

The influence of sport involvement on adolescents' alcohol use



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## **Abstract**

This study investigated the influence of sport involvement (total sport memberships and frequency of sport activities) on weekly alcohol use among adolescents and to what extent this relationship is influenced by doing sport activities with parents and the availability of alcohol in sport canteens. In the literature, a lot of inconsistency for those relationships are reported. Cross-sectional and longitudinal data (T1 & T2) of an ongoing Dutch study were used. In total 1365 participants (*Mean age 14.14, SD 1.03*) were included. To test the influence of sport involvement on weekly alcohol use among adolescents and the role of the moderators, multiple linear regression analyses were conducted cross-sectionally and longitudinally. More total sport memberships significantly predicted more alcohol use among adolescents. This effect was particularly found for adolescents who did more sport activities with their parents. The influence of frequency of sport activities on weekly drinking was only found for adolescents who perceived alcohol more available in sport canteens. More research is necessary to get a better understanding of the influence of sport involvement on the drinking behaviour of adolescents.

*Keywords: Adolescents, alcohol use, number of sport memberships, frequency of sport activities, sport activities with parents, alcohol availability in sport canteens, longitudinal*

## **Samenvatting**

Deze studie onderzocht de invloed van sport deelname (totaal aantal sport lidmaatschappen en hoeveelheid sportactiviteiten) op het alcohol gebruik van jongeren en in welke mate deze relatie wordt beïnvloed door sportactiviteiten met ouders te doen en de beschikbaarheid van alcohol in sportkantines. In de literatuur zijn er veel tegenstrijdigheden voor deze relaties gerapporteerd. Cross-sectioneel en longitudinaal data (T1 & T2) van een voortdurende Nederlandse studie is gebruikt. In totaal zijn er 1365 participanten (*Gem. leeftijd 14.14, SD 1.03*) meegenomen. Om de invloed van sportdeelname op wekelijks alcohol gebruik en de rol van de moderaties te testen zijn multiple lineair regressieanalyses uitgevoerd, cross-sectioneel en longitudinaal. Meer totaal aantal sport lidmaatschappen voorspelde significant meer alcohol gebruik onder adolescenten. Dit effect werd vooral gevonden bij adolescenten die meer sportactiviteiten met ouders doen. De invloed van de hoeveelheid sportactiviteiten op het wekelijkse alcohol gebruik werd alleen gevonden voor adolescenten die vonden dat alcohol meer beschikbaar was in sportkantines. Meer onderzoek is nodig om de invloed van sport deelname op het alcoholgedrag van adolescenten beter te kunnen begrijpen.

## **Introduction**

### **Alcohol use**

Drinking alcohol is common among youth in the Netherlands. Half of the adolescents in secondary school (12-16 years) have ever drunk alcohol and this increases up to 85% at the age of 18 (Volksgezondheidszorg, 2019). Also, a lot of youth drink alcohol at an early age and the older they get, the more they drink (Inchley et al., 2018; Volksgezondheidszorg, 2017). The Health Behaviour in School Children (HBSC) study states that, in Europe, between 2002 and 2014 weekly alcohol use has declined from 24% to 12% respectively (De Looze et al., 2019). However, among those adolescents how start drinking, research showed that they tend to drink high quantities (De Looze et al., 2015). Even though the alcohol use among adolescents declines, it remains a major public health concern (Inchley et al., 2018).

Alcohol use among youth can cause several risks related to physical, emotional, social problems and mental health problems (Clements-Nolle et al., 2019; Inchley et al., 2018). Particularly early drinking is an important risk factor for future problematic and addicted alcohol use as well as other substances (Inchley et al., 2018). It is important to investigate factors that provide more insight into factors related to early drinking among youth. One factor that is related to drinking, often inconsistently, is involvement in sports activities (Clements-Nolle et al., 2019; Halldorsson et al., 2014; Kwan et al., 2014; Vest & Simpkins, 2013). This inconsistency is likely to exist because of the broad concept of 'involvement in sport activities'. Therefore, it relevant to distinguish different characteristics of sport involvement (e.g., total number of sport memberships and frequency of sport activities) and link them longitudinally and separately to adolescents' alcohol use. Moreover, it is likely that the relationship between sports activities and alcohol use is different across groups of adolescents. That is, it may depend on e.g., doing sport activities with parents and the availability of alcohol in sport canteens. Therefore, this study will examine the influence of the total number of sport memberships and the frequency of sport activities on weekly alcohol use among adolescents, and to what extent this relation is moderated by doing sport activities with parents and easiness of alcohol availability in sport canteens.

