Total	9.11	4.634	389
Other	**Never**	9.58	4.655	903
	Lifetime	11.19	4.879	104
	Last 4 weeks	13.78	6.331	113
	Total	10.15	5.036	1120
Total	**Never**	9.34	4.751	9734
	Lifetime	11.35	4.927	873
	Last 4 weeks	13.15	5.586	684
	Total	9.73	4.926	11291

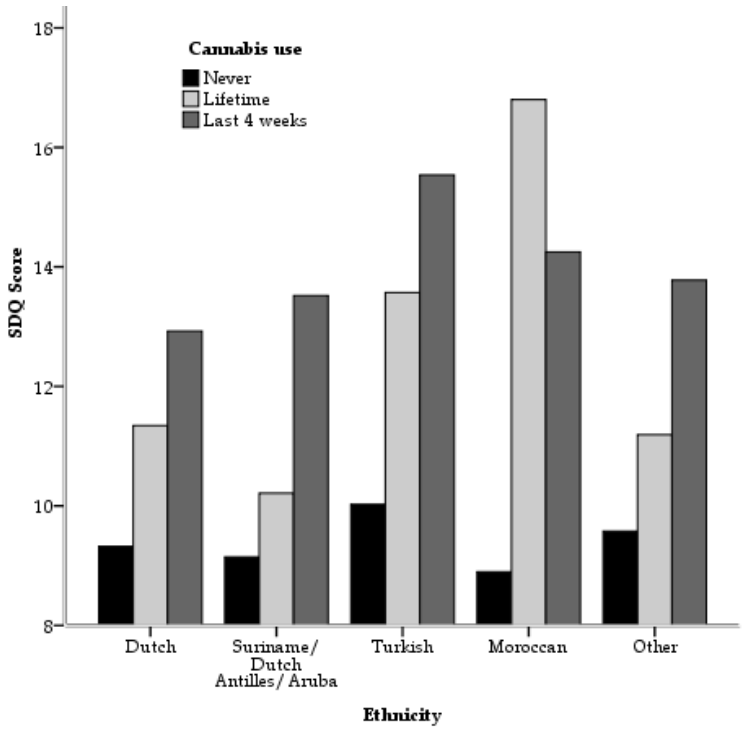

Figure 1: *Mean sum score on SDQ for Ethnicity, set out against Cannabis use.*

Table 4: *Post-hoc comparisons for Cannabis use.*

Cannabis use		Mean Difference	SE	P	95% Confidence Interval	
					Lower Bound	Upper Bound
Never	**Lifetime**	-2.01*	.170	.000*	-2.34	-1.67
	Last 4 weeks	-3.81*	.190	.000*	-4.19	-3.44
Lifetime	**Never**	2.01*	.170	.000*	1.67	2.34
	Last 4 weeks	-1.81*	.246	.000*	-2.29	-1.32
Last 4 weeks	**Nooit**	3.81*	.190	.000*	3.44	4.19
	Lifetime	1.81*	.246	.000*	1.32	2.29

*** p < 0.05**

Table 5: *Post-hoc comparisons for Ethnicity*

Ethnicity		Mean Difference	SE	P	95% Confidence Interval	
					Lower Bound	Upper Bound
Dutch	**Surinam/Dutch Antilles/Aruba**	.04	.279	.878*	-.50	.59
	Turkish	-.76*	.287	.008*	-1.32	-.20
	Moroccan	.58*	.249	.021*	.09	1.06
	Other	-.47*	.152	.002*	-.77	-.17
Surinam/Dutch Antilles/Aruba	**Dutch**	-.04	.279	.878*	-.59	.50
	Turkish	-.80*	.393	.041*	-1.57	-.03
	Moroccan	.53	.367	.147*	-.19	1.25
	Other	-.51	.309	.100*	-1.12	.10
Turkish	**Dutch**	.76*	.287	.008*	.20	1.32
	Surinam/Dutch Antilles/Aruba	.80*	.393	.041*	.03	1.57
	Moroccan	1.34*	.373	.000*	.60	2.07
	Other	.29	.317	.355*	-.33	.91
Moroccan	**Dutch**	-.58*	.249	.021*	-1.06	-.09
	Surinam/Dutch Antilles/Aruba	-.53	.367	.147*	-1.25	.19
	Turkish	-1.34*	.373	.000*	-2.07	-.60
	Other	-1.04*	.283	.000*	-1.60	-.49
Other	**Dutch**	.47*	.152	.002*	.17	.77
	Surinam/Dutch Antilles/Aruba	.51	.309	.100*	-.10	1.12
	Turkish	-.29	.317	.355*	-.91	.33
	Moroccan	1.04*	.283	.000*	.49	1.60

