Keeping youth in play

The effects of sports-based interventions in the prevention of juvenile delinquency

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The Effects of a Dutch Sports-Based Intervention to Prevent Juvenile Delinquency in At-Risk Adolescents

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This chapter has been submitted for publication

Abstract

Despite the wide implementation of sports-based crime prevention programs, there is a lack of empirical knowledge on the effectiveness of these interventions. This study evaluated a Dutch sport-based program in N = 368 adolescents at risk for juvenile delinquency. Intervention effects were tested in a quasi-experimental study, using multilevel models. The primary outcome was juvenile delinquency, measured by official police data. The secondary outcomes were risk and protective factors for delinquency (e.g., conduct problems, acceptance of authority, and academic engagement) assessed with self- and teacher reports. Significant effects were found on the delinquency measures. The intervention group consisted of fewer youth with police registrations as a suspect (d = -0.34), and had a lower mean number of registrations than the control group (d = -0.23). No significant intervention effects were found on the secondary outcomes. Implications for theory and practice concerning the use of sports-based crime prevention programs are discussed.

Introduction

Juvenile delinquency is a serious problem in today's society, causing considerable financial and societal costs (Siegel & Welsh, 2015). In the Netherlands, approximately 34% of the registered suspects of crimes were below the age of 25 in 2014 (CBS, 2015). Similar numbers were found in the USA in 2014, with 36% of the arrestees under the age of 25 (CJIS, 2016). A meta-analytic review of Assink and colleagues (2015) showed that once youth committed a crime, they were more likely to develop a persistent pattern of offending. Moreover, juvenile delinquency has been associated with undesirable developmental outcomes, including educational dropout, unemployment, and (mental) health and social problems (Borduin, 1994; Chung, Mulvey, & Steinberg, 2011; Kirk & Sampson, 2013; Lanctôt, Cernkovich, & Giordano, 2007; Wiesner, Kim, & Capaldi, 2010). Therefore, preventing juvenile delinquency has become an important topic in youth studies.

Youth crime prevention programs consist of a broad spectrum of programs and activities. Many of these programs focus on improving family functioning, parenting behaviors, social skills, problem behavior, and educational outcomes in youth, generally with small or modest effects on delinquency (De Vries, Hoeve, Assink, Stams, & Asscher, 2015; Deković et al., 2011; Lösel & Beelmann, 2003). More recently, youth policy makers have become interested in the use of sports in prevention programs. Sports-based interventions are perceived as low-cost, non-stigmatizing programs that positively influence youth development (Coalter, 2007; Coalter, 2015; Fraser-Thomas, Côté, & Deakin, 2005; Magee, Spaaij, & Jeanes, 2015; Moreau et al., 2014). Additionally, they are seen as fun to do and therefore attract (otherwise) difficult to reach population subgroups (Haudenhuyse, Theeboom, & Nols, 2012). Nowadays, local governments and institutions all over the world are offering youth sports activities to prevent juvenile delinquency (Cameron & MacDougall, 2000; Hartmann, 2003; Kelly, 2013; Morris, Sallybanks, & Willis, 2003; Nichols, 2007). However, evidence for the effect of sports-based crime prevention programs mostly comes from qualitative studies or studies with designs that do not permit causal inferences (Chamberlain, 2013; Coalter, 2015). To our knowledge, none of the widely implemented sports-based crime prevention programs have ever been evaluated using a (quasi-) experimental design.

The assumption that sports-based interventions prevent juvenile delinquency originates from Hirschi's (1969) theory of social bonds, which claims that individuals with stronger bonds to society are less likely to engage in delinquency, as delinquency may put these valuable bonds at risk (see Hoeve et al., 2012). Central to Hirschi's theory are the elements of attachment, commitment, belief, and involvement, and all four elements are supposed to be enhanced by sports participation (Agnew & Petersen, 1989; Hass, 2001; Spruit, Van Vugt, Van der Put, Van der Stouwe, & Stams, 2016). The *attachment* to significant others may be strengthened by sports participation, as youth become members of a team, generally supervised by a coach who is closely related to all members. Further, by

participating in sports programs, youth are *committed* to conventional activities. Therefore, they may refrain from deviant acts, as delinquency may compromise their opportunity to participate in these conventional activities. Young athletes may not want to risk the chance of being excluded from the sports field due to delinquent acts. *Beliefs* in society's values may be enhanced by sports participation, because similar rules, norms, and values are being pursued in the sports context. Finally, it is hypothesized that because of their *involvement* in sports, youth are simply too busy to commit delinquent acts (Hirschi, 1969). In line with Hirschi's (1969) theory of social bonds, scholars have argued that sports participation has a positive effect on social inclusion, identity formation, and community participation (Bailey, 2005; Haudenhuyse, Theeboom, & Skille, 2014; Kelly, 2011; Perks, 2007). Consequently, it is assumed that sports-based interventions may prevent delinquency (Agnew & Petersen, 1989; Bailey, 2005; Chamberlain, 2013; Nichols, 2010).

