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PROXIMITY TO DUTCH COFFEE SHOPS AND CANNABIS USE IN THE NETHERLANDS

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Abstract

The aim of this paper is to assess the influence of coffee shop availability on the prevalence and intensity of cannabis use, as well as the effectiveness of the ‘separation of markets’ policy. A convenience sample of night life visitors and a sub selection of last year cannabis users were used for analyses on cannabis and hard drug use. Logistic regression analyses showed that coffee shop proximity does not seem to be linked to prevalence of cannabis use or intensity of use. In addition, proximity of coffee shops does not seem to be linked directly to hard drug use.

1. Introduction

Across Europe, the illicit retail market in cannabis is similar, with various levels of distribution, ranging from social suppliers to profit-making sellers (Sifaneck et al., 2007; Stevenson, 2008; Werse, 2008). The Netherlands is an exception, however, because retail sales of cannabis for personal consumption by adults are condoned in ‘coffee shops’, which are allowed to sell cannabis under certain conditions. It remains undetermined whether or not the exceptional situation in the Netherlands influences the prevalence of cannabis use. Although it has been suggested that the presence of coffee shops causes an increase in the prevalence of use (MacCoun & Reuter, 1997; MacCoun & Reuter, 2001), others have questioned this association and argue that, across western countries, trends in cannabis prevalence seem to develop independently of drug policy (Korf, 2002; Reinerman & Cohen, 2007; Reuband, 1995). These studies on cannabis policy and prevalence of use to date have several limitations. First, many studies base their conclusions on prevalence among minors, who are not allowed in coffee shops. Second, they are often based on *aggregate* data (with the exception of those using arrest rates). On an *individual* level, however, other factors might play a role in cannabis use prevalence and aggregate data will not identify the underlying mechanisms. Third, many of the studies are based on formal policies, but when considering policy in practice different conclusions may be reached. Apart from these practical limitations, outcomes of international comparisons are hard to interpret because many other factors (such as social and historical influences) come into play.

In the Netherlands, the sale of cannabis in coffee shops is tolerated only when certain – nationally determined – criteria are met: no advertising, no sale of hard drugs, no nuisance, a minimum age of 18 to enter a coffee shop and buy cannabis there and no sale or stock of large quantities (>5 grams per person per transaction, >500 grams in stock). Another part of the coffee shop policy is determined at a local level, where municipalities have the authority to determine if and where coffee shops can be established. As a result, coffee shops are not evenly spread throughout the Netherlands: almost 80% of Dutch municipalities have none (Bieleman & Nijkamp, 2010).

A recent evaluation of Dutch drug policy (Van Laar & Van Ooyen-Houben, 2009) concluded that decreases in the prevalence of cannabis use within the Netherlands seem to develop in parallel with decreases in coffee shops, but these developments can (also) be influenced by other factors such as the decrease in tobacco smoking. One expects cannabis users in the Netherlands to buy from coffee shops rather than on the illicit market. However, when taking into consideration the limitations of availability of coffee shops (e.g. minimum age, uneven geographical spread) it seems plausible for users to (also) buy elsewhere. Several studies show that a substantial part indeed does (Abraham, Kaal & Cohen, 2002; Cohen & Kaal, 2001; Korf, Nabben & Benschop, 2003; Monshouwer et al., 2004; Wouters & Korf, 2009). Availability can consist of several aspects, which entail the physical availability (to what extent is a coffee shop present and accessible, including distance), availability in time (to what extent does someone have the opportunity to visit a coffee shop considering daily activities and opening hours) and social availability (to what extent is someone stimulated or restrained to buy at a coffee shop). It has been known for decades that the distance to be travelled to a source of goods, like a store, influences the likelihood a person will visit this store (Clark, 1968). In an earlier study, we looked at cannabis availability through (tolerated) coffee shops and other (non-tolerated) suppliers (Wouters & Korf, 2009). A survey among current cannabis users was held in seven Dutch cities. Unsurprisingly, in municipalities without coffee shops, significantly less cannabis was purchased through coffee shops. Significant predictors of buying outside of coffee shops were coffee shop *density* (a measure for availability: the number of coffee shops per 100,000 inhabitants), age (minors) and sex (male).

The relationship between availability and use has also been studied in other relevant fields, such as the use of tobacco, alcohol, illicit drugs in general and gambling. Several studies into tobacco use and the proximity or density of tobacco retailers point towards a positive relationship (Chuang, 2005; Henriksen et al., 2004; Pokorny, Jason & Schoeny, 2003; West et al., 2010), although there have been contradictory findings (Henriksen et al., 2004; Leatherdale & Strath, 2007; Lovato, 2007). Recent studies on alcohol outlets show a positive relationship between proximity or density of sales points, and prevalence and intensity of alcohol use and problematic use (Popova et al., 2009; West et al., 2010). However, other factors (such as those related to socio- economic status) can be of greater influence than proximity (Ellaway et al., 2010; West et al., 2010). Regarding gambling, casino proximity seems to increase or generate demand. Studies have shown that the presence of a casino increases (problem) gambling (Abbott & Volberg, 2000; Gerstein et al., 1999; Room, Turner & Ialomiteanu, 1999; Sévigny et al., 2008). Several studies have shown a positive relationship between rates of illicit drug use and living in areas where drugs are easily obtained (Alexander et al., 2001; Coffey et al., 2000; Dembo, Schmeidler & Burgos, 1979; Freisthler et al., 2005; Hofler et al., 1999; Korf, 2002; Madu & Matla, 2003; Spencer, 1985; Van Etten, Neumark & Anthony, 1997). In summary, it seems that both density and proximity increase the prevalence of substance use and gambling, although social factors often are more important.

The rationale behind the Dutch coffee shop policy is to reduce the risk of cannabis users being exposed to hard drugs, which are viewed as more hazardous to health: this is referred to as the “separation of markets”. This approach appears to be effective as hard drugs are very rarely found in coffee shops (Broekhuizen, Raven & Driessen, 2006; Reinerman & Cohen, 2007). However, with cannabis retail suppliers other than coffee shops – the illicit market – the risk of being exposed to hard drugs could be higher. More specifically, the potential risk is that not allowing minors in coffee shops will undermine the separation of markets philosophy.

In the current study, the aim is to assess the relationship between proximity of coffee shops (a measure of availability: distance to be travelled to the coffee shop) and cannabis use. Cannabis use will be analysed regarding three different aspects: prevalence of use, frequency of use and amounts used. As stated above, it has been suggested that easier access to cannabis might stimulate use of the drug. Therefore, our first hypothesis is that higher coffee shop proximity is associated with a higher prevalence of cannabis use, more frequent use and larger amounts used. In addition, we explore the “separation of markets” policy behind the coffee shops: our second hypothesis is that buyers from the illicit market are more likely to use hard drugs than those who buy in coffee shops.

2. Methods

2.1 Sample

A general population survey would yield too few numbers of cannabis and hard drug users to study the relationship between proximity of coffee shops, and prevalence of cannabis and hard drug use¹. In addition, existing general population surveys in the Netherlands do not contain information on frequency of use nor the amounts used. To avoid the problem of inadequate sample size, we used data from a study into the use of drugs among 15-35 year-olds who visit night life venues (Van der Poel et al., 2010). Respondents were recruited at night life locations (e.g. clubs), geographically spread out over the Netherlands. Recruitment took place between spring 2008 and autumn 2009. A total of 26 clubs and discos were selected, based on the type of music, number of visitors and geographical spread.

Questionnaires were administered opportunistically by trained interviewers. Those who appeared to be aged 15-35 years were approached, asked if they were willing to participate in a survey and were given assurance of anonymity. Those who agreed were given a flyer with an URL for a website where they could fill out the questionnaire online, or a paper questionnaire which could be returned by mail. This resulted in 2,027 respondents.

¹ A problem is that they yield only small numbers of respondents that used cannabis, and an even smaller number that have used hard drugs. For example, in the most recent Dutch general population survey on substance use, only 7.0% of 5769 (7.0%) respondents aged 15-65 were last year cannabis users, and only 2.2% were last year hard drugs users (Van Rooij, Schoenmakers & Van de Mheen, 2011).

2.2 Measures

Continuous or ordinal variables (frequency of cannabis use, amounts of cannabis used, age of first cannabis use, coffee shop proximity and urbanicity) were recoded as dichotomous variables. Recoding these variables into two categories was motivated by the lack of linearity of the variables in their original form with the logit of last year cannabis use, frequency of cannabis use, amounts of cannabis used and/or last year hard drugs use. For frequency of cannabis use, amounts of cannabis used, coffee shop proximity and urbanicity, almost half or more of the respondents actually were in the lowest category and therefore this was chosen as a cut-off point. For age of first cannabis use, 13 years was chosen based on studies that showed that starting cannabis use earlier is linked to several forms of risk behaviour (Erickson et al., 2006; Monshouwer et al., 2005).

Proximity of coffee shops: Distance by transport (bike, on foot, etc.) between respondents' residence and the nearest coffee shop (0= < 5 km, 1= ≥5 km).

Cannabis buying behaviour: Places of cannabis purchases (0= coffee shop only, 1= non-buyers, 2= (also) elsewhere).

Cannabis use: Last year cannabis use (0=no last year use, 1=last year use). Frequency of cannabis use (0=seldom/almost never, 1=more frequent). Amounts used per occasion (0= ≤1 cannabis cigarette, 1= >1 cannabis cigarette). Early starter: first cannabis use before the age of 13 (0=first cannabis use ≥13 years, 1=first cannabis use < 13 years).

Hard drugs use: Last year use of any hard drug (ecstasy, powder cocaine, amphetamines, heroin, crack, GHB, LSD, ketamine) (0=no last year use, 1=last year use).

Demographics: Sex (0=female, 1=male), age (years), being a minor (0=18 years and older, 1=under 18 years), ethnicity (0=non-western, 1=western)², living situation (0=other than with parents, 1=with parents), attending school, college or university (0=no student, 1=student), unemployment (1=work, 1=no work) and educational level (0=finished or following lower vocational or below, 1=higher).

Frequent attendance at night life venues: Number of times going out 30 days prior to survey (0=less than 4 times, 1=4 times or more).

Urbanicity: Number of inhabitants in respondents' place of residence (0=less than 25,000, 1=more than 25,000).

Tobacco smoking behaviour: Daily tobacco smoking (0=no daily tobacco smoking, 1=daily tobacco smoking).

2.3 Analysis

To determine the relationship between coffee shop availability and prevalence, a logistic regression analysis with last year cannabis use as dependent variable was performed, using coffee shop proximity as independent variable. In addition, logistic regression analyses with frequency of cannabis use and with amounts of cannabis used as outcome variables were performed: again proximity of coffee shops was an independent variable and cannabis

² Ethnicity was measured using the standardized procedure in the Netherlands (i.e. birth country of the respondents as well as that of their parents). The distinction between western and non-western ethnicity was applied as an alternative to race, which is not allowed to be registered in the Netherlands; in practice most westerners are White (Benschop et al., 2006).

buying behaviour was also included. Finally, a logistic regression analysis with last year hard drug use was performed to determine the relationship between coffee shop proximity and the use of hard drugs. In all analyses, demographic characteristics were used as independent variables to account for confounder effects. Frequent attendance at night life venues was used as a measure for lifestyle. Since in the Netherlands cannabis is mostly used with tobacco, daily tobacco smoking was introduced to account for the effects of being a regular tobacco user. Finally, urbanicity was introduced, because cannabis use tends to be higher in more urban areas. All analyses were performed for last year cannabis users only.

All statistical analyses were performed using PASW 17.0. Multivariate logistic regression analyses were used to model associations with last year cannabis use, frequency of cannabis use, amounts of cannabis used and last year hard drug use. Because hypotheses were being tested, all variables were introduced through forced entry. Different types of variables were entered in different blocks: demographics (sex, western ethnicity, living with parents, being a student, no work, higher education and age), frequent night life attendance, substance use measures (daily tobacco use, early starter), coffee shop measures (coffee shop proximity, cannabis purchasing behaviour), urbanicity and interaction terms. A significance level of .05 was used for all the analyses and hence, a two-tailed 95% confidence interval is provided for each odds ratio. The originally continuous or ordinal variables (frequency of cannabis use, amounts of cannabis used, age of first cannabis use, coffee shop proximity and urbanicity) were recategorised as dichotomous variables. Recoding these variables into two categories was motivated by the lack of linearity of the variables in their original form with the logit of last year cannabis use, frequency of cannabis use, amounts of cannabis use and/or last year hard drugs use.

Differences in dynamics for minors and adults can be expected. Since minors are not allowed in coffee shops, it is likely minors are less (or not at all), affected by coffee shop proximity. Therefore, the regression analysis for last year cannabis use was performed for the total group, followed by adults and minors separately.

To ensure all influences were considered, interaction terms that were deemed likely to influence the relationships studied were included in the analyses: interactions between demographic characteristics, proximity, buying behaviour and urbanicity. These interactions did not significantly add to the model.

3. Results

Approximately half of the sample was female, the mean age was 21.8 years, two thirds of the respondents were students and one in five was unemployed (Table 1). Almost two thirds lived with their parents or other caretakers (such as family or guardians), while the remaining one third lived on their own or with others (such as a partner or friends). One in six was under the age of 18 and thus considered a minor in the Netherlands.

Table 1 Sample characteristics (%)

	Total (n=2027)	Adult (n=1651)	Minor (n=355)
Substance use measures			
Daily tobacco use	29.7	29.7	29.0
Last year cannabis use	37.8	37.2	41.1
Early starter ^a (<13 years)	12.1	10.4	18.8
Higher frequency ^a	28.4	28.9	24.8
Larger amounts ^a (>1 cannabis cigarette)	32.3	31.9	31.8
Last year hard drug use	16.7	18.7	8.8
Coffee shop measures			
Proximity (>5 km from residence)	58.7	60.3	52.5
Cannabis purchasing behaviour ^a			
Coffee shop only	27.4	31.7	9.0
Non-buyer	48.3	41.8	75.2
(also) buys elsewhere	24.3	26.5	15.9
Demographics			
Male	47.7	49.6	37.8
Western ethnicity	94.2	93.9	95.5
Living with parents	58.3	50.0	96.9
Student	64.0	57.5	94.6
Unemployment	21.8	20.7	27.5
Higher education (> vmbo)	54.8	56.2	48.3
Age: mean (sd)	21.9 (5.6)	23.1 (5.5)	16.4 (0.7)
Minor (>18 yrs)	17.7		
Frequent night life attendance	59.1	60.4	53.8
Urbanicity (>25,000 inhabitants)	57.4	60.4	43.4

^a Last year cannabis users only (n=755)

Almost two thirds of all respondents had used cannabis at least once in their lives, 37.8% had used it in the year before the survey. Two thirds of the last year cannabis users reported a low frequency of use. The average age of initiation into cannabis use was 16.2 years. A quarter of the sample had used a least one hard drug at least once in their lives, while 17% had done so in the year before the survey.

Almost half of last year cannabis users did not buy cannabis themselves. A little over a quarter bought exclusively from coffee shops, while less than a quarter (also) bought elsewhere. 41.3% of last year cannabis users lived less than 5 kilometres from a coffee shop, more than half lived further away. A little over half of the respondents lived in a town or city with more than 25,000 residents.

When proximity and the use of cannabis and hard drugs are studied by using bivariate analyses, there seems to be a relationship. Among last year cannabis users, proximity is lower than among those that did not use cannabis in the twelve months prior to the survey (Chi²=16.372, p<.001). Among last year cannabis users that had used more often than once a week, proximity to coffee shops is lower than among less frequent users (Chi²=4.272, p<.05). Proximity to coffee shops is similar for last year users that use more than one cannabis cigarette per occasion and those that use lower amounts (Chi²=.000, p=1.000). Respondents that used hard drugs in the year prior to the survey, generally live closer to

coffee shops (Chi2=8.066, p<.01). However, when controlling for other factors – for example sex, ethnicity and urbanicity – it remains to be seen whether this relationship between proximity and the use of cannabis and hard drugs still remains. This will now be explored in multiple logistic regression analyses.

Table 2 Proximity and urbanicity and use of cannabis and hard drugs

		Proximity: <5 km to coffeeshop			Urbanicity: >25,000 inhabitants		
		%	Chi2	p	%	Chi2	p
LY cannabis use (n=2027)	No	55.0	16.372	<.001	53.2	25.245	<0.001
	Yes	64.4			64.7		
Frequency of use (n=757)	Seldom/almost never	61.9	4.272	.039	62.6	2.695	.101
	More frequent	70.0			69.1		
Amount used (n=757)	<=1 cannabis cigarette	65.4	.000	1.000	65.9	.415	.520
	>1 cannabis cigarette	65.4			63.5		
LY hard drug use (n=2027)	No	57.1	8.066	.005	55.2	16.166	<.001
	Yes	65.5			67.1		

3.1 Predictors of last year cannabis prevalence

In the logistic regression for all respondents and with last year cannabis prevalence as the outcome variable (Table 2), both proximity of coffee shops and urbanicity are not of influence in the multivariate analyses. Tobacco smoking increases the chance of last year cannabis use by three times, being a student by 1.4 times, and frequent night life attendance by 1.5 times. Being of non-western ethnicity increases the chances of last year cannabis use by 4.2 times. Among adults, western ethnicity, living with parents and age decreases the chances of last year cannabis use, while daily tobacco smoking and frequent night life attendance increases it. Daily tobacco smoking is the only remaining significant variable for the minors.

3.2 Predictors of frequency of cannabis use

In the logistic regression analysis using frequent cannabis use as the outcome variable (Table 3), only last year cannabis users were included. Proximity is not a significant predictor of frequent cannabis use. Buying behaviour is the strongest one. Coffee shop buyers have a 12.3 times higher chance of being a frequent cannabis user than those not buying for themselves at all, and a 3.2 times higher chance than those buying elsewhere. Other predictors are being a minor (3 times higher), daily tobacco use (2.1 times) and a lower level of education (1.6 times).

3.3 Predictors of amounts of cannabis used

In the logistic regression analysis predicting larger amounts of cannabis used per occasion (Table 3), again only the last year cannabis users were included. Again, proximity to coffee shops is not a significant predictor. Buying behaviour is, but coffee shop buyers differ only from non-buyers, not from those who buy elsewhere. Coffee shop buyers have a 9.0 times higher chance of using larger amounts. Other predictors are being male (2.8 times), being an

early starter of cannabis (2.2 times), being a minor (2.0 times) and daily tobacco smoking (1.7 times).

3.4 Predictors of last year hard drug use

The logistic regression with last year hard drug use as outcome variable for lifetime users of cannabis shows no influence of coffee shop proximity (Table 3). Being male increases the chance by 2.4 times, non-western ethnicity (2.0 times), frequent night life attendance (1.5 times) and being an early starter (4.2 times) also increase this chance. Living with parents decreases the chance of last year hard drugs use by 2.4 times and a higher education by 1.8 times.

Table 3 Multivariate logistic regression analyses with last year cannabis use as dependent variable for total group, adults and minors

	Last year cannabis use TOTAL ^a				ADULTS ^b				MINORS ^c			
	B	OR	95% CI	p	B	OR	95% CI	p	B	OR	95% CI	p
Background factors												
Male	0.181	1.199	.497-2.888	.686	.484	1.622	.614-4.287	.329	-.794	.452	.023-8.950	.602
Western ethnicity	-1.438	0.237	.082-.686	.008	-1.276	.279	.084-.926	.037	-1.098	.334	.018-6.184	.461
Living with parents	-0.179	0.836	.652-1.072	.158	-.544	.580	.432-.779	<.001	-.808	.446	.075-2.644	.374
Minor	1.157	3.182	.936-10.814	.064	-	-	-	-	-	-	-	-
Student	0.367	1.444	1.122-1.859	.004	.047	1.048	.795-1.382	.741	-.399	.671	.187-2.415	.542
Unemployment	0.240	1.272	.987-1.638	.063	.263	1.301	.976-1.734	.073	-.075	.928	.517-1.666	.802
Higher education	0.255	1.291	.520-3.204	.582	.657	1.930	.715-5.207	.194	-.145	.865	.021-35.454	.939
Age	-	-	-	-	-.088	.916	.887-.946	<.001	-.063	.939	.654-1.349	.735
Frequent night life attendance	0.425	1.530	1.232-1.901	<.001	.341	1.406	1.100-1.798	.007	.373	1.451	.866-2.431	.157
Substance use measures												
Daily tobacco use	1.276	3.584	2.846-4.512	<.001	1.246	3.447	2.684-4.503	<.001	1.636	5.134	2.852-9.243	<.001
Urbanicity	-0.562	0.570	.194-1.680	.308	-.318	.727	.220-2.403	.602	-2.445	.087	.002-3.847	.206
Coffee shop measures												
Proximity	-0.444	0.641	.241-1.706	.373	-.671	.511	.176-1.485	.217	1.433	4.190	.181-97.000	.371
Interaction terms												
Western * higher education	-0.056	0.945	.373-2.396	.905	-.515	.598	.217-1.650	.321	.670	1.955	.046-83.185	.726
Male * western	0.516	1.675	.679-4.134	.263	.327	1.387	.512-3.757	.520	1.433	4.191	.200-87.680	.356
Student * minor	-0.820	0.440	.126-1.537	.198	-	-	-	-	-	-	-	-
Western * coffee shop distance	0.376	1.456	.559-3.788	.441	.678	1.970	.701-5.534	.198	-1.882	.152	.007-3.552	.241
Western * urbanicity	0.677	1.968	.667-5.807	.220	.594	1.812	.544-6.033	.333	1.794	6.012	.142-254.648	.348
Urbanicity * coffee shop distance	0.433	1.541	.968-2.454	.068	.306	1.358	.800-2.305	.257	1.074	2.928	.961-8.915	.059

^aCox & Schnell R^2 = .131, Nagelkerke R^2 = .178, n = 1788. ^bCox & Schnell R^2 = .148 Nagelkerke R^2 = .201, n = 1476. ^cCox & Schnell R^2 = .174; Nagelkerke R^2 = .234, n = 312.

Table 4 Multivariate logistic regression analysis with frequency of cannabis use, amounts of cannabis used and last year hard drug use as dependent variables cannabis users only

	Frequency of cannabis use ^a				Amounts of cannabis used ^b				Last year hard drug use ^c			
	B	OR	95% CI	p	B	OR	95% CI	p	B	OR	95% CI	p
Background factors												
Male	.679	1.973	.939-4.143	.073	1.034	2.814	1.342-5.898	.006	.692	1.998	1.103-3.619	.022
Western ethnicity	-.623	.536	.256-1.124	.099	-.428	.652	.320-1.327	.238	-.714	.490	.250-.958	.037
Living with parents	-.243	.784	.484-1.271	.323	-.042	.959	.605-1.518	.857	-.857	.425	.281-.642	<.001
Minor	1.100	3.004	1.559-5.789	.001	.703	2.021	1.104-3.700	.023	-.210	.811	.111-5.944	.837
Student	-.133	.876	.534-1.435	.598	-.017	.983	.617-1.567	.943	-.152	.859	.575-1.282	.456
Unemployment	-.039	.962	.595-1.555	.874	.067	1.069	.676-1.690	.776	-.363	.696	.458-1.056	.089
Higher education	-.493	.611	.386-.966	.035	-.229	.795	.519-1.219	.293	-.566	.568	.388-.830	.004
Frequent night life attendance	-.238	.789	.504-1.235	.299	-.013	.987	.645-1.511	.953	.479	1.615	1.100-2.371	.014
Substance use measures												
Daily tobacco use	.734	2.083	1.359-3.191	.001	.501	1.650	1.104-2.466	.015	.293	1.340	.941-1.908	.104
Early starter cannabis	.527	1.695	.929-3.090	.085	.769	2.158	1.217-3.826	.008	1.305	3.688	2.160-6.295	<.001
Urbanicity	-.055	.946	.571-1.568	.830	-.474	.622	.388-.999	.050	-.580	.560	.303-1.034	.064
Coffee shop measures												
Proximity	.332	1.394	.646-3.011	.398	.234	1.264	.591-2.704	.546	-.443	.642	.303-1.362	.248
Buying behaviour				<.001				.001				
Coffee shop buyers		1.000				1.000						
Non-buyers	-2.511	.081	.025-.268	<.001	-2.198	.111	.034-.360	<.001				
(also) elsewhere	-1.155	.315	.100-.990	.048	-.618	.539	.176-1.648	.279				
Interaction terms												
Proximity * buying behaviour				.576				.816				
Non-buyers * proximity	-.339	.713	.235-2.162	.550	-.306	.737	.267-2.035	.556				
(also) elsewhere buyers * proximity	.258	1.294	.469-3.569	.618	-.523	.776	.289-2.081	.615				
Male * buying behaviour				.665				.720				
Non-buyers * male	-.472	.624	.206-1.892	.404	.314	1.369	.475-3.947	.561				
(also) elsewhere buyers * male	-.043	.958	.337-2.725	.936	-.106	.899	.321-2.520	.840				
Minor * student									-.443	.642	.083-4.986	.672
Proximity * urbanicity									.580	1.786	.772-4.133	.175
Proximity * male									.058	1.060	.506-2.221	.878

^a Cox & Schnell R²: .272 Nagelkerke R²: .392, n=681 ^b Cox & Schnell R²: .223 Nagelkerke R²: .315, n=654 ^c Cox & Schnell R²: .142; Nagelkerke R²: .194 n=686

4. Discussion

In this study, the relationship between the proximity of coffee shops and the prevalence of cannabis use was explored. Although several studies suggest that there is a positive relationship, others have yielded contradictory results. We hypothesized that a closer proximity of coffee shops would result in a higher prevalence of cannabis consumption. This hypothesis was not confirmed, as we found no association between the distance from the coffee shop to place of residence and last year cannabis use. In addition, more frequent cannabis use and larger amounts used per occasion was not predicted by coffee shop proximity. However, buying behaviour was proven to be of influence: respondents who bought only in coffee shops were more regular users than non-buyers and (also) elsewhere buyers. In addition, they used more cannabis per occasion than non-buyers. When the logistic regression with last year cannabis use as an outcome variable was performed for minors and adults separately, far fewer variables were of significance among minors, with last year tobacco smoking as the only remaining variable.

Our second hypothesis was that proximity of coffee shops would have a relationship with last year use of hard drugs. This was not confirmed either. First use of cannabis at an early age (before 13 years), however, was an important predictor of hard drug use. Last year tobacco smoking was a strong and stable predictor of last year cannabis use, more regular use and larger amounts used, but not of hard drug use.

Although this study is the first that focuses on the relationship between the availability of coffee shops and cannabis use, with such large numbers of respondents, it has some limitations. We used a non-normative sample and although this resulted in a sample size that would otherwise have been very difficult to achieve, the results may not be generalizable to the whole population. Compared to a general population survey, the prevalence of drug use was much higher in our sample (Van der Poel et al., 2010). Also, even though the survey was distributed mainly in more rural areas, a large part of the sample lived within 5 km range of a coffee shop, thus not providing a large range of distances. The average distance to the nearest coffeeshop is a little lower: 4 km. However, this distance is based on the distance as the crow flies, while the travel distance by foot or bike will always be larger. To persons living in other, larger countries, distances below 5 km may not seem significant, but in the Dutch situation it might be important to make further distinctions. The Netherlands is the most densely populated country in Europe after Malta³ and many inhabitants are accustomed to having the facilities they use near to their homes. In addition, many young people in the Netherlands travel by bicycle rather than by car, and therefore travel shorter distances than in most other countries.

Two of the outcome measures (more regular cannabis use and larger amounts used) do not represent very frequent use or very high amounts used. The variable for frequency of use

³ Retrieved 25/8/2011, from <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps00003&plugin=1>

distinguishes between the more regular users from those who seldom use cannabis, but as cut-off point for amount used was low (one joint per occasion), this did not represent a very intensely using group.

In our earlier study we found that a lower coffee shop density (the number of coffee shops per 100,000 inhabitants) was related to buying cannabis elsewhere. In the current study, we found that proximity of coffee shops does not influence cannabis use but that buying cannabis in coffee shops is related to more regular cannabis use and larger amounts used. In both studies, the objective was to identify the role of coffee shops, but while in the first study the emphasis was on buying behaviour, the study reported here focused on cannabis use. Even though minors are not allowed in coffee shops, they can still obtain it from adults who give it to them, buy it for them or sell it to them. Consequently, even for minors, the proximity of coffee shops still could be of influence. We based our data on the distance between the respondents' residences and the nearest coffee shop. However, following the logic of the routine activity theory (Cohen & Felson, 1979), there are other places people visit in their daily routines, such as work, school, shopping centres and other public places. In the future, it would be interesting to consider this in analysing the relationship between proximity of coffee shops and cannabis consumption.

Regarding cannabis buying behaviour, we distinguished three groups: non-buyers, coffee shop only buyers and (also) elsewhere buyers. It should be noted that the last group still purchased most of their cannabis at coffee shops. Conclusions on the relationship between cannabis buying behaviour and intensity of use should therefore be treated with some caution and the distinction between coffee shop buyers and (also) elsewhere buyers may be rather indistinct. In this sense, the situation in the Netherlands does not necessarily differ from the situation in other countries. Coffee shops may be unique to the Netherlands but the situation of cannabis being resold to friends or distributed among minors is the same.

The separation of markets policy does not seem to have much influence on the use of hard drugs. Having used cannabis at an early age was an important factor, confirming earlier findings (Baumeister & Tossman, 2005; Lynskey, 2003; Lynskey, Vink & Boomsma, 2006). In our study it was again very clear, indicating that this is a robust predictor of hard drug use. It could be argued that coffee shops 'radiate' the concept of separation of markets to all cannabis users, meaning that this separation becomes the norm for all users, including those who buy (part of) their cannabis outside of coffee shops. Cannabis users might prefer sales points that sell cannabis only, even when these sales points are not coffee shops. Thereby the separation of markets may limit the mixed sales of cannabis and hard drugs, even among non-tolerated sales points.

For both frequency of cannabis use and amounts of cannabis used, being a minor increased the chances of belonging to the group of more intense users. It is a possibility that the minors who are part of the population we studied use more intensely than other minors because we recruited them in night life venues where other, less regularly using, minors might not go. Also, minors who use cannabis may belong to a group of individuals displaying

risk behaviour at a young age, so it is not surprising that they use cannabis more regularly and in larger amounts compared to adults.

In our study, current use and proximity of coffee shops did not correlate, but the early use of cannabis might still be influenced by the proximity or availability of coffee shops. Therefore, in future studies, the different stages of use might be of interest. Studies on tobacco use, for instance, show different results for the influence of proximity on initiation (Pokorny et al., 2003) or continuation (Leatherdale & Strath, 2007)). Research with a longitudinal design where different stages of using careers are studied can perhaps shed some light on this specific issue.

Although tobacco smoking behaviour apparently is an important factor, most tobacco smokers do not use cannabis. For example, four out of five current tobacco smokers in the Netherlands are not current cannabis users (Van Laar et al., 2011). In our own sample, little over half of the last year tobacco smokers had used cannabis in the past year (55.7%). In Europe, cannabis is most often used in combination with tobacco. Our study points towards a strict policy regarding the use of tobacco as the most effective way of preventing intense use of cannabis. However, when a strict tobacco policy proves effective, cannabis use may become more prevalent than tobacco use. A recent survey among US students aged 15-16 showed that last month cannabis use (16.7%) was higher than last month tobacco use (13.6%) (Johnston et al., 2010). This shows that the relationship between tobacco use and the use of cannabis changes over time.

Buying behaviour did have an influence on frequency of use and amounts used, and coffee shop buyers were more frequent users. Whether this means that coffee shops are the cause remains unanswered. It does mean that coffee shops could provide a fruitful location for identifying individuals for indicated prevention initiatives.

It has been suggested that greater availability of cannabis might stimulate demand (MacCoun & Reuter, 1997; MacCoun & Reuter, 2001). From this perspective of a supply-driven market, coffee shops would be stimulating cannabis use. This would mean that living near a coffee shop increases the chance of cannabis use, more regular cannabis use and larger amounts of cannabis used. Conversely, when following the logic of a demand-driven market, coffee shops would have greater appeal to more frequent cannabis users. From the results of this study, it remains unresolved whether the presence of coffee shops stimulates more intense cannabis use (supply-driven), or whether more frequent users more often buy at coffee shops (demand-driven). Proximity did not play a significant role in our analyses. However, buying in coffee shops only did show a connection to more regular use and larger amounts used. One explanation is that cannabis users who use frequently prefer a continuous source of cannabis – which coffee shops provide. Thus, coffee shops may not cause but rather facilitate frequent use. In addition, when using cannabis regularly, it seems less likely that cannabis is always procured from friends. Consequently, frequent cannabis users can buy from either the coffee shop or the non-tolerated market. It is likely they prefer

the coffee shop to other sales points. Conversely, the less frequent users of cannabis tend to be occasional cannabis smokers, who never buy cannabis. Additional analyses with only the respondents that lived with their parents and thus had little say about the location of their homes and their proximity to coffee shops, showed that those who bought in coffee shops only again were the most frequent and intense users of cannabis⁴. Therefore, coffee shops might play a role in both frequency of use and amounts used per occasion, but longitudinal studies are required to determine whether this is a causal relationship.

⁴ One could argue that cannabis buying behaviour will be influenced strongly by coffee shop proximity. However, multicollinearity between these two variables was minimal.

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