



## Full length article

# A parent-oriented alcohol prevention program “Effekt” had no impact on adolescents’ alcohol use: Findings from a cluster-randomized controlled trial in Estonia

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## ABSTRACT

**Aim:** To evaluate the effectiveness of a universal parent-oriented alcohol prevention program (“Effekt”) in Estonia. The main objective of the program was to delay and reduce adolescents’ alcohol consumption by maintaining parental restrictive attitudes towards adolescents’ alcohol use over time.

**Methods:** A matched-pair cluster randomized controlled trial with a three-year assessment period (baseline (T1), 18-months (T2) and 30-months (T3) follow-ups) was undertaken in 2012–2015 among 985 fifth grade adolescents and 790 parents in sixty-six schools (34 intervention, 32 control). The primary outcome measure was adolescents’ alcohol use initiation. Secondary outcome measures were lifetime drunkenness and alcohol use in the past year. Intermediate outcomes were restrictive parental attitudes towards adolescents’ alcohol use reported by parents and perceived restrictive parental attitudes and parental alcohol supply reported by adolescents.

**Results:** There were no significant differences in adolescents’ alcohol use initiation, lifetime drunkenness, alcohol use in the past year, parental alcohol supply, and adolescent’s perception of parental restrictive attitudes between intervention and control school participants at T2 and T3. There were significant differences in parental attitudes – the odds of having restrictive attitudes were 2.05 (95% confidence interval (CI) = 1.32–3.17) times higher at T2 and 1.92 (95% CI = 1.31–2.83) times higher at T3 in the intervention group than in the control group.

**Conclusions:** The Estonian version of the “Effekt” program had a positive effect on parental attitudes, but it did not succeed in delaying or reducing adolescents’ alcohol consumption.

## 1. Introduction

Alcohol use is high in Europe – 66% of the population aged 15 and older have consumed alcohol in the past 12-months, and 17% are heavy episodic drinkers (World Health Organization, 2014). Use is typically initiated in adolescence, when attitudes and behaviors develop, and is often associated with increased autonomy and proving oneself to others (Brown et al., 2008; Schulenberg and Maggs, 2002). According to the 2013/14 Health Behaviour of the School-aged Children study (Inchley et al., 2016), 27% of 15-year-old students have ever consumed alcohol, and 8% have been drunk by the age of 13. Alcohol use prevalence among adolescents in Estonia is considerably higher than in most other

European countries. Nearly one in two (49%) 15-year-olds have consumed alcohol, and 19% have been drunk by the age of 13 (Aasvee and Rahno, 2015). Initiation at an early age is related to several negative outcomes, e.g., development of health problems, injuries, early sexual behavior and delinquent behavior (Newbury-Birch et al., 2009). In addition, alcohol has a serious negative impact on brain development (Bava and Tapert, 2010; Brown et al., 2000) which continues up until the mid-twenties (Giedd et al., 1999; Mills et al., 2014).

Primary socialization theory (Oetting and Donnermeyer, 1998) postulates that parents are one of the main sources for children when learning norms, values, and behaviors. Children tend to imitate their parents to receive recognition and to be perceived more like adults

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(Kohlberg, 1984). Kindergarten children who role play adults are more likely to buy alcohol and cigarettes if their parents drink alcohol or smoke (Dalton et al., 2005). This suggests that children who see drinking and smoking at home might be more prone to trying it out themselves. However, not only witnessing parents' drinking influences drinking behavior (Rossow et al., 2016; Yap et al., 2017); several other parental factors are related, including the provision of alcohol, attitudes, the quality of parent-child relationship, parenting style, monitoring, support and involvement (Čablová et al., 2014; Kaynak et al., 2014; Sharmin et al., 2017; Yap et al., 2017). Targeting parents and related factors in programmes to prevent and reduce adolescents' alcohol use has shown positive lasting results (Bo et al., 2018; Foxcroft and Tsertsvadze, 2011a; Smit et al., 2008), in comparison to student-oriented programs that in general have not shown effectiveness (Foxcroft and Tsertsvadze, 2011b; Jones et al., 2007). Favorable aspects covered in effective parent-focused interventions include rule-setting, monitoring and parent-child communication (Kuntsche and Kuntsche, 2016).