Additionally, the sports context may provide a wide range of learning opportunities for positive traits, skills, and virtues that protect against the development of delinquent behavior (Sage, 1990; Segrave, 1983; Shields & Bredemeier, 1995; Spruit, Van Vugt, Van der Put, Van der Stouwe, & Stams, 2016). By participating in sports activities, youth are expected to learn sportsmanship, morality, obeying rules and authority, self-control, conflict-resolution, skills to cope with disappointments, and to co-operate with others (Kreager, 2007; Mouratidou, Goutza, & Chatzopoulos, 2007; Shields & Bredemeier, 1995). More recently, a meta-analytic review found small-to-moderate effects of physical activity interventions on adolescent psychosocial functioning, including externalizing problems, internalizing problems, academic achievement, and self-esteem (Spruit, Assink, Van Vugt, Van der Put, & Stams, 2016). This implicates that sports-based interventions can contribute to positive youth development, and therefore, may be promising in preventing juvenile delinquency.

Qualitative studies and non-experimental or community-based research have often reported successes, and have interpreted their positive results as support for the theoretical basis of sports-based crime prevention efforts (Hartmann & Depro, 2006; McMahon & Belur, 2013; Moreau et al., 2014; Nichols & Crow, 2004). However, the problem with these type of studies is that it is not possible to attribute the positive outcomes to the intervention, and therefore to draw conclusions about the causal effect of sports-based interventions remains problematic (Chamberlain, 2013; McMahon & Belur, 2013). In sum, convincing empirical evidence on the effect of sports-based interventions on preventing juvenile delinquency is still lacking (Chamberlain, 2013; Coalter, 2015; Sandford, Armour, & Warmington, 2006).

This is the first study to test the assumed effect of sports-based interventions in the prevention of juvenile delinquency, using a quasi-experimental design. 'Only You Decide Who You Are' [*Alleen Jij Bepaalt Wie Je Bent* (AJB)] is a Dutch sports-based intervention providing team sports training at local sports clubs to adolescents at-risk for developing

delinquent behaviors. The primary aim of AJB is to prevent juvenile delinquency by reducing risk factors and increasing protective factors for delinquency. In the current study, the effect of AJB to prevent juvenile delinquency is assessed using official police registration data. To assess the effect of AJB on risk and protective factors of juvenile delinquency the following constructs were measured: conduct problems, aggression, acceptance of authority, friends' participation in delinquent behaviors, perceived peer pressure, resistance to social pressure, prosocial behavior, and academic engagement. We expected adolescents participating in AJB to have lower delinquency rates, less risk factors, and more protective factors for juvenile delinquency than the control group.

Methods

Participants

Participants in this study were 368 adolescents (88.4 % male; between 12 and 18 years of age) from 22 different schools, and their teachers. The intervention group consisted of 248 participants, the control group of 120 participants. All of the adolescents in our sample attended the lowest level of Dutch regular education (lower vocational education), or attended a form of special education for youth with learning disabilities (practical training). Dutch schools for practical training have the following admittance criteria: (1) an IQ between 55 and 85; and (2) learning delays of 50 % or more in at least two major subjects (e.g., mathematics or reading comprehension). AJB is targeting male adolescents from disadvantaged neighborhoods with high crime rates involved in special education or the lowest educational level. Therefore, it was concluded that the sample was at risk for delinquency (Spruit, Van der Put, Van Vugt, Stams, & Bloch, 2015).

Table 4.1 presents the demographic characteristics of the intervention and control group. Differences between treatment conditions at T0 on demographic characteristics and outcome variables (see Table 4.4 for descriptions) were tested with independent samples *t*-tests for continuous variables and chi-square analyses for categorical variables.

There were no significant differences on sex, ethnicity, living situation, type of education, police registrations as a suspect, conduct problems, aggression, perceived peer pressure, self-reported resistance to social pressure, academic engagement, and teacher reported prosocial behavior and acceptance of authority. However, there was a significant difference between the intervention and control group on age (M_{AJB} = 14.51, $M_{control}$ = 14.24). Because age was significantly correlated with two of our outcome measures (r = .111 for registrations as a suspect, and r = -.137 for aggression), we chose to control for age in the analyses pertaining to these outcomes. Further, adolescents in the intervention group reported more prosocial behavior (d = 0.26), more acceptance of authority (d = 0.25), and to have less delinquent friends (d = -0.30). Their teachers reported less resistance to social pressure (d = 0.27) on T0 in the experimental group compared to the control group.

Table 4.1 *Demographic characteristics of participants*

	Intervention group (*n* = 247)	Control group (*n* = 116)	Tests of significance of the differences between groups
Sex (%)			χ^2 (1) = 0.309
Male	89.1	87.1	
Female	10.9	12.9	
Age (years)			*t*(360) = 2.789**
Mean	14.51	14.24	
SD	1.05	0.77	
Ethnicity (%)			χ^2 (6) = 7.242
Dutch	19.9	25.2	
Moroccan	23.2	14.8	
Turkish	11.0	13.0	
Surinamese	10.6	15.7	
Antillean	11.0	7.0	
Other Western	5.7	7.0	
Other non-Western	18.7	17.6	
Living situation (%)			χ^2 (2) = 1.755
Two parent family	61.6	59.8	
Single parent family	35.4	39.3	
Other	3.0	0.9	
Type of education (%)			χ^2 (1) = 0.123
Special education	56.3	54.3	
Low level regular education	43.7	45.7	

** $p < .01$

Procedure

Participants were recruited at schools. The intervention group consisted of adolescents who participated in AJB. The control group was formed of adolescents who attended six of the same schools as the intervention group, but they did not participate in AJB. The control group was formed in a way that the composition of the control group reflected the composition of the intervention group on sex, and type of education. All study participants were asked for consent. Also, their parents were informed about the study. Three participants were excluded from the study because either they refused to participate themselves or their caregivers did not give consent.

Participants in both conditions, and their teachers, were assessed on three different occasions. For the intervention group, this was at the start of AJB in March 2014 (T0), 6.6 months after the start of the intervention (T1), and 12.9 months after the start of AJB (T2).

The measurement occasions of the intervention group took place at the sports clubs. The inclusion of the control group ran from March 2014 to September 2014. The control group was assessed at school, with the same amount of time between each measurement occasion as the intervention group.

The Dutch Public Prosecution Service gave permission to access official police data. Police registrations were available for the 2 year period before the start of AJB (criminal history) and for the 16.0 months period after the start of AJB (delinquent outcome). All data gathered in this study was anonymized.

Experimental Conditions

Intervention condition

AJB is a sports-based intervention targeting adolescents at risk for developing delinquent behavior. AJB was developed by the Dutch Ministry of Safety and Justice to prevent juvenile delinquency. Through sports clinics given by professional athletes at selected schools, adolescents were encouraged to participate in AJB. If they were interested, they could become a member of a locally partnered sports club. Contribution fees and sports materials were covered by the Ministry of Safety and Justice. At the sports clubs, adolescents participated in indoor and field soccer, baseball, or basketball training in special AJB-teams. The Ministry of Safety and Justice selected the coaches on their ability to act as a role model, and to effectively deal with the characteristics of this group of adolescents. The AJB-teams practiced an average of twice a week. During the training, specific attention was given to behavioral difficulties of the participants. The aim of the training was to create a safe educational environment, with positive relationships between the coach and the participants. The coach had to be clear about desirable and undesirable behavior, and to set a good example. The participants were approached in a positive, respectful way and were motivated to participate in prosocial activities at the club. If necessary, the trainer provided individual guidance to the participants and discussed concerns about the behavior with the school. AJB-coordinators ensured good coordination between the schools and sport clubs. During the first sports season, the teams consisted only of participants of AJB. In the course of the second season, participants were encouraged to join the regular sports teams of the club if their behavior and development allowed this. The intervention did not have a fixed end point.

Control condition

The control group did not receive any specific intervention. However, 65.5% of the control group stated that they practiced sports, and 48.3% of the control group stated that they were a member of a sports club.

Attrition and Missing Values

Intervention attrition was defined as attrition from AJB during the first sports season (the time between T0 and T1). In total, 83 (33.5%) participants dropped out: 9.6% moved to a different city, 12.0% chose to participate in a sports club outside AJB, 9.6% did not have time anymore to participate in AJB, 22.9% lost interest in AJB, 27.7% dropped out because the sports club had stopped with AJB, and 18.1% of the dropouts did not provide a reason for attrition. Dropouts did not differ from non-dropouts on demographic characteristics (sex, age, ethnicity, and living situation), criminal history, or secondary outcomes (conduct problems, aggression, acceptance of authority, friends' participation in delinquent behavior, peer pressure and support for delinquent behavior, resistance to social pressure, prosocial behavior, and academic engagement). We did find a difference between dropouts and non-dropouts on type of education (χ^2 (1) = 9.089; $p < .01$). Participants from special schools for practical training were more likely to drop out than participants from the lowest level of regular education (schools for vocational training).

We could obtain official police registration data for 364 (98.9%) participants in the study. With regard to the secondary outcomes assessed with the self- and teacher reports, not all participants could be reached at all measurement occasions, resulting in missing values. At T0, 99.6% of the intervention group and 96.7% of the control group was assessed. At T1, we collected data on 63.8% of the participants in the intervention group and on 97.5% of the participants in the control group. At T2, we retrieved data on 62.5% of the intervention group and 90.8% of the control group.

Measures

Primary outcome

Juvenile delinquency

Juvenile delinquency was assessed using data from official police records. We coded whether the adolescent was registered as a suspect of a criminal offense within 16.0 months after T0, and the number of offenses for which the juvenile was registered as a suspect during that period. To control for pre-intervention differences in delinquency, we created criminal history scores. It was coded whether the juvenile was registered as a suspect of a criminal offense during the two years prior to AJB (prior to T0), and the number of offenses for which the juvenile was registered as a suspect.

Secondary outcomes

Conduct problems

Teachers reported on their student's conduct problems with the use of a subscale of the Dutch version of the Strenghts and Difficulties Questionnaire (SDQ; Van Widenfelt, Goedhart,

Treffers, & Goodman, 2003). The five items had to be scored on a three point Likert-scale ("not true", "somewhat true", or "certainly true"). Higher scores indicated more conduct problems. The Cronbach's alphas ranged from .75 to .80 on the different measurement occasions.

Aggression

Juveniles reported on their aggressive behaviors using the Overt aggression scale of the Dutch Adaptation of the Buss-Durkee Hostility Intentory (BDHI-D; Lange, Hoogendorn, Wiederspahn, & Beurs, 2005). The BDHI-D presents 16 statements that were scored true or false. Higher scores indicated more aggression. The Cronbach's alphas ranged from .65 to .70.

Acceptance of authority

Teachers and juveniles reported on the juvenile's ability to accept authority using a subscale of the Tasks and Skills of Adolescents questionnaire (TVA; Van der Knaap, Beenker, & Bijl, 2004). The seven-item scale assessed how well adolescents deal with authority. With a five point Likert-scale (ranging from "does not apply to me at all" to "totally applies to me"), the juveniles answered to what extent a statement applied to them. The teacher scale ranged from "does not apply to X" to "totally applies to X". Higher scores indicated better acceptance of authority. Cronbach's alpha of the self-report scale ranged from .76 to .83, and of the teacher scale from .86 to .94.

Friends' participation in delinquent behavior

To assess the involvement with deviant peers, a six item scale of Megens and Weerman (2010) was used. The juveniles reported on how many of their friends ("none", "some" or "most or all of them") committed offenses. Higher scores indicated more delinquent friends. The Cronbach's alphas ranged from .82 to .89 for the different measurement occasions.

Peer pressure and support for delinquent behavior

Juveniles reported on perceived peer pressure and support for delinquent behavior by their friends on a six item scale of Megens and Weerman (2010). Answers were given on a five point Likert-scale, ranging from "completely agree" to "completely disagree". Higher scores indicated that youth experienced more peer pressure. Cronbach's alphas ranged from .82 to .85.

Resistance to social pressure

The teachers and juveniles reported on the juvenile's resistance to social pressure using a four item subscale of the TVA (Van der Knaap et al., 2004). Higher scores indicated more

resistance to social pressure. Internal consistency alpha coefficients of the self-report scale ranged from .81 to .86, and of the teacher scale from .89 to .93.

Prosocial behavior

To assess the level of prosocial behavior, the teachers and juveniles filled in a subscale of the SDQ (Van Widenfelt et al., 2003). Higher scores indicated more prosocial behavior. Cronbach's alpha of the self-report scale ranged from .63 to .68, and of the teacher scale from .83 to .89.

Academic engagement

The teachers and juveniles reported on the juvenile's academic engagement using a subscale of the TVA (Van der Knaap et al., 2004). The Cronbach's alphas of the self-report scale ranged from .78 to .83, and of the teacher scale from .89 to .92.

Analyses

To examine the effect of AJB on the primary and secondary outcomes, multilevel analyses with maximum likelihood estimation procedures were performed. In this study, measurement occasions (level 1) were nested within individuals (level 2), who were nested within schools (level 3). Multilevel analyses take into account the dependencies among measurements within respondents, as well as dependencies among participants of the same schools, and have the advantage of using all the available data (including those from participants with missing data). The effect of AJB on binary measures of juvenile delinquency (registered as a suspect yes/no) was estimated with a multilevel model for binary distributions (Heck, Thomas, & Tabata, 2012), while controlling for criminal history and age. The effect of AJB on the number of registrations as a suspect was estimated with a multilevel model for Poisson distributions (i.e., count data; Heck et al., 2012), while controlling for criminal history. In both analyses, the group difference was estimated as a fixed effect in a multilevel model that separated variation in delinquency at the within-school level from the between school level. In the multilevel models to measure the effect of AJB on secondary outcomes, Group, Time, and Group*Time effects were estimated with fixed effects, while the variances of individual schools and the within-person variances were modeled with random effects. In the analysis measuring the effect of AJB on aggression, we controlled for age.

At each measurement occasion, we checked for extreme outliers (+/- 3.29 *SD* from the mean; Tabachnik & Fidell, 2013) in the continuous outcome variables. The outliers were then brought back to an acceptable value of +/- 3.29 *SD* from the mean. All continuous variables (i.e., the secondary outcomes) were transformed into standard normal scores (with an overall mean of 0 and a standard deviation of 1). Using this approach, the parameter estimates can be interpreted as a measure of effect (Cohen's *d* for categorical predictors

and correlation coefficient *r* for continuous predictors). All analyses were tested one-sided, except for the tests on T0-differences between intervention and control group. Values of $p < .05$ were considered as statistically significant.

An intention-to-treat analysis (ITT) was employed; that is, all participants who were included in the study at T0 were also included in the analyses, regardless of whether they had dropped out. By performing ITT analysis, we avoided the problem of overestimated effectiveness, which may be created by omitting dropouts (Kruse et al., 2002).

Results

Effects of AJB on Juvenile Delinquency

Table 4.2 presents the descriptions of juvenile delinquency prior to T0 (i.e., criminal history) and juvenile delinquency during the 16 months after T0 (i.e., delinquent outcome). Table 4.3 shows the results of the multilevel analyses concerning the group effect on delinquent outcomes, while controlling for criminal history and age.

Table 4.2 *Descriptions of Police Registration as a Suspect for Both Groups*

		Criminal history[a]		Delinquent outcome[b]	
	N	%	*M* (*SD*)	%	*M* (*SD*)
Intervention group	245	15.5	0.23 (0.73)	11.0	0.20 (0.84)
Control group	119	10.1	0.15 (0.51)	15.1	0.23 (0.66)

[a] Police registrations as a suspect during the two years prior to T0
[b] Police registrations during the 16 months after T0

Table 4.3 *Parameter Estimates of the Multilevel Models Concerning the Effect of Group on Juvenile Delinquency*

	Registered as suspect (yes/no)					Number of registrations as suspect				
	Estimate	SE	*t*	*p*[a]	*OR*	Estimate	SE	*t*	*p*[a]	*OR*
Group[b]	-0.61	0.35	-1.73	**.042**	0.542	-0.43	0.24	-1.78	**.039**	0.654
Criminal history	1.86	0.36	5.12	**.000**	6.411	0.55	0.04	13.37	**.000**	1.725
Age	0.28	0.18	1.59	.057	1.327	0.18	0.12	1.413	.080	1.191

Note. Bold emphasis: $p < .05$; OR = Odds ratio.
[a] One-sided *p-values*
[b] Control group = 0; intervention group = 1.