This research is relevant for policymakers, because a policy can be made in order to help to reduce the weekly alcohol use which can lead to less negative effects of alcohol use. The role of sport canteens is especially important for the government because they can decide to lower the availability of alcohol use in there. Also, for parents it is important to know if they can play a role in reducing the amount of alcohol use of their children.

## **Sport activities**

Research showed inconsistent relationships between sports activities and alcohol use (Vest & Simpkins, 2013). On the one hand, involvement in sport activities is often considered as a protective factor for a healthy development, including lower levels of alcohol use (Eccles & Gootman, 2002; Peck et al., 2008). In line with this, Halldorsson et al. (2014), O Lorente et al. (2004) and Werch et al. (2003) showed that participating in sport activities reduced the amount of alcohol use among adolescents. On the other hand, other studies showed that participation in sport activities, particularly team sport, is positively related to alcohol use (Hellandsjo Bu et al., 2002; Mays et al., 2010; Poortinga, 2007; Terry-McElrath & O'Malley, 2011). Beside team sport, other characteristics of sport may play a role, namely the total number of sport memberships (Partington et al., 2013; Wichstrom & Wichstrom, 2008) and the frequency of sport activities (Halldorsson et al., 2014; Hellandsjo Bu, 2002; O Lorente et al., 2004; Vest & Simpkins, 2013).

### **Number of sport memberships**

The first characteristic of sport is the number of sport memberships. Though little research is available that has investigated this aspect in relation to alcohol use, one studies demonstrated that adolescents who are a member of a sport association exceed non-members in the quantity of alcohol consumed at each drinking session (Partington et al., 2013). However, this study did not mention anything about multiple sport memberships. Vest and Simpkins (2013) stated that “athletes who participated in several different sport had elevated alcohol use”. On the other hand, other research state that adolescents who play more competitions, have less time for other activities, including activities associated with alcohol use (Wichstrom & Wichstrom, 2008). By assuming that adolescents who play more competitions, also are a member of multiple sport associations, it is likely that they also have less time to do activities that includes drinking alcohol. Because Wichstom and Wichstrom (2008) conducted a longitudinal research, this result is the most valid. Therefore, it is hypothesized that the number of sport memberships has a negative effect on the weekly alcohol use among adolescents.

### **Frequency of sport activities**

The second characteristic of sport is the frequency of sport activities. Vest and Simpkins (2013) mentioned that the frequency of sport activities was important to take into account in future research. In the literature, it was found that sport participation at a (inter)national level (training more than 6 times weekly) is associated with a reduced daily alcohol consumption (O Lorente et al., 2004; Wichstrom & Wichstrom, 2008). This is in line with the findings of Halldorsson et al. (2014), which stated that the more often adolescents take part in sport

activities, the less alcohol they drink. Also, research found that regularly participating in sport predicted a later alcohol debut (Hellandsjo Bu et al., 2002). A reason for this is that the amount of time spent on doing sport activities will reduce the possibility of participating in norm-breaking activities such as experimenting with substances (Hellandsjo Bu et al., 2002). Therefore, it is hypothesized that higher frequency of sport activities has a negative effect on the weekly alcohol use among adolescents.

### **Moderators**

A factor that may influence the impact of sport involvement on alcohol use is doing sport activities with parents. Although little research is available about adolescents and parents doing sport activities together, Halldorsson et al. (2014) showed that adolescents who spend more time with their parents were drinking less alcohol than adolescents who spend less time with their parents. According to the social bond/control theory (Hirschi, 1969), this could be because of the social bond between parents and children. When there is a stronger social bond with parents, youth are less likely to engage in antisocial or deviant behaviour (Hirschi, 1969). Doing sport activities with parents can strengthen the social bond and can be seen as a protective factor for the alcohol use among adolescents. In line with this, Hellandsjo Bu et al. (2002) stated that family support causes an accepting attitude and good emotional attachment. And this good attachment is a crucial factor in childhood development. This family support can be strengthened by doing sport activities together. Besides, Hayoz et al. (2016) stated that in active families (where sport activities are done together), healthy nutrition, which include drinking less alcohol, plays an important role and is lived in daily life. Based on previous research, it is hypothesized that the negative relationship between the number of sport memberships and the frequency of sport activities with the weekly alcohol use is stronger when adolescents do sport activities with parents.

Another moderator that may influence the impact of sport involvement on alcohol use is the greater availability of alcohol in sport canteens. In sport canteens youth have easy access to alcohol and the drinks are very cheap (Anker Solutions, 2008). Research stated that the availability of alcohol in sport canteens was an explanation for the positive link between physical activity and alcohol use (Poortinga, 2007; Schuit et al., 2002). However, little research is available about the influence of alcohol availability in canteens on the relationship between sport involvement and alcohol use among adolescents. Following little available research, it is hypothesized that perceived easiness of alcohol in sport canteens weaken the

protective influence of the number of sport memberships and frequency of sport activities on the level of drinking among adolescents.

### Current study

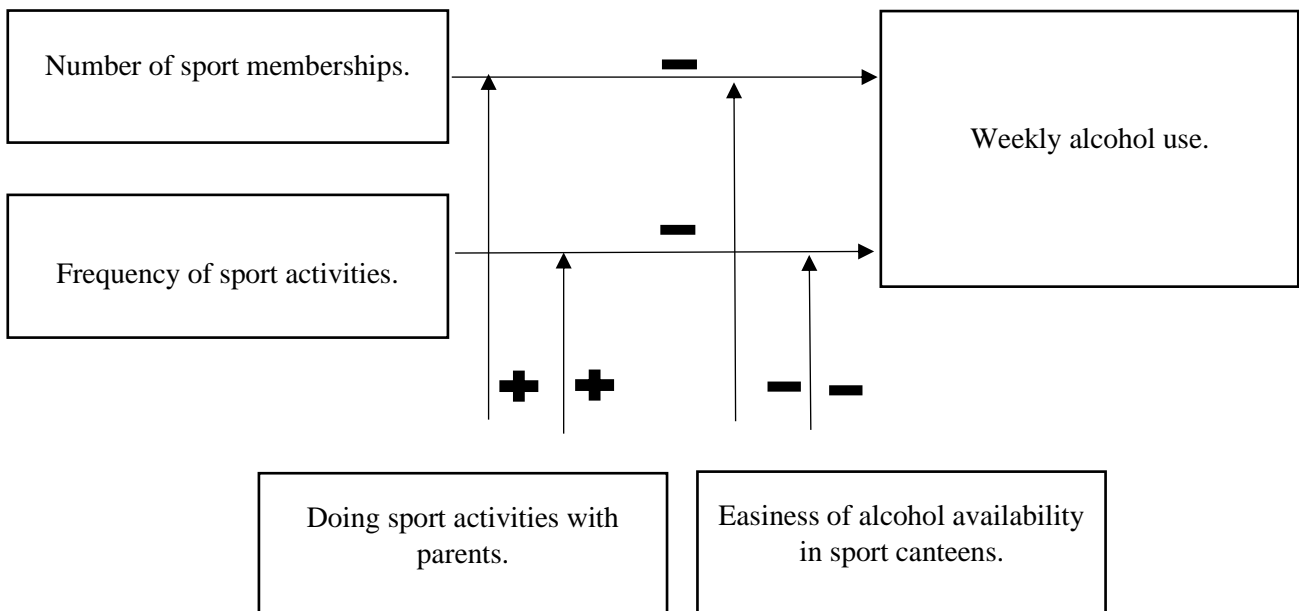
A lot of research has studied the link between sport activities and alcohol use, yet many of these studies are cross-sectional, meaning that no causation can be established. Next to that, most of the found results in the literature are inconsistent, depending on the different aspects of sport that is investigated. This longitudinal study will investigate involvement in sport activities in a more detailed manner by distinguishing the number of sport memberships and frequency of doing a sport in relation to alcohol.

In this research the following research question will be answered:

*To what extent is involvement in sport (number of sport memberships and frequency of sport activities) of influence on the weekly alcohol use among adolescents and to what extent is this relationship moderated by doing sport activities with parents and easiness of alcohol availability in sport canteens?*

A visual overview of this research question is depicted in Figure 1.

Figure 1. Research model.



## Methods

### Procedure and participants

This study is part of a larger quasi-experimental study on the effectiveness of a community based alcohol intervention (Koning & Van Der Rijst, 2018). Two waves (T1 and T2) were used before any intervention was carried out so that the data were not affected by the intervention. Two secondary schools, one from each condition, participated in the study. All students at the school, except for the students in their graduation year, were asked to fill out an online questionnaire in class under supervision of a research assistant. Parents of the students received a letter with information about the study and the option to indicate if they did not want their child to participate. First wave data were collected in June 2018 and the second wave data were collected in November 2018. The study obtained ethical approval (20-0606).

Data of 2983 participants were collected. A total of 43 participants were excluded because they did not fill in any answers. Besides, 783 participants who only filled in the questionnaire at T1 were excluded, next to 685 participants who only filled in the questionnaire at T2. Also 4 participants were excluded because they did not fill in the questionnaire seriously. There was 1 missing value by gender and 12 missing values by frequency of sport activities, these participants are all excluded.

In total there were 1365 participants included in this study. The division of boys and girls was fairly equal, namely 48.3% boys and 51.7% girls. All participants were between 12 and 18 years old ( $M_{age}=14.14$ ,  $SD=1.03$ ). With respect to the level of education of the adolescent, 24.2% were in lower levels of educational (VMBO-kader and VMBO-tl) 11.1% in the middle level (VMBO/HAVO) and 64.7% in higher levels of educational (HAVO, HAVO/VWO and VWO).

### Measures

*Weekly alcohol use* is measured at T1 and T2 by the quantity-frequency measure, including two items (Engels et al., 1999; Engels and Knibbe, 2000). The first question asks how many days adolescents drink and can be answered on an 8-point Likert scale ranging from 7 days (1) to never (8). The second question asks adolescents how many glasses of alcohol they drink at a drinking session and can be answered on a 9-point Likert scale ranging from 11 glasses or more (1) to never drinking alcohol (9). Both items were recoded so that a higher score indicates drinking more days / more glasses. The product of the two items were

calculated to compute an average weekly drinking score, where a higher score indicates a higher level of weekly drinking. The correlation was 0.697 at T1 and 0.734 at T2.

*Number of sport memberships* is measured at T1 and T2 by asking adolescents how many different associations they are a member of. This question included eight possible answer options (can choose multiple options), including sport clubs (1), dance clubs (2), music schools (3), creative associations (4), nature associations (5), youth associations (6), another kind of association (7) and no association (8). Because in this study we wanted to know at how many sport associations participants are a member, we included the answer options: sport clubs (1), dance clubs (2), youth associations like scouting (6) and another kind of association (7). For each of these items, the answer responses were recoded into 0=no member of sport association and 1=member of a sport association. The sum of these items was calculated so that we had an indication of the number of memberships of sport associations, with a minimum score of 0 and maximum of 4.

*Frequency of sport activities* indicates how often adolescents play sports (Carlos et al., 2016). This is measured by one item asking how often the adolescent has played a sport in the past 12 months. The answer categories to this question range from never (1) to three days a week or more (5). Those items are recoded that 0 reflects no involvement in sport activities at all and 4 reflects doing sport activities three days a week or more.

*Sport activities with parents* is measured at T1 and T2 by asking adolescents how often they do different activities with their parents, among which sport activities is included in this study (Sweeting & West, 1998). The question was answered on a 5-point Likert scale ranging from every day (1) to never (5). Those items are recoded that 1 reflects no sport activities with parents and 5 reflects doing sport activities with parents every day.

*Perceived easiness of alcohol availability* is measured at T1 and T2 by asking adolescents how easy it is for them to get alcohol at a sports canteen. The answer to this question ranges from easy (1) to impossible (5). Those items are recoded that 1 reflects impossible to get alcohol in sports canteens and 5 reflects very easy to get alcohol in sports canteens.

*Control variables* are measured at T1. The control variables in this study that were taking into account were age, gender, and educational level.



## **Data analysis**

For the data analysis first descriptive analyses and a Pearson correlation test were conducted for the dependent and independent variables and moderators. After that, the data was checked for linearity and normality by doing a Shapiro Wilks test. Because weekly alcohol use was not normal distributed, it was decided to lower the outliers by making the maximum score on weekly alcohol use the mean + two times the standard deviation. By doing this, 64 answers were recoded.

To test the influence of sport involvement on weekly alcohol use among adolescents cross-sectionally, a multiple linear regression analysis was conducted. In model 1, the control variables (gender, age, level of education) and weekly alcohol use as dependent variable were added, whereafter in model 2 the predictors number of sport memberships and frequency of sport activities were added to the model. To test if this relation was dependent on doing sport activities with parents and the easiness of alcohol availability, centred interaction terms were created between the both predictors with each of the moderators after the variables were centred. These interaction terms and the main moderators were added in model 3. This multiple regression analysis was done two times. One with all the variables at T1 and one with all the variables at T2 so that cross-sectional analyses were done at T1 and T2. To test the influence of sport involvement at T1 on weekly alcohol use among adolescents at T2 (longitudinal analysis), another multiple linear regression analysis was conducted. In here, the same models as the cross-sectional analyses were used with the dependent variable of T2, the predictors and interaction terms of T1, next to the dependent variable of T1.

## **Results**

### **Descriptive statistics and correlations**

Table 1 shows the descriptive statistics of all variables, including means, standard deviations and the Pearson's correlations. As seen in the correlation matrix, almost all variables are significantly correlated with the control variables gender and age.

In addition, weekly alcohol use was significantly correlated with both the moderators, sport activities with parents and easiness of alcohol availability in sport canteens, at T1 and T2.

Table 1

*Descriptive and Pearson's Correlations of the Dependent, Independent and Moderating Variables at T1 and T2.*

	%M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender (percentage of males)	48.3	1.00												
2. Age	14.14 (1.03)	-.01	1.00											
3. Educational level	4.01 (1.61)	-.05	.22**	1.00										
4. Frequency of sport activities T1	3.36 (.10)	-.06*	-.07*	.11**	1.00									
5. Frequency of sport activities T2	3.25 (1.13)	-.06*	-.03	.17**	-	1.00								
6. Total sport memberships T1	.95 (.43)	.06 *	-.09**	.02	.44**	-	1.00							
7. Total sport memberships T2	.93 (.49)	.05	-.06*	.02	-	.43**	-	1.00						
8. Sport activities with parents T1	1.82 (1.06)	-.11**	-.06*	-.02	.17**	-	.06*	-	1.00					
9. Sport activities with parents T2	1.72 (1.05)	-.08**	-.06*	-.03	-	.17**	-	.09**	-	1.00				
10. Easiness of alcohol availability in sport canteens T1	1.71 (1.05)	-.10**	.27**	.11**	.01	-	.01	-	-.02	-	1.00			
11. Easiness of alcohol availability in sport canteens T2	1.86 (1.08)	-.09**	.26**	.10**	-	.02	-	.02	-	.01	-	1.00		
12. Weekly alcohol use T1	3.38 (4.81)	.06*	.47**	.06*	.02	-	.03	-	-.07**	-	.29**	-	1.00	
13. Weekly alcohol use T2	3.74 (5.11)	.04	.42**	-.00	.02	-.03	.05	.03	-.08**	-.07*	.16**	.20**	.66**	1.00

Note: \*  $p < .05$ . \*\*  $p < .01$

### Cross sectional analyses

#### Cross-sectional T1: Relations between sport involvement and weekly alcohol use

A multiple linear regression analysis at T1 was conducted to predict weekly alcohol (Table 2). It was found that the main variables frequency of sport activities and total sport memberships were not significantly related with weekly alcohol use at T1.

Table 2

*Multiple Linear Regression Analysis of Frequency of Sport Activities and Sport Memberships at T1.*

<i>Variable</i>	<i>B</i>	<i>SE</i>	$\beta$
Gender	.57	.24	.06*
Age	2.29	.11	.49***
Educational level	-.16	.07	-.05*
Frequency of sport activities	.20	.13	.04
Total sport memberships	.56	.30	.05

Note:

Dependent variable: Weekly alcohol use at T1. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

$R^2$  model 1 = .227.  $R^2$  model 2 = .232.

### **Cross-sectional T1: Moderation by sport activities with parents and alcohol availability in sport canteens**

In addition to the multiple linear regression analysis for the independent variables, a multiple linear regression analysis including the main predictors in interaction with doing sport activities with parents and the availability of alcohol in sport canteens as well as the moderator itself was conducted at T1. It was found that the interaction between doing sport activities with parents and total memberships did not significantly predict weekly alcohol use at T1. Also, the interaction between the availability of alcohol in sport canteens with total memberships did not significantly predict weekly alcohol use at T1. Besides the interaction between doing sport activities with parents and frequency of sport activities did not significantly predict weekly alcohol use at T1. On the other hand, the interaction between the availability of alcohol in sport canteens and frequency of sport activities did negative significantly ( $\beta = -.06, p = .01$ ) predict weekly alcohol use at T1. This indicates that a higher availability of alcohol in sport canteens weakens the relationship between frequency of sport activities and weekly alcohol use at T1. Meaning that adolescents who perceived more alcohol available in sport canteens drink less alcohol when they have a higher frequency of sport activities.

### **Cross-sectional T2: Relations between sport involvement and weekly alcohol use**

Also at T2 a multiple linear analysis was conducted (Table 3). Besides the control variables, it was found that total sport memberships ( $\beta = .07, p = .02$ ), is positively significant related to weekly alcohol use at T2. Indicating that adolescents who are a member of more sport associations have higher levels of weekly alcohol use.

Table 3

#### *Multiple Linear Regression Analysis of Frequency of Sport Activities and Sport Memberships at T2*

<i>Variable</i>	<i>B</i>	<i>SE</i>	$\beta$
Gender	.34	.25	.03
Age	2.21	.12	.45***
Educational level	-.30	.08	-.09***
Frequency of sport activities	-.11	.13	-.02
Total sport memberships	.68	.28	.07*

*Note:*

Dependent variable: Weekly alcohol use at T2. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

$R^2$  model 1 = .186.  $R^2$  model 2 = .189.

### **Cross-sectional T2: Moderation by sport activities with parents and alcohol availability in sport canteens**

In addition to the multiple linear regression for the independent variables, a multiple linear regression including the main predictors in interaction with doing sport activities with parents and the availability of alcohol in sport canteens as well as the moderator itself was conducted at T2. It was found that the interaction between doing sport activities with parents and total memberships did not significantly predict weekly alcohol use at T2. Also, the interaction between the availability of alcohol in sport canteens with total memberships did not significantly predict weekly alcohol use at T2. Besides the interaction between doing sport activities with parents and frequency of sport activities did not significantly predict weekly alcohol use at T2. As in T1, the interaction between the availability of alcohol in sport canteens and frequency of sport activities did significantly ( $\beta = .07, p = .02$ ) predict weekly alcohol use at T2. However, in T2 this significant effect was positive. Indicating that a higher availability of alcohol in sport canteens strengthen the relationship between frequency of sport activities and weekly alcohol use at T2. Meaning that adolescents who perceived more alcohol available in sport canteens drink more alcohol when they have a higher frequency of sport activities.

### **Longitudinal analyses**

Next, a multiple regression analysis was conducted to predict the longitudinal effect of sports involvement at T1 on weekly alcohol use at T2 (Table 4). First, all the control variables were added to the model. Next, the independent (weekly alcohol use) and dependent variables (Frequency of sport activities and total sport memberships) at T1 were added to the model. Next to the control variables, the independent variable total sport memberships was positively significant ( $\beta = .58, p = .05$ ). Indicating that more sport memberships at T1 predicts a higher weekly alcohol use at T2.

Table 4

*Multiple Linear Regression Analysis of Frequency of Sport Activities and Sport Memberships at T1 on Weekly Alcohol Use at T2.*

<i>Variable</i>	<i>B</i>	<i>SE</i>	<i>β</i>
Gender	.00	.21	.00
Age	.83	.12	.17***
Educational level	-.23	.07	-.07**
Frequency of sport activities T1	.04	.12	.01
Total sport memberships T1	.54	.27	.05*
Weekly alcohol use T1	.62	.02	.58***

*Note:*

Dependent variable: Weekly alcohol use at T2. \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

$R^2$  model 1 = .186.  $R^2$  model 2 = .453.

### **Longitudinal: Moderation by sport activities with parents and alcohol availability in sport canteens**

To test the moderation effect longitudinal, another multiple linear regression analysis was conducted. The main predictors in interaction with doing sport activities with parents and the availability of alcohol in sport canteens at T1 as well as the moderator itself at T1 were added to the model. For the availability of alcohol in sport canteens, not significant interaction effect with total sport memberships, nor with frequency of sport activities were found. Furthermore, for sport activities with parents, the interaction with frequency of sport activities was not significant. The interaction between doing sport activities with parents and total memberships was a significant predictor of weekly alcohol use at T2 ( $\beta = .04$ ,  $p = .05$ ). This indicates that doing more sport activities with parents at T1, then the relationship between frequency of sport activities and weekly alcohol use at T2 is strengthened. Meaning that adolescents who do more sport activities with parents at T1 are drinking more alcohol when they have a higher frequency of sport activities at T2.

### **Discussion**

The aim of this study was to investigate the influence of sport involvement on the weekly alcohol use among adolescents and to what extent this relationship is influenced by doing sport activities with parents and the availability of alcohol in sport canteens. One significant

main effect was found; more sport memberships significantly predicted more weekly alcohol use. In addition, this main effect was particularly found for adolescents who did more sport activities with their parents. Only among those adolescents who perceived alcohol as more available, a higher frequency of sport activities predicted more weekly drinking, however this effect was only found at the cross-sectional analyses.

Total sport memberships was longitudinally related to adolescents' drinking, whereas the frequency of sport activities was not. Adolescents who are a member of more sport associations have higher levels of weekly alcohol use, which is in contrast with hypotheses 1. It is in line with the study of Vest and Simpkins (2013) who stated that "athletes who participated in several different sport had elevated alcohol use". It was expected that adolescents who play more competitions, have less time for other activities, including activities associated with alcohol use (Wichstrom & Wichstrom, 2008). However, it may also be the case that adolescents who play more competitions are more often at a sport association and therefore have more exposure to alcohol. Next to that, Hellandsjo Bu et al. (2002) stated that adolescents who play several sports are less influenced by non-sport friends (who drink less) in their drinking because they are less time exposed to their non-sport friends, which leads to less behavioural influence. Also adolescents who play several sport are less motivated to emulate the drinking behaviours of their non-sport friends (Hellandsjo Bu et al., 2002). To substantiate this hypothesis, this study should be replicated including a larger variation of adolescents with multiple sport memberships. Also it might be interesting to take into account the role of peer influence (Hellandsjo Bu et al., 2002).

Inconsistent with the literature, the frequency of sport activities did not predict weekly alcohol use among adolescents. Research stated that the more often adolescents take part in sport activities, the less alcohol they drink (Halldorsson et al., 2014; O Lorente et al., 2004; Wichstrom & Wichstrom, 2008). An explanation for the inconsistency in results could be due to that in this study the frequency of sport activities is measured by asking how often adolescents played sport in the past 12 months and not how many sport practices in total they have in a week. Therefore, this study should be replicated and ask adolescents how many sport practices in a weekday they have instead of how often they sported in the last 12 months. Next to that, no distinction between team sport and individual sport is made, this could also contribute to the inconsistent outcome as we know that adolescents who play in a team sport often have higher levels of alcohol than adolescents in individual sport (Vest & Simpkins, 2013). By making this distinction, it is important to take into account the social norms theory. This theory describes situations in which individuals do not correctly perceive

the attitudes or behaviours of peers to be different from their own (Perkins, 2003). Being part of a team increases the likelihood that misperceptions of how other peers think and act influence adolescents' own behaviour, like alcohol use (Perkins, 2003). For example, someone can feel they need to drink alcohol after the game because the whole team does this. Thus, the greater role of social norms about drinking may contribute to explaining the higher levels of drinking among adolescents involved in team sport compared to individual sports. Therefore, it is important that future research investigate the different influence of team sport and individual sport on alcohol use.

Longitudinally, the main effect of this study, more sport memberships significantly predicted more weekly alcohol use, was particular found for adolescents who did more sport activities with parents. This is not in line with the theory of Halldorsson et al. (2014) who stated that adolescents who spend more time with their parents, are drinking less alcohol than adolescents who spend less time with their parents. It is also not in line with the social bond/control theory of Hirschi (1969). The theory explains that a stronger social bond between parents and children will lead to less antisocial or deviant behaviour. However, looking at the found effect in this study, it seems the other way around. An explanation for this can be that too much social control from parents will lead to oppositional and protesting attitude of adolescents (Hellandsjo Bu et al., 2002). This attitude might bring adolescents into experimenting in the youth culture and might lead to more alcohol use, especially an early alcohol debut (Hellandsjo Bu et al., 2002).

At last, the influence of frequency of sport activities on weekly drinking was found for adolescents who perceived alcohol more available in sport canteens. However, there was some inconsistency in the result. Namely, at T1 a negative effect was found, while on the other hand at T2 a positive effect was found. This means that there must have been a change between T1 and T2. The found negative effect is in line with research of Poortinga (2007) and Schuit et al. (2002). Both studies stated that the availability of alcohol in sport canteens could explain the relationship between sport involvement and alcohol use. This study showed that those predictions are true. Although, the found positive effect is not in line with those studies. A possible explanation for this is that in a lot of sport canteens there are good policies for alcohol use among adolescents under the age of 18 (Hellandsjo Bu et al., 2002). Also, it could be the case that adolescents could get alcohol from parents out of the sport canteens but are not able to get alcohol by themselves. A last explanation could be the age difference between T1 and T2. At a younger age doing sports may have a protective effect and at an older age this protective effect has disappeared and leads to more alcohol use. To clarify the inconsistency

between the different waves, more research and theory must be available about the role of alcohol availability in sport canteens.

### **Limitations and strengths**

The strengths of this study are first of all the big sample size, namely 1365, which makes this study more reliable. Another strength of this study is the longitudinal study design. Because of this, this study says something about causality and changes over time are visible.

Nevertheless, there are also some limitations of this study that should be mentioned. First of all, the data of this study is collected in one municipality of the Netherlands. Because of this, the study cannot fully be generalized to other populations and has less reliability. At last, a lot of variables are only measured by one item, which effects the validity of this study.

This study is the first study that operationalise sport involvement in a distinction between frequency of sport activities and total membership of sport associations. In literature there was a lot of inconsistency in the relationship between sport involvement and alcohol use, therefore it was important to further investigate those relationships. It can be concluded that the influence of sport involvement on the weekly alcohol use of adolescents is a complicated relationship. More research is necessary to get a better understanding of the influence of sport involvement on the weekly alcohol use of adolescents. In future research, it is important that data is collected among adolescents in high school in more municipalities of the Netherland to have a better generalization. By doing this, it is also important that there is a more equal distribution between higher and lower educational levels of the participants. Next to that it is important that in future research, the distinction between team sports and individual sport is taken into account.



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