This article focuses on the parent-oriented program “Effekt” (formerly known as the Örebro Prevention Programme) which was developed in Sweden at the end of the 1990s (Koutakis, 2011; Koutakis et al., 2008). The main objective is to delay and reduce adolescents' alcohol use by maintaining parental restrictive attitudes towards adolescents' alcohol use over time. The program has so far been evaluated in Sweden (Bodin and Strandberg, 2011; Koutakis et al., 2008; Özdemir and Koutakis, 2016; Strandberg and Bodin, 2011) and the Netherlands (Koning et al., 2013, 2012, 2011a, 2011b, 2009; Verdurmen et al., 2014), resulting in equivocal findings on adolescents' alcohol use. The developers of the program found it effective in reducing the frequency of drunkenness ( $d = 0.35$ ) (Koutakis et al., 2008) and the onset of monthly drunkenness, mediated by parental attitudes (Özdemir and Koutakis, 2016). However, in a much larger evaluation of the program in a different Swedish sample no evidence was found that the program was effective in delaying use (odds ratio (OR) = 0.99, 95% confidence interval (CI) = 0.61–1.60) or reducing drunkenness (OR = 1.07, 95% CI = 0.79–1.44) (Bodin and Strandberg, 2011). In an evaluation in the Netherlands, where the number of meetings was reduced from the original six to two, only a combined intervention targeting both parents and students directly had a positive effect on delaying heavy weekly alcohol use (Koning et al., 2013 2011a, 2011b, 2009; Verdurmen et al., 2014). Interventions targeting parents and students separately had no effect on adolescents' alcohol use.

The idea to implement an alcohol prevention program in Estonia emerged in 2011 after several schools approached the National Institute for Health Development to request a systematic and sustainable solution to prevent and reduce adolescents' alcohol use. A systematic review (Foxcroft and Tsertsvadze, 2011a) published the same year indicated that family-based prevention programs had shown promising results. If effective, a parent-focused intervention could be potentially a lower cost intervention than a combined parent and adolescent-focused intervention. Therefore, it was important to identify if a parent only intervention would be effective, before rolling out a program across the entire country. Criteria applied when selecting the program to implement were: 1) low long-term costs, 2) administratively easy to implement, 3) time efficient (from parents' and teachers' perspective), 4) promising results on reducing and delaying alcohol use. “Effekt” met the criteria most closely and was initiated in 2012. Throughout the implementation process, the content of the program was adjusted by extending the topics on alcohol use and parenting and by increasing the interaction between parents and trainers.

The aim of the present study was to evaluate the effectiveness of the “Effekt” program, modified for the cultural context in Estonia. Specifically, it was examined whether allocation to the intervention had an effect on adolescents' alcohol use, alcohol supply by parents, and parental attitudes.

## 2. Methods

A matched-pair cluster-randomized controlled trial was conducted among adolescents and their parents in 2012–2015. The trial was approved by the Tallinn Medical Research Ethics Committee (KK2710, 19.04.12).

### 2.1. Recruitment, allocation and participants

In May 2012 all Estonian speaking schools in the Network of Health Promoting Schools (NHPS) that had at least seven grades received an electronic invitation to participate in the trial (schools for children with special needs were excluded). Out of 138 schools that met the criteria, 68 (49.3%) agreed to participate. All parallel classes in fifth grade were included. To allocate schools to groups, pairs and triplets were compiled, based on schools' and classes' (5th grades) size and spatial proximity (Figure S1). An online program “Research Randomizer” (Urbaniak and Plous, 2007) was used to randomly allocate school(s) from each pair/triplet to intervention or control group. Immediately after randomization two control schools withdrew. Due to this change, out of 66 remaining schools, 34 received the intervention, and 32 schools were control schools.

All parents received a consent form to confirm adolescents' (n = 2246) participation in the trial. Out of 2246 parents (one parent per household), 35.5% did not give their consent, and 18.4% did not send the form back (Fig. 1). The baseline assessment (T1) was carried out in September–October 2012, the first follow-up at 18 months (T2) and the second follow-up at 30 months (T3). Students completed self-report questionnaires during one school lesson. Each student received a sealed envelope with a prepaid envelope and a parent's questionnaire inside to take home. Unique sequence numbers were used to link parent's and adolescent's data.

The final number of students and parents participating at T1 was 985 and 790, respectively (43.9% and 35.2% of the whole sample) (Table S1). All participants who completed questionnaires at T1 were invited to participate at T3, irrespective of their participation at T2.