A significant group effect was found on the proportion of adolescents that was registered as a suspect, while controlling for criminal history and age. The intervention group had a significantly lower chance of being registered as a suspect than the control group (*OR* =

0.542; *d* = -0.34), which means that the control group was 1.845 times more likely to be registered as a suspect than the intervention group. Additionally, a significant group effect was found for the number of registrations as a suspect, while controlling for criminal history and age. The intervention group had significantly fewer registrations as a suspect than the control group (*OR* = 0.654; *d* = -0.23), indicating that the control group was likely to have 1.529 more registrations as a suspect than the intervention group.

Effects of AJB on Risk and Protective factors of Juvenile Delinquency

Table 4.4 presents the mean scores and standard deviations per group on each secondary outcome variable on all measurement occasions. See Figure 4.1 for the developmental paths over time for both groups. Table 4.5 shows the results of the multilevel analyses concerning Time, Group, and Group*Time interactions on the secondary outcomes. The Group*Time interactions can be interpreted as the effect of AJB.

Conduct problems

There were no significant reductions in teacher reported conduct problems during T0-T1 and T0-T2. The absence of a significant Group effect indicated that across the measurement occasions, the levels of conduct problems were not significantly different for the intervention group and the control group. Further, there were no significant interaction effects for T0-T1 and Group and for T0-T2 and Group, indicating that AJB had no significant effect on conduct problems.

Aggression

The multilevel model on aggression was controlled for age. During T0-T1 and T0-T2, there were no significant reductions in self-reported aggression. Across the measurement occasions, the level of aggression was not significantly different for the two groups. There were no significant interaction effects for T0-T1 and Group and for T0-T2 and Group, which indicated that AJB had no significant effect on aggression.

Acceptance of authority

There were significant improvements over time for self-reported acceptance of authority for T0-T1 (*d* = 0.23) and T0-T2 (*d* = 0.23). The teachers did not report Time effects. The intervention group reported higher levels of acceptance of authority across the measurement occasions than the control group (*d* = 0.28). However, in the teacher reports, this Group effect was not significant. The interaction effects for Time and Group were not significant in both the self-reports and teacher reports, indicating that ABJ did not have a significant effect on acceptance of authority.

Table 4.4 *Means and Standard Deviations of Secondary Outcomes per Group per Measurement Occasion*

	AJB			Control group		
	T0	T1	T2	T0	T1	T2
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Conduct problems						
Teacher report	0.51 (0.51)	0.37 (0.42)	0.26 (0.35)	0.47 (0.47)	0.37 (0.43)	0.33 (0.36)
Aggression						
Self-report	0.51 (0.19)	0.49 (0.21)	0.46 (0.21)	0.55 (0.19)	0.53 (0.20)	0.53 (0.20)
Acceptance of authority						
Self-report	2.68 (0.74)	2.87 (0.62)	2.94 (0.64)	2.49 (0.82)	2.66 (0.69)	2.66 (0.74)
Teacher report	2.56 (0.89)	2.68 (0.82)	2.85 (0.84)	2.61 (0.92)	2.78 (0.82)	2.89 (0.78)
Friends' delinquent behavior						
Self-report	0.30 (0.44)	0.28 (0.41)	0.24 (0.40)	0.44 (0.51)	0.31 (0.44)	0.41 (0.51)
Perceived peer pressure						
Self-report	1.07 (1.06)	0.97 (1.01)	0.76 (0.92)	1.23 (1.07)	0.85 (0.95)	0.77 (0.92)
Resistance to pressure						
Self-report	2.92 (1.06)	3.09 (1.04)	3.20 (1.03)	2.77 (1.11)	2.89 (0.96)	3.15 (0.86)
Teacher report	2.42 (0.90)	2.59 (0.76)	2.79 (0.72)	2.64 (0.82)	2.63 (0.78)	2.69 (0.77)
Prosocial behavior						
Self-report	1.58 (0.36)	1.67 (0.31)	1.76 (0.33)	1.49 (0.38)	1.57 (0.38)	1.63 (0.34)
Teacher report	1.40 (0.47)	1.47 (0.45)	1.53 (0.48)	1.43 (0.48)	1.51 (0.47)	1.55 (0.43)
Academic engagement						
Self-report	2.99 (0.79)	3.17 (0.61)	3.14 (0.74)	2.97 (0.68)	3.08 (0.65)	3.07 (0.63)
Teacher report	2.62 (0.79)	2.77 (0.72)	2.81 (0.73)	2.72 (0.80)	2.83 (0.77)	2.87 (0.78)

Friends' delinquent behavior

The delinquent behavior of friends significantly decreased during T0-T1 (d = .30). Over the course of T0-T2, no significant Time effect was found. There was a significant Group effect (d = -0.31), indicating that across assessments, the intervention group reported to have less delinquent friends than the control group. Further, there were no significant interaction effects for T0-T1 and Group and for T0-T2 and Group, indicating that AJB had no significant effect on the delinquent behaviors of friends.

Perceived peer pressure

The total group showed significant reductions in perceived peer pressure over the course of T0-T1 (d = -0.38), and T0-T2 (d = -0.46). There were no significant group effects. Also, no significant interaction effects for Group and Time were found, which indicated that AJB had no significant effect on reducing peer pressure.

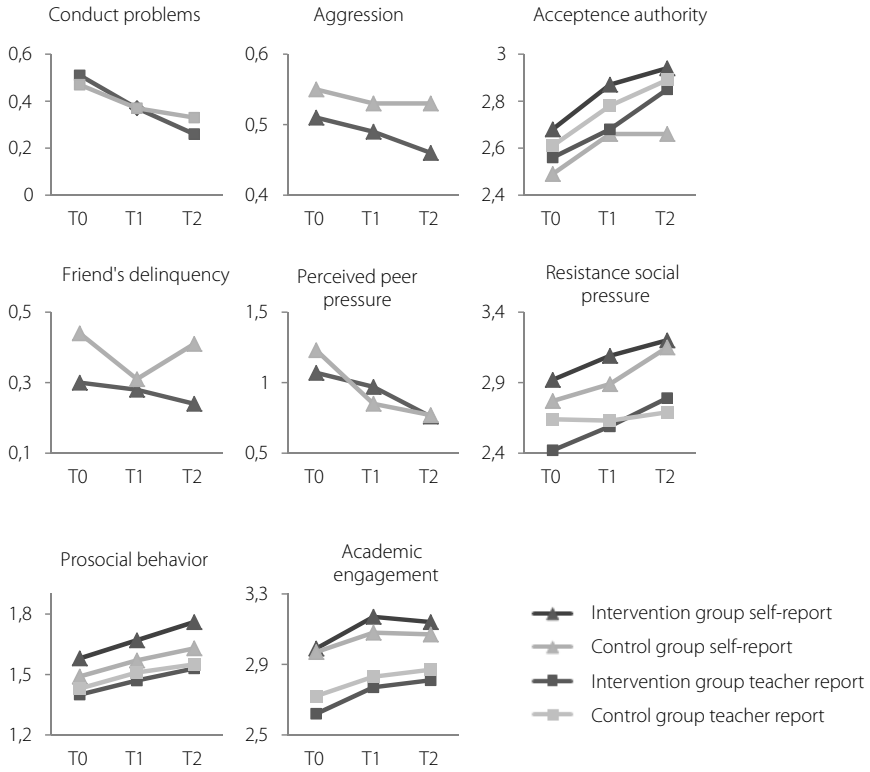

Figure 4.1 *Development over Time for Secondary Outcomes per Group*

Resistance to social pressure

For T0-T1, no significant improvements in self-reported and teacher reported resistance to social pressure were found. For T0-T2, significant improvements were reported by the adolescents (d = 0.36), but not by their teachers. Across measurement occasions, the two groups did not differ significantly in their levels of resistance to social pressure. Further, there were no significant interaction effects for T0-T1 and Group and for T0-T2 and Group, indicating that AJB had no significant effect on resistance to social pressure.

Prosocial behavior

In the self-reports, we found significant improvement of prosocial behavior over time ($d_{T0\text{-}T2}$ = 0.40). No time effects were reported by the teachers. The adolescents in the intervention group reported significantly higher levels of prosocial behavior across assessments (d = 0.31), the teachers reported no significant Group effects. The interaction effects for Time and Group were not significant in both the self-reports and teacher reports, which indicated that ABJ did not have a significant effect on prosocial behavior.

Table 4.5 *Parameter Estimates[a] of the Multilevel Models Concerning the Effects of Time, Group, and Interactions between Time and Group on Secondary Outcomes*

	Conduct problems				**Aggression**				**Acceptance of authority**							
	Teacher report				Self-report				Self-report				Teacher report			
	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*
T0-T1	-0.23	0.19	-1.21	.118	-0.10	0.13	-0.73	.233	0.23	0.13	1.75	**.040**	0.27	0.22	1.21	.118
T0-T2	-0.32	0.19	-1.68	.052	-0.13	0.13	-0.97	.167	0.23	0.14	1.73	**.042**	0.36	0.22	1.62	.058
Group[b]	-0.07	0.17	-0.40	.346	-0.11	0.11	-0.94	.174	0.28	0.12	2.27	**.012**	0.14	0.20	0.74	.233
T0-T1*Group	-0.06	0.24	-0.24	.405	-0.03	0.17	-0.19	.425	0.05	0.16	0.29	.386	-0.13	0.27	-0.49	.684
T0-T2*Group	-0.23	0.23	-1.02	.157	-0.12	0.17	-0.72	.236	0.14	0.17	0.83	.203	-0.02	0.27	-0.09	.533
Age	-	-	-	-	-0.20	0.04	-2.57	**.005**	-	-	-	-	-	-	-	-
	Friends' delinquent behavior				**Perceived peer pressure**				**Resistance to social pressure**							
	Self-report				Self-report				Self-report				Teacher report			
	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*
T0-T1	-0.30	0.16	-1.89	**.036**	-0.38	0.13	-2.90	**.002**	0.12	0.13	0.89	.188	0.05	0.24	0.20	.422
T0-T2	-0.07	0.16	-0.43	.337	-0.46	0.13	-3.53	**.000**	0.36	0.13	2.74	**.003**	0.12	0.23	0.54	.298
Group[b]	-0.31	0.14	-2.18	**.018**	-0.09	0.12	-0.76	.224	0.15	0.12	1.20	.115	-0.14	0.21	-0.65	.261
T0-T1*Group	0.24	0.19	1.22	.884	0.16	0.17	0.98	.834	0.05	0.17	0.27	.395	0.21	0.29	0.72	.238
T0-T2*Group	-0.09	0.20	-0.43	.336	0.29	0.17	1.77	.960	-0.08	0.17	-0.47	.681	0.35	0.28	1.27	.106
	Prosocial behavior								**Academic engagement**							
	Self-report				Teacher report				Self-report				Teacher report			
	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*	Estimate	SE	*t*	*p*
T0-T1	0.24	0.15	1.63	.062	0.23	0.21	1.09	.142	0.16	0.13	1.21	.115	0.15	0.21	0.72	.240
T0-T2	0.40	0.15	2.71	**.008**	0.31	0.21	1.51	.071	0.15	0.14	1.06	.144	0.20	0.20	0.97	.171
Group[b]	0.31	0.13	2.29	**.016**	0.20	0.19	1.07	.146	0.03	0.13	0.27	.396	0.05	0.18	0.25	.404
T0-T1*Group	-0.01	0.18	-0.08	.531	-0.11	0.25	-0.43	.664	0.12	0.16	0.74	.230	0.06	0.25	0.24	.404
T0-T2*Group	0.09	0.19	0.49	.313	-0.04	0.25	-0.14	.556	0.09	0.18	0.49	.310	0.07	0.25	0.27	.395

Note. Bold emphasis: $p < .05$.

[a] Parameter estimates (while controlling for the effects of other parameters) can be interpreted as effect sizes (Cohen's *d* for dichotomous variables and *r* for continuous variables. [b] Control group = 0; intervention group = 1.

Academic engagement

There were no significant improvements in self- and teacher reported academic engagement during T0-T1 and T0-T2. The absence of significant Group effects in self-reports and teacher reports indicated that across the measurement occasions, the levels of academic engagement were not significantly different for the intervention group and the control group. Further, there were no significant interaction effects for T0-T1 and Group and for T0-T2 and Group, indicating that AJB had no significant effect on academic engagement.

Discussion

Sports-based crime prevention programs are widely implemented by local governments and institutions all over the world (Cameron & MacDougall, 2000; Caruso, 2011; Kelly, 2013; Nichols, 2007; Sandford, Armour, & Warmington, 2006). Successes of these programs have been reported, but most studies lacked the methodological rigor to draw conclusions about the causal effects of sports-based interventions on juvenile delinquency (Chamberlain, 2013; McMahon & Belur, 2013). Therefore, empirical evidence on the effect of sports-based crime prevention programs is currently lacking. This was the first study to assess the effect of a sports-based intervention on juvenile delinquency and associated outcomes using a quasi-experimental design. AJB is a Dutch sports-based crime prevention program for adolescents at risk for developing delinquent behaviors. During the 16 months after the start of AJB, effects of AJB on juvenile delinquency were found. Adolescents in the intervention group had fewer registrations as a suspect in the police records than the control group (d = -0.34). Additionally, the adolescents of the intervention group had a lower mean number of registrations as a suspect than the control group (d = -0.23). The total sample showed improvements on various risk and protective factors for juvenile delinquency. However, no significant intervention effects of AJB were found on the secondary outcomes.

The current study provides an empirical indication that sports-based crime prevention programs can be effective. This is in line with the expectations that arose from theories of the positive effects of sports on delinquency (Agnew & Petersen, 1989; Shields & Bredemeier, 1995) and is consistent with previous reports on sports-based crime prevention programs (Hartmann & Depro, 2006; McMahon & Belur, 2013; Nichols, 2004; Sandford, Duncombe, & Armour, 2008). The lack of intervention effects on the risk and protective factors for juvenile delinquency was unexpected. When inspecting the effect sizes of the intervention effects on the secondary outcomes, we noticed small, but non-significant effects on several outcomes (for example, d = -0.23 on conduct problems, d = 0.14 on self-reported acceptance of authority, and d = 0.35 on teacher reported resistance to social pressure, see Table 5). Notably, the current study lacked sufficient power to detect small intervention effects on the individual secondary outcomes. Although the intervention effects on the secondary

outcomes were not statistically significant, they may have been clinically relevant (Verdam, Oort, & Sprangers, 2014). The combination of these small effects could have had a cumulative effect on reducing the risk of developing delinquent behaviors, explaining why significant intervention effects were found on delinquent outcomes, but not on the individual risk and protective factors for delinquency. The risk and protective factors for juvenile delinquency should therefore not be perceived as independent influences on delinquency, but in line with systems theory, as "simultaneously occurring, mutually influential, and interrelated phenomena" (Schoenwald & Rowland, 2002, p. 95).

In evaluating the significance of the findings of the current study, it is important to consider both strengths and limitations of the present study. As mentioned before, an important strength is that this is, to our knowledge, the first study that assesses the effects of a sports-based crime prevention program, using a quasi-experimental design. A problem with quasi-experimental designs is that there could be systematic differences between the two experimental groups that could influence study outcomes. However, by statistically ruling out potential threats to internal validity, we conclude that statements about causality are justified. Additionally, no exclusion criteria were formulated, which means that adolescents in the control group may also participated in after-school sports activities. Because of this, the current study evaluated the effect of the specific sports-based intervention, and not so much the effect of sports participation in general. Further, rigorous statistical methods were used to account for the multilevel structure of the data and handling of missing data. Moreover, to assess the effects of AJB on delinquency, we used official police registration data, which constitute a valid and reliable measure of delinquent behavior (Hindelang, Hirschi, & Weis, 1979; Krohn, Thornberry, Gibson, & Baldwin, 2010). Finally, an intention-to-treat analysis (ITT) was used to prevent overestimated intervention effects that may occur when drop-outs are not included in the study (Kruse et al., 2002).

The first limitation that needs to be mentioned is that, because of practical considerations, a quasi-experimental design was used to assess the effects of AJB. As participants were not randomly allocated to the experimental conditions, it is possible that systematic differences between the intervention and control group existed at the start of the study. Although we statistically controlled for potential confounders (including age and initial baseline differences on the outcome variables), RCT-designs are generally perceived as superior to quasi-experimental designs in intervention studies for their ability to reduce selection bias (White, 2010). A second weakness of the study was the drop-out rate in the intervention group, and the missing values associated with drop-out on the secondary outcomes. Participants from special education classes (schools for practical training) were more likely to drop-out from AJB than participants from regular education classes (lower vocational training), which may form a threat to the internal validity of the study. On the other hand, we could obtain police registration data of 98.9% of the participants in the study, including

the drop-outs. Therefore, the issue on the missing values is only a potential problem for the secondary outcomes.

Finally, participants in the control group were recruited at the same schools, or in some cases, even the same classes as the intervention group. While this increased the comparability between the groups, it might have suppressed the estimated intervention effect because of transference (Shadish, Cook, & Campbell, 2002). Although the control group did not participate in AJB, it cannot be ruled out that they indirectly benefitted from the intervention. Over the course of T0-T2, the intervention group showed significant improvements on conduct problems (d = -0.53), aggression (d = -0.24), acceptance of authority (d_{self} = 0.40, $d_{teacher}$ = 0.38), perceived peer pressure (d = -0.30) , resistance to social pressure (d_{self} = 0.27, $d_{teacher}$ = 0.49), prosocial behavior (d_{self} = 0.49, $d_{teacher}$ = 0.28), and academic engagement behavior (d_{self} = 0.22, $d_{teacher}$ = 0.30). Improvements in the intervention group could have indirectly affected the control group through improved school climate and more positive peer interactions (Dishion & Tipsord, 2011; Wissink et al., 2014). This argument also offers an explanation for the lack of intervention effects on secondary outcomes in the current study.

The current study yields important implications for future research and practice concerning sports-based crime prevention programs. Results confirmed the potential of sports-based interventions to prevent juvenile delinquency, which is the first step in the justification of the increasing use of sports-based interventions for at-risk adolescents. However, we do emphasize that the widespread implementation of sports-based crime preventions programs should be followed critically. Group-based interventions for at-risk adolescents, including sports-based crime prevention programs, are vulnerable for increasing anti-social behavior through deviancy training. Deviancy training refers to "the interpersonal dynamic of mutual influence during which youth respond positively to deviant talk and behavior" (Dishion & Tipsord, 2011, p. 189), and is known for its reinforcing effect on delinquency in at-risk peer groups (Dishion & Tipsord, 2011). During the development and implementation of sports-based crime prevention programs, specific attention should be directed to avoid negative peer interaction.

Several scholars have argued that contextual factors are very important in determining the influence of sports on the behavior of adolescents (Côté & Gilbert, 2009; Haudenhuyse, Theeboom, & Coalter, 2012; Ntoumanis, Taylor, & Thøgersen-Ntoumani, 2012; Super, Verkooijen, & Koelen, 2016). For example, Rutten and colleagues (2007) showed that higher quality coach-athlete relationships and better moral atmosphere in teams were related to reduced levels of antisocial behavior and higher levels of prosocial behavior in the adolescent athletes. Guaranteeing a positive socio-moral climate demands a lot of interpersonal skills, pedagogical knowledge and competence of the coach (Côté & Gilbert, 2009; Vierimaa, Erickson, Côté, & Gilbert, 2012). Therefore, sports-based crime prevention

programs for at-risk adolescents should invest in training and education of the coaches (Coakley, 2011; Haudenhuyse, Theeboom, & Skille, 2014; Sandford, Duncombe, & Armour, 2008).

To fully understand the potential effects of sports-based crime prevention programs, more research should be conducted. We emphasize the need for high quality research designs that incorporate measures of the sports context, such as behaviors of the coach, characteristics of the coach-athlete relationship, and socio-moral climate indicators. Additionally, more insight into the mechanisms of change underlying the positive effect on juvenile delinquency of AJB, and sports-based crime prevention programs in general, is needed (Kazdin & Nock, 2003). At this moment, a full understanding on why sports-based interventions could be effective in preventing juvenile delinquency is absent. This could be achieved by mediation analyses, including multiple potential mediators (Kazdin & Nock, 2003).

Conclusions

Despite the common recommendation of youth policy makers to provide community recreation activities to improve youth behavior and prevent juvenile delinquency, the scientific support for sports-based crime prevention programs is weak (Caldwell & Smith, 2006; Chamberlain, 2013; Coakley, 2011). The current study is the first study to assess the effects of a sports-based intervention in the prevention of juvenile delinquency in at-risk adolescents using a quasi-experimental design. The results of the current study indicated positive effects of a Dutch sports-based crime prevention. AJB aimed to create an adequate educational sports environment and positive relationships between coaches and participants. It is concluded that this is an indication that sports-based interventions can be effective in preventing delinquent behaviors if the program is implemented with specific attention given to factors that assure the educational quality of the sports environment (Coakley, 2001). Contrary to the expectations, we did not find significant intervention effects on the risk and protective factors for delinquency in this study. Future research into mechanisms of change in sports-based interventions may provide important knowledge on why sports could be effective in preventing juvenile delinquency and to increase the potential effects of sports-based interventions.