*** p < 0.05**

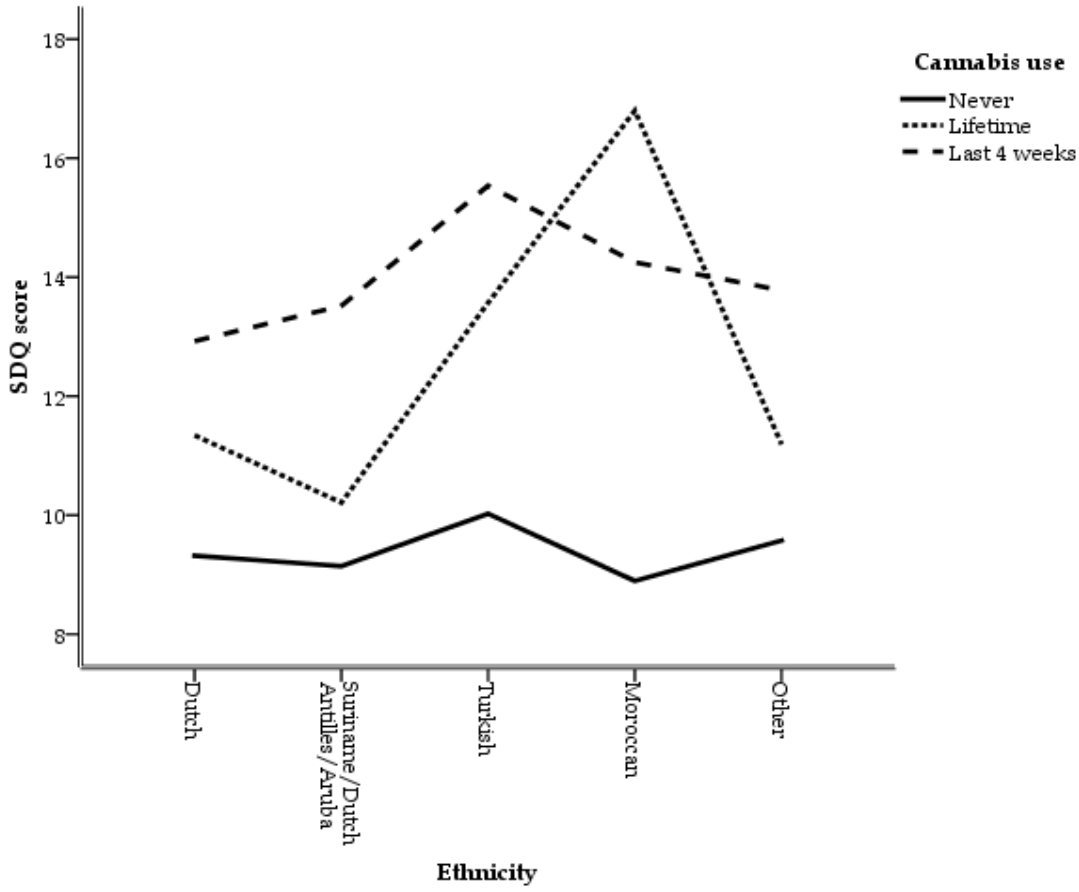

Figure 2: *Mean sum score on SDQ for Ethnicity, set out against Cannabis use after controlling for possible confounding factors.*

The confounding factors, severe life events, social economic status, alcohol use, use of hard drugs and smoking, will be analyzed using a two-way between-subjects analysis of covariance (ANCOVA). Again, the results of Levene's Test of Equality of Variance showed that the homogeneity of variance assumption was violated. Therefore, the level of significance was re-set at α = .010.

Results of the ANCOVA (see Table 6) showed that when controlled for the confounding factors, the significant main effect for ethnicity on SDQ score no longer existed (F (4, 11271) = 2.714, p = .028). There is, however, a significant main effect for the use of cannabis on SDQ score when controlled for the confounding factors (F (2, 11271) = 5.041, p = .006). The effect size for this main effect was small (eta squared = .001). No interaction effect for ethnicity and cannabis use on SDQ score was found (F (8, 11271) = 1.356, p = .211). For an overview of all the mean scores after adjusting for the confounding variables, see Table 7.

Scores on the confounding factors of the ANCOVA were: severe life events (F (1, 11271) = 425,528, p = .000), social economic status (F (1, 11271) = 15,935, p = .000), alcohol use (F (1, 11271) = 63,015, p = .000), hard drugs (F (1, 11271) = 57,926, p = .000) and smoking (F (1, 11271) = 157,630, p = .000). The effect sizes (eta squared) of the confounders were as following: social economic status (.036), severe life events (.001), alcohol use (.006), hard drugs (.005) and smoking (.014). Distribution of the confounders among the different groups of participants can be found in Table 8.

Table 6: *Analyses of Covariance for Ethnicity, Cannabis use and Ethnicity*Cannabis use (covariates were use of hard drugs and alcohol, smoking, severe life events and social economic status).*

	df	F	P
Etnicity	4	2.714	.028*
Cannabis use	2	5.041	.006*
Ethnicity * Cannabis	8	1.356	.211*
Total	11271		

* **p < 0.01**

Table 7: *Adjusted mean sum score on SDQ for Ethnicity, set out against Cannabis use.*

				95% Confidence Interval	
Ethnicity	**Cannabis use**	**Mean**	**SE**	**Lower Bound**	**Upper Bound**
Dutch	**Never**	9.59	0.054	9.48	9.69
	Lifetime	9.88	0.187	9.51	10.25
	Last 4 weeks	10.55	0.232	10.10	11.00
	Total	10.0	0.106	9.80	10.21
Surinam/Dutch Antilles/Aruba	**Never**	9.48	0.295	8.90	10.05
	Lifetime	8.94	0.811	7.35	10.53
	Last 4 weeks	11.14	0.900	9.37	12.90
	Total	9.85	0.416	9.04	10.68
Turkish	**Never**	10.85	0.289	10.29	11.42
	Lifetime	11.63	1.244	9.19	14.07
	Last 4 weeks	11.87	1.301	9.39	14.42
	Total	11.45	0.608	10.26	12.64
Moroccan	**Never**	9.62	0.244	9.14	10.10
	Lifetime	15.49	2.079	11.38	19.53
	Last 4 weeks	10.52	1.651	7.28	13.57
	Total	11.87	0.891	10.12	13.61
Other	**Never**	9.88	0.155	9.57	10.18
	Lifetime	9.63	0.460	8.73	10.54
	Last 4 weeks	11.30	0.451	10.41	12.18
	Total	10.27	0.223	9.83	10.71
Total	**Never**	9.88	0.103	9.86	10.09
	Lifetime	11.11	0.523	10.08	12.13
	Last 4 weeks	11.07	0.483	10.13	12.02

Table 8: *Distribution of confounders among participants groups.*

		Ethnicity						Cannabis Use			
		Dutch	**Su./D.A./ Aruba**	**Turkish**	**Morrocan**	**Other**	**Total**	**Never**	**Lifetime**	**Past 4 weeks**	**Total**
Severe Life Events	**None**	550	8	35	18	55	666	576	31	11	618
	No difficulties	6830	241	209	329	826	8408	7380	577	429	8386
	Difficulties	2005	69	50	61	274	2459	1892	284	275	2451
	Total	9358	318	294	408	1155	11533	9848	892	715	11455
Smoking	**None**	7790	259	249	373	944	9615	9044	379	173	9596
	Smoking	1527	59	45	28	204	1863	804	513	542	1859
	Total	9317	318	294	401	1148	11478	9848	892	715	11455
Alcohol	**Never**	3673	122	230	368	479	4872	4762	27	21	4810
	Lifetime	1500	76	23	17	208	1842	1700	93	28	1821
	Past 4 weeks	4185	120	41	23	468	4837	3386	772	666	4824
	Total	9358	318	294	408	1155	11533	9848	892	715	11455
Hard Drugs	**Never**	9090	310	284	400	1090	11174	9790	807	512	11109
	Lifetime	173	6	4	4	35	222	33	67	122	222
	Past 4 weeks	95	2	6	4	30	137	25	18	81	124
	Total	9358	318	294	408	1155	11533	9848	892	715	11455
SES	**Normal**	9172	6	45	44	23	160	9558	861	691	11110
	Problematic	42	307	244	354	1104	11181	139	14	7	160
	Total	9214	313	289	398	1127	11341	9697	875	698	11270

DISCUSSION

In the current study we examined the association between ethnicity, cannabis use and mental health of secondary school children living in the Netherland. We expected that immigrants would report more mental health problems than their native Dutch peers. Furthermore, we expected that participants who at one point in their live used cannabis or were using cannabis in the four weeks prior to the study, would report more mental health problems than non-using participants. Finally, a closer look on the possible interaction between ethnicity and cannabis use on mental health was taken. Since it is expected that both ethnicity and cannabis use are of influence on the development of mental health problems, it is also expected that immigrants who use cannabis are at an even higher risk of developing mental health problems.

As predicted, a main effect of ethnicity on mental health was found. This implies that immigrants do encounter more mental health problems in comparison to their native pears. Also, a main effect of cannabis use on mental health was found. This suggests that participants who ever used or used cannabis in the past four weeks, are indeed at higher risk of developing mental health problems than their peers who never used cannabis. However, the effect sizes of both main effects were small, as classified by Cohen (1973), indicating that the difference in mental health between participants who used cannabis and who did not use cannabis is small (see table 2b). The difference in mental health problems between immigrants and native participants is small too. The interaction between ethnicity and cannabis did not reach statistical significance. However, as seen in Figure 2 there are some interesting results shown, especially for the participants of Moroccan and Turkish origin. It seems that these group of immigrants may be at a higher risk of developing mental health problems when using cannabis in comparison to native participants and immigrants from other countries. When controlled for the confounding factors, smoking, use of alcohol and hard drugs, severe life events and social economic status, the main effect of ethnicity on mental health was no longer significant. This means that being an immigrant as such does not put participants at a higher risk of mental health problem. This is in contrast with results of the studies described earlier (Hutchinson & Haasen, 2004; Fearon, et al., 2006; Veling, et al., 2006). They did find an association between ethnicity and mental health problems, but the effect is mediated by adverse factors associated with being an immigrant (for example a low social economic status). It may be that this effect is created by having an marginal identity (as explained in the introduction). However, the current study shows that other factors play a role in developing mental health problems. When controlling for these factors, the effect found by those earlier studies no longer exists. These contrasting conclusions may have to do with the use of confounders in the current study. The previous studies did not take any confounding factors into consideration when analysing their data. It might be that the results of the previous and current study would be less contradicting when controlled for confounding factors such as the ones in the current study.

Furthermore, the main effect for cannabis use on mental health was maintained. This result is in line with earlier studies to the effects of cannabis on psychiatric experiences as discussed in the introduction (Richardson, 2010; De Graaf, et al., 2010; Schubart, et al., 2010) This indicates that the use of cannabis has an influence on mental health problems, even when controlled for other factors

that might be of influence. Again, the effect size of the main effect was small, indicating that the difference in amount of mental health problems in participants who use cannabis and those who do not use cannabis is small (see table 3b). When controlling for confounding factors, no significant interaction effect between ethnicity and cannabis use on mental health was found, which implies that immigrants who are using of have been using cannabis are not at higher risk for mental health problems. However, as said before, there is some sort of interaction effect for particular groups of immigrants (i.e. Moroccan and Turkish immigrants). This effect can be explained by the confounding factors that were used in the analyses. As presented in the results, all confounding factors had an significant effect on the total SDQ score. Although the effect sizes of all confounding factors are small, it seems that a severe life event is of influence on the development of mental health problems. In the current study 3.6% of the variance in the total SDQ score was explained by whether someone has dealt with a severe life events. Another 1.4% of variance in the total SDQ score can be explained by whether one is currently smoking. Social economic status, use of alcohol and hard drugs seem to be of less influence (i.e. less than 1.0%). This indicates that immigrants who went through a sever life event should be careful when it comes to using cannabis. Even smoking and cannabis use simultaneously might cause a higher risk of developing mental health problems.

There are several limitations that might have influenced the results of this study. First of all, the samples were not of equal sizes. The immigrated participants and the participants who ever used or are using drugs are greatly outnumbered by the native participants who never used cannabis. However, to control for this skewness the level of significance was set at a higher rate. Second, the possibility of reversed causality has to be taken into consideration. It may be that a weak and negative ethnic identity is a result of a low social economic status or a severe life event (Veiling et al., 2010). However, the current study uses social economic status and severe life events as an confounding factor to control for this possible reversed causality. Moreover, the Dutch standards regarding drug use are different from the standards of immigrants from Moroccans or Turkey, for example. Whereas the use of drugs is more accepted in the Netherlands, the use of drugs is strictly prohibited in other countries. Perhaps, immigrants are more careful when it comes to exploring drugs or when it comes to reporting drugs use. However, this difference in expressing problems between Dutch natives and immigrants may be partially reduced by the use of a self-report questionnaire. The questionnaires were all anonymous, which might have enlarged the participants' honesty about experiences with drugs and mental health problems. Moreover, whereas the amount of cannabis used by participants is not know in the current study, it does make a distinction between participants who have not used cannabis recently and participant who did use cannabis in the four weeks prior to the study. This distinction may neutralise somewhat of the possible differences in mental health problems of participants who use cannabis frequently and participants who used cannabis a few times in their life. Furthermore, the way immigrants express their mental health problems differs from the way Dutch citizens express their mental health problems. Dutch citizens are much more at ease with expressing feelings as anxiety and depression, whereas immigrants tend to express their problems in somatic ways like a headache or stomach ache (Knipscheer & Kleber, 2005).

A strong point of this study is the access to a large database, which enlarges power. Of great importance, in comparison with other studies, is the fact that the participants are of a fairly young age. Our participants either just had their first contact with drugs or did not have any experience with drugs. In concordance with the studies described in the introduction (Schubart, et al., 2009; Schubart, et al., 2010, Richardson, 2010; De Graaf, et al, 2010), the current study shows that early onset of cannabis use may be of influence on the development of mental health problems. Moreover, to our knowledge, the interaction between cannabis use and ethnicity on mental health problems has not been examined before. Therefore, the results of this study give new insight and raise questions that hopefully can be answered by future research.

Future research should be conducted to support the current results and to further explore the found association between ethnicity, cannabis use and mental health problems. For instance, in this study no distinction was made between participants who only used cannabis once and participants who smoke or smoked cannabis on a regular basis. A distinction between participants who smoked at one point in their life and participants who smoked cannabis four weeks prior to the study was made, but no distinction on the amount of cannabis used was made. It may be that mental health problems will more violently occur in people who are regularly and heavy users of cannabis. Furthermore, it would be interesting to make a distinction between second generation immigrants who consider themselves Dutch and those who see themselves as part of a minor ethnic group. Since second generation immigrants grow up with the culture of their parents on one side and the Dutch culture on the other side, it is possible that they will differ in their beliefs about drug use and in the way they express their mental problems. In light of these possible differences it would also be interesting to make a distinction between internalising problems and externalising problems. If these distinctions exist, interventions may be developed for each immigrant type separately to prevent mental illness and better understand symptoms of specific disorders. Hence, if a possible association between ethnicity and mental problems may be enhanced by (early) cannabis use, as partially seen in the current study, this interaction should be taken into consideration when discussing the current legalised status of cannabis in the Netherlands, since the amount of immigrants to the Netherlands has never been as large as the previous year (CBS, 2011).

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