### 2.2. Intervention

The universal parent-oriented alcohol prevention program targeted parents, whose children were 11–13 years old (grades 5–7). Six meetings, two meetings per year (autumn and spring) were held at all schools by qualified trainers, who underwent intensive training throughout the program. The mean number of meetings in the 34 intervention schools (60 classes) was 4.78 (SD = 1.30). Out of 60 classes, 22 received all six meetings, 19 received five, seven received four, 10 received three, one received two and one did not receive any meetings. Participation rates varied (14.0–47.1%, N = 1139), being higher in the autumn. After each meeting teachers received a summary by e-mail and forwarded it to all parents in the class, irrespective of their participation in the meeting (prerequisite was that the meeting had taken place). Twice a year parents also received two-page newsletters. The objective of the meetings and newsletters was to increase parents' knowledge and awareness of children-related alcohol topics and parenting skills (Table 1). Three main messages were repeated in all the meetings and newsletters: 1) talk to your child (general communication, including alcohol); 2) do not offer alcohol to your child; 3) express clearly your restrictive attitudes towards children's alcohol use. In addition, parents were encouraged to make agreements with other parents in the class to support children's development; agreements were included in the meetings' summaries.

The feedback from parents and trainers after the first two meetings implied that the repetition of the content – as done in the original program – created reluctance among parents to participate in the following meetings. The main messages and making agreements were kept the same as in the original program, but the content was modified (e.g.,

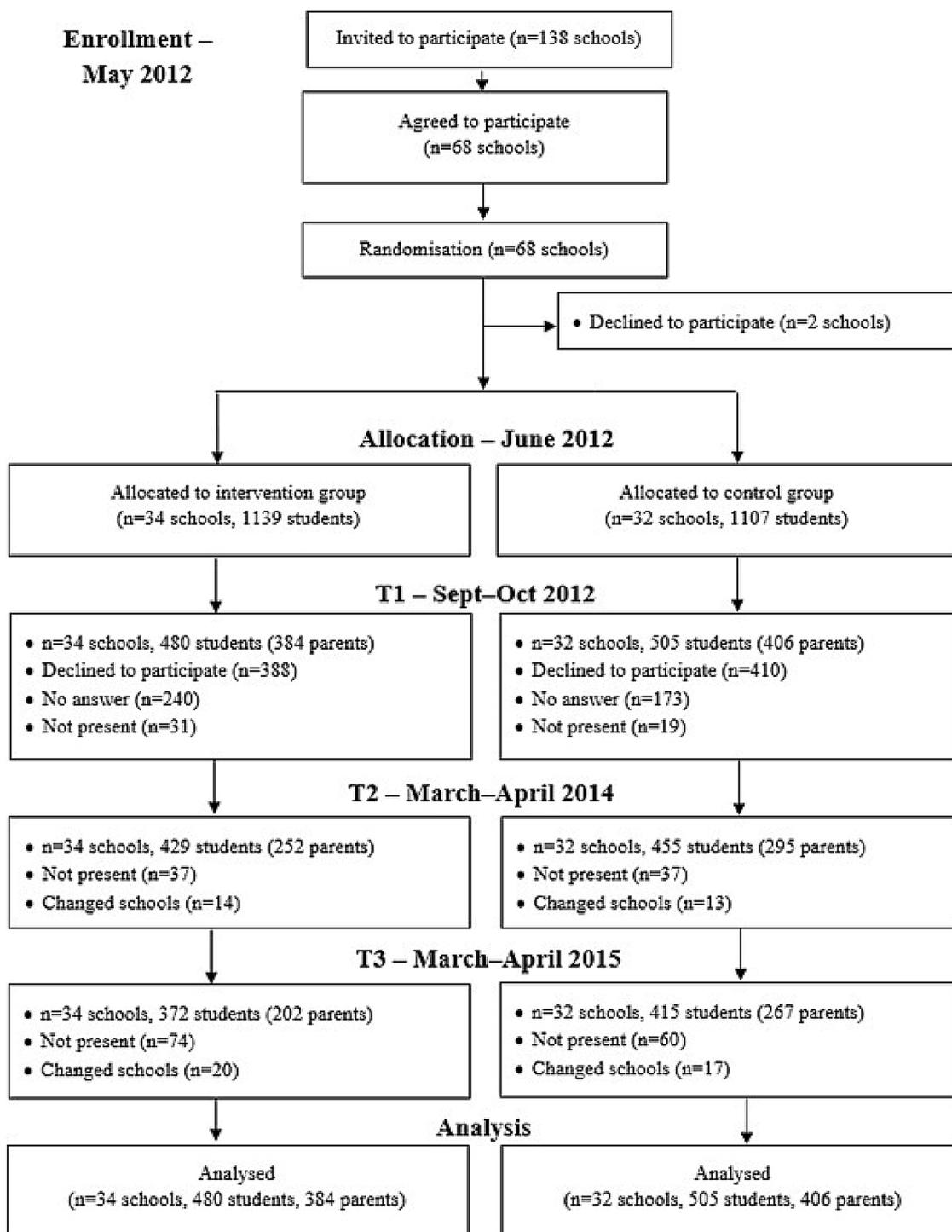


Fig. 1. Consolidated Standards of Reporting Trials (CONSORT) 2010 flow diagram.

additional topics, more emphasis on discussion, roleplay) after the second meeting. Involving a team of experts (e.g., family therapists, psychologists, educational scientists, teachers, and public health experts) ensured the topics covered in the program were age appropriate.

2.3. Measures

Identical questionnaires were used for all adolescents. Parents' questionnaires at intervention schools had minor differences (i.e., additional questions related to the program) from those in control schools. All sociodemographic and socioeconomic characteristics are described

in Table 2.

2.3.1. Primary outcome

The primary outcome was adolescents' alcohol use initiation indicator used in the Health and Behaviour of School-aged Children study (Aasvee and Minossenko, 2011) – "Have you ever tried an alcoholic beverage (more than a sip)? Yes/no".

2.3.2. Secondary outcomes

Secondary outcomes included: 1) adolescents' past year alcohol use – "How frequently have you consumed the following alcoholic

**Table 1**  
Topics covered in the meetings and/or newsletters.

	Meeting and newsletter	Meeting only	Newsletter only
Autumn 2012	Introduction of the programme Parents' role in prevention (main messages) Alcohol use consequences among youth Parental alcohol supply	Statistics on alcohol use Programme's results in Sweden	Reasons why adolescents drink
Spring 2013	Parents' role in prevention (main messages) Alcohol use consequences among youth Communication (e.g. how and what to talk about alcohol)	Introductory exercise "Which factors influence adolescents' alcohol use the most and what can parents do about that?" Programme's results in Sweden	Energy drinks
Autumn 2013	Parents' role in prevention (main messages) Importance of recreational activities	Introductory exercise "Do you agree with the following statements on alcohol supply?" Statistics on alcohol related accidents Programme's results in Sweden	Cannabis and alcohol Snus Is adolescents' alcohol use inevitable?
Spring 2014	Parents' role in prevention (main messages) Parenting styles	Initial results from the Estonian study Demonstration and practice of solving a problematic situation	Reasons why adolescents drink Child's self-esteem and assertiveness E-cigarettes
Autumn 2014	Parents' role in prevention (main messages) Alcohol advertisements Alcohol and the brain	Analysis of an alcohol advertisement	How to talk to the child about alcohol use related risks?
Spring 2015	Parents' role in prevention (main messages) Peer pressure and group norms	How to handle peer pressure – roleplay with parents	How to act, when the parent sees another child behaving delinquently? How to plan the 9 <sup>th</sup> grade graduation party?

beverages (beer, wine, strong alcohol, light alcoholic beverages and cocktails) in the last 12 months? Never/seldom/every month/week/day". This measure was dichotomized (irrespective of beverage type) into have not consumed versus have consumed alcohol in the past year; 2) adolescents' lifetime drunkenness – "Have you ever consumed so much alcohol that you got drunk? No, never/ yes, once/2–3 times/4–10 times/more than 10 times" (Currie et al., 2012). This measure was dichotomized into never versus at least once. Both measures were dichotomized due to very low rates of monthly and more frequent alcohol use and being drunk more than once.

### 2.3.3. Intermediate outcomes

Intermediate outcomes included: 1) parental alcohol supply – "From where have you usually acquired alcoholic beverages?". Two options – parent(s) gave to try and parent(s) allow(s) alcohol use – were combined and dichotomized (yes/no); 2) parental attitudes towards adolescents' alcohol use – "At what age do you feel adolescents could try an alcoholic drink for the first time (at least one sip)?" The item was dichotomized into below 18 (lenient) versus 18 and over (restrictive); 3) adolescents' perception of parental attitudes – "How do your parents feel about adolescents your age consuming alcohol? Bad/neutral/tolerant/I do not know". This measure was dichotomized into at least one parent has restrictive ("bad") attitudes versus neither parent has restrictive attitudes.

### 2.4. Sample size and power analysis

As part of the study design, an emphasis was placed on identifying schools with a low likelihood of dropping out; therefore, schools from the NHPS were included. The project team estimated that compared to non-NHPS schools, the NHPS schools are more likely to participate in the program for three years and also to support and motivate parents. However, this was a somewhat limited pool of schools, and the evaluation was dependent on schools opting into the trial, which reduced control over the sample size. Therefore, a formal sample size calculation was not undertaken. A similar approach was reported by Streimann et al. (2017) as it is difficult to include a large number of schools in trials in Estonia.

### 2.5. Data analysis

Statistical analysis was carried out using Stata version 14.2 for Windows (StataCorp, 2015). Pearson's Chi-squared test and Fisher's exact test were used to assess the relationship between baseline characteristics and non-participation at T2 and T3. As the sample consisted of matched pairs, Pearson correlation analysis was performed to assess the need to take into account the design in the following analysis. The correlation between members of pairs regarding alcohol use initiation at T1 was very weak; therefore, the pairs were broken and the analysis performed was unmatched (Diehr et al., 1995; Donner et al., 2007). Two-level logistic regression was performed to account for school-level clustering when estimating how intervention condition predicted adolescents' alcohol use, parental alcohol supply and parental attitudes at T2 and T3. The alcohol use initiation and lifetime drunkenness models included only adolescents who had not initiated specific behavior at T1. All models were adjusted to account for background characteristics at the exact follow-up and random effect for school. In addition, all models except alcohol use initiation and lifetime drunkenness were adjusted to account for the baseline outcome measure. The number needed to treat was calculated as the inverse of the risk difference (Cook and Sackett, 1995) if the intervention condition predicted a statistically significant change in outcomes.

Separate models were created to assess if pre-specified attitude related measures might act as mediators. At first, it was assessed if parental attitudes at T2 and perception of parental attitudes at T3 predict alcohol use initiation at T3 among students who had not initiated alcohol use at T1 (Table S2). Thereafter multilevel generalized structural equation modeling (StataCorp, 2013) was performed only with the former indicator, as the latter did not predict alcohol use initiation at T3.

Bayes Factor (West, 2016) was computed for the primary outcome using an online calculator (Dienes, 2018). Half-normal distribution, with the mode set to 0 (indicating no effect), one-tailed and standard deviation equal to the expected effect size (OR = 0.71, 95% CI = 0.54–0.94; obtained from a meta-analysis by Smit and colleagues (Smit et al., 2008)) was used for prediction. Additional two-level logistic regression was carried out to assess the dose-response relationship between the number of meetings and outcome measures at the intervention schools.

**Table 2**  
Baseline characteristics of the sample.

School level	Intervention (n = 34)	Control (n = 32)
Area <sup>a</sup> , n (%)		
Tallinn	8 (23.5)	4 (12.5)
Urban	14 (41.2)	15 (46.9)
Rural	12 (35.3)	13 (40.6)
School size, mean (SD)	411.79 (265.54)	423.91(401.56)
Cluster size, mean (SD)	14.12 (8.29)	15.78 (15.77)
Individual level	Intervention (n = 480)	Control (n = 505)
<b>Students</b>		
Girls, n (%)	243 (50.6)	260 (51.5)
Age, n (%)		
10yo	24 (5.0)	29 (5.7)
11yo	430 (89.6)	442 (87.5)
12yo	25 (5.2)	32 (6.3)
Missing	1 (0.2)	2 (0.4)
Area, n (%)		
Capital	135 (28.1)	137 (27.1)
Urban	269 (56.0)	311 (61.6)
Rural	76 (15.8)	57 (11.3)
Family income		
Good	318 (66.3)	345 (68.3)
Average	147 (30.6)	148 (29.3)
Bad	9 (1.9)	7 (1.4)
Missing	6 (1.3)	5 (1.0)
Nuclear family, n (%)		
Nuclear	319 (66.5)	346 (68.5)
Non-nuclear	154 (32.1)	157 (31.1)
Missing	7 (1.5)	2 (0.4)
<b>Parents</b>		
Participation, n (%)	384 (80.0)	406 (80.4)
Gender		
Female	349 (72.7)	369 (70.1)
Male	31 (6.5)	32 (6.3)
Missing	100 (20.8)	14 (20.6)
Family income, n (%)		
Good	90 (18.8)	101 (20.0)
Average	256 (53.3)	266 (52.7)
Bad	33 (6.9)	38 (7.5)
Missing	101 (21.0)	100 (19.8)
Parents' education, n (%)		
At least one has higher education	154 (32.1)	201 (39.8)
No parent has higher education	225 (46.9)	200 (39.6)
Missing	101 (21.0)	104 (20.6)

<sup>a</sup> Capital–Tallinn, urban–1000+ inhabitants, rural–less than 1000 inhabitants. SD = standard deviation.

“Logical” imputation was used on alcohol use initiation and lifetime drunkenness to treat inconsistencies and replace missing values based on longitudinal data (Table S3). This approach was not used on past year alcohol use and parental alcohol supply, as the answers from one wave were not logically dependent on the previous one(s) (Table S4). Table S5 shows the distribution of missing data among variables. The missing data on outcomes were handled under four scenarios (Bodin and Strandberg, 2011): 1) completers only, 2) missing data treated as negative (no) – best case scenario, 3) missing data treated as positive (yes) – worst case scenario, 4) multiple imputation. The latter was performed via fully conditional specification for multilevel data under missing at random assumption in Blimp 1.0 (Enders et al., 2017; Keller and Enders, 2017). To reduce the sampling variability, 100 datasets were created, an imputed data set was created after every 1000<sup>th</sup> computational cycle, and 1000 iterations were performed before saving the first set. The seed value was set at 90,291. Additional options incorporated in the imputation were: 1) the Gibbs option – used when some clusters might have few or no cases, 2) common residual variance for all clusters, 3) cluster means as additional predictors. All variables with missing data were included in the multiple imputation process.

### 3. Results

#### 3.1. Baseline characteristics

The students' sample (n = 985) consisted of 51.1% of girls at T1 (Table 2). Most of the participants were 11-years old (88.5%) and lived in urban areas (86.5%). The parents' sample (n = 790) consisted of 90.9% of females at T1. Almost half (44.9%) of the participating parents had higher education (i.e., a degree from the university) at T1.

#### 3.2. Attrition analysis

At T2 884 students (89.7% of baseline) and 547 parents (55.5% of baseline) completed study measures (Table S1). At T3 the rates were 79.9% and 47.6%, respectively. Non-participants in the intervention group differed ( $p \leq 0.05$ ) from completers at both follow-ups by family structure, alcohol use initiation, past year use and lifetime drunkenness and at T3 by alcohol supply by parents (Table S6). Non-participants in the control group differed from completers at T2 by alcohol use initiation, lifetime drunkenness and parents' perception of family wealth, and at T3 by living area and alcohol use initiation.

#### 3.3. Primary outcome

Around 30% of students had initiated alcohol use at the baseline (Table 3), and over time the proportion of new initiators increased (Fig. 2), but there were no statistically significant differences between groups (T2 – OR = 1.21, 95% CI = 0.81–1.81; T3 – OR = 0.87, 95% CI = 0.59–1.29) (Table 4). Adjusting the model for background

**Table 3**

Baseline rates of primary, secondary and intermediate outcomes by intervention condition.

	Intervention (n = 480)	Control (n = 505)
<b>Students</b>		
Alcohol use initiation, n (%)		
Yes	126 (26.3)	154 (30.5)
No	352 (73.3)	350 (69.3)
Missing	2 (0.4)	1 (0.2)
Lifetime drunkenness, n (%)		
Yes	16 (3.3)	19 (3.8)
No	464 (96.7)	485 (96.0)
Missing	0 (0.0)	1 (0.2)
Alcohol use in the past 12 months, n (%)		
Yes	104 (21.7)	143 (28.3)
No	371 (77.3)	361 (71.5)
Missing	5 (1.0)	1 (0.2)
Alcohol supply by parents, n (%)		
Yes	136 (28.3)	144 (28.5)
No	342 (71.3)	360 (71.3)
Missing	2 (0.4)	1 (0.2)
Perception of parental attitudes towards adolescents' alcohol use, n (%)		
At least one with restrictive attitude	342 (71.3)	368 (72.9)
None with restrictive attitude	114 (23.8)	118 (23.4)
Missing	24 (5.0)	19 (3.8)
<b>Parents</b>		
Attitudes towards adolescents' alcohol use <sup>a</sup> , n (%)		
Lenient	238 (49.6)	283 (56.0)
Restrictive	114 (23.8)	95 (18.8)
Missing	128 (26.7)	127 (25.2)

<sup>a</sup> Parental attitudes towards adolescents' alcohol use was measured by asking parents the age, when adolescents could try an alcoholic drink for the first time (at least one sip), age below 18 implies lenient attitudes and age at 18 or over implies restrictive attitudes.

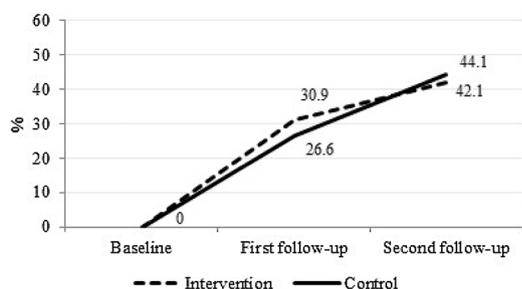


Fig. 2. Alcohol use initiation rates at T1, T2 and T3 at the intervention and control schools among adolescents who had not initiated alcohol use at T1 (N<sub>intervention</sub> = 352/333/280, N<sub>control</sub> = 350/331/297).

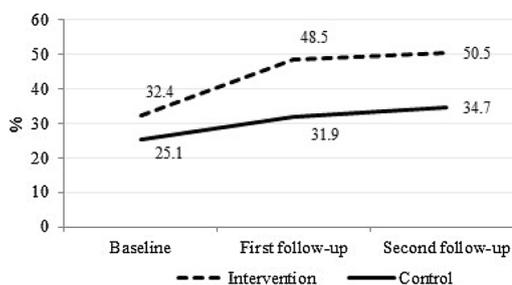


Fig. 3. Restrictive parental attitudes towards adolescents' alcohol use among parents at T1, T2 and T3 at the intervention and control schools (N<sub>intervention</sub> = 352/237/188, N<sub>control</sub> = 378/213/159).

characteristics did not change the results (Table S7). The Bayes Factor at T2 was 1.11 and at T3 0.88, which indicates the program to be more likely ineffective than effective in delaying alcohol use initiation (Beard et al., 2016).

### 3.4. Secondary and intermediate outcomes

There were no statistically significant differences between groups regarding their past year alcohol use, lifetime drunkenness, parental alcohol supply and perception of parental attitudes (Table 4, Figures S2–5).

The proportion of parents with restrictive attitudes towards alcohol use increased over time in both groups (Fig. 3), and the intervention condition predicted restrictive attitudes at T2 (OR = 2.05, 95% CI = 1.32–3.17) and T3 (OR = 1.92, 95% CI = 1.31–2.83).

The results of the mediation analysis indicate that intervention condition did not have a direct effect on adolescents' alcohol use at T3 ( $\beta = 0.04$ , SE = 0.28,  $p = 0.87$ ), but did have an effect on parental attitudes at T2 ( $\beta = 0.78$ , SE = 0.24,  $p \leq 0.01$ ) and the latter had an effect on adolescents' alcohol use at T3 ( $\beta = -0.60$ , SE = 0.26,  $p \leq 0.05$ ). Alcohol use initiation may also have been indirectly affected by parental attitudes, but this was not significant at the 5% level ( $\beta = -0.47$ , SE = 0.25,  $p = 0.06$ ); the total effect was not statistically significant ( $\beta = -0.43$ , SE = 0.35,  $p = 0.22$ ).

### 3.5. Dose-response relationship

The number of meetings was not significantly associated with outcome measures at T2 and T3 (Tables S8–9).

Table 4

Unadjusted two-level logistic regression models on the effect of intervention condition on primary, secondary and intermediate outcomes at T2 and T3.

	T2					NNT	T3					NNT
	N	ICC	OR	95% CI	P		N	ICC	OR	95% CI	P	
Alcohol use initiation <sup>a</sup>												
Completers	664	0.04	1.21	0.81–1.81	0.36	–	577	0.03	0.87	0.59–1.29	0.49	–
Best case	705	0.04	1.23	0.83–1.84	0.30	–	705	0.04	0.82	0.56–1.19	0.30	–
Worst case	702	0.04	1.17	0.80–1.71	0.41	–	702	0.02	1.02	0.73–1.42	0.92	–
MI	702	0.04	1.20	0.80–1.81	0.37	–	702	0.04	0.88	0.59–1.31	0.52	–
Lifetime drunkenness <sup>b</sup>												
Completers	871	0.11	0.97	0.51–1.84	0.92	–	721	0.05	1.10	0.69–1.75	0.69	–
Best case	950	0.11	0.93	0.49–1.77	0.84	–	950	0.07	1.00	0.63–1.61	0.99	–
Worst case	949	0.07	1.00	0.63–1.58	1.00	–	949	0.01	1.25	0.94–1.66	0.13	–
MI	949	0.13	0.94	0.50–1.79	0.85	–	949	0.08	1.06	0.66–1.72	0.80	–
Past year use												
Completers	862	0.06	0.94	0.64–1.39	0.77	–	733	0.06	0.80	0.54–1.20	0.29	–
Best case	985	0.05	0.96	0.67–1.37	0.81	–	985	0.06	0.74	0.51–1.08	0.12	–
Worst case	985	0.06	0.92	0.65–1.32	0.67	–	985	0.02	0.98	0.72–1.33	0.90	–
MI	985	0.05	0.96	0.67–1.39	0.84	–	985	0.07	0.86	0.57–1.29	0.46	–
Alcohol supply												
Completers	940	0.06	1.02	0.70–1.49	0.92	–	880	0.01	0.76	0.55–1.03	0.07	–
Best case	985	0.05	1.01	0.70–1.45	0.97	–	985	0.01	0.73	0.54–0.98	<b>0.04</b>	17
Worst case	985	0.06	1.05	0.72–1.52	0.80	–	985	0.02	0.86	0.64–1.16	0.33	–
MI	985	0.06	1.02	0.70–1.49	0.91	–	985	0.01	0.72	0.53–1.00	<b>0.05</b>	16
Parental attitudes												
Completers	510	0.05	2.05	1.32–3.17	< <b>0.01</b>	6	436	0	1.92	1.31–2.83	< <b>0.01</b>	6
Best case	985	0.03	1.72	1.22–2.42	< <b>0.01</b>	9	985	0	1.97	1.47–2.64	< <b>0.01</b>	8
Worst case	985	0.01	1.50	1.08–2.09	<b>0.02</b>	15	985	0.02	1.20	0.84–1.73	0.31	–
MI	985	0.11	1.81	1.09–3.02	<b>0.02</b>	7	985	0.09	2.03	1.22–3.38	< <b>0.01</b>	6
Perception of attitudes												
Completers	869	0	1.25	0.86–1.82	0.24	–	778	0	1.11	0.77–1.59	0.59	–
Best case	985	0	1.27	0.88–1.85	0.20	–	985	0	1.20	0.84–1.70	0.31	–
Worst case	985	0.01	1.05	0.77–1.43	0.77	–	985	0.02	0.87	0.64–1.17	0.34	–
MI	985	0	1.24	0.84–1.82	0.28	–	985	0	1.05	0.72–1.55	0.79	–

<sup>a</sup> Among adolescents who had not initiated alcohol use at T1.

<sup>b</sup> Among adolescents who had not been drunk at T1. MI = multiple imputation.

## 4. Discussion

### 4.1. Summary of main findings

The “Effekt” program was the first universal parent-oriented alcohol prevention program to be implemented in Estonia. Assessing the program in the North-Eastern-European cultural context gives valuable input on its adaptability to other countries with high rates of adolescents’ alcohol use. It was expected that the program would help to delay and reduce adolescents’ alcohol use by maintaining parental restrictive attitudes over time. However, while the intervention appeared to increase parents’ restrictive attitudes towards adolescents’ alcohol use, it did not influence adolescents’ behavior. Similar results regarding parental attitudes have been presented in all previous studies (Koning et al., 2011b; Koutakis et al., 2008; Özdemir and Koutakis, 2016; Strandberg and Bodin, 2011; Verdurmen et al., 2014), in addition, two, rather than six meetings have been suggested to be enough to see a change in attitudes (Bodin and Strandberg, 2011; Koning et al., 2009). Equivocal results have been presented on the program’s effect on adolescents’ alcohol use (see Introduction).

### 4.2. Comparability with previous studies

The Estonian findings are not directly comparable with other studies that have evaluated the “Effekt” program as the content of the program was modified. It was important to adjust the program to the current situation in Estonia and to ensure that parents would attend the meetings, without changing the main messages and the format. Similarly, there were changes incorporated in the Dutch version by reducing the number of meetings from six to two (Koning et al., 2009). Additionally, the emphasis of the program was mainly on prevention and therefore it was started among fifth graders (~11-years-old), while the Dutch version of the program was started among adolescents with mean age of 12.6 (Koning et al., 2009) and the Swedish version among seventh graders (~13-years-old) (Koutakis et al., 2008). This resulted in choosing different outcome measures that addressed the initiation aspect of alcohol use, while previous studies focused more on heavy drinking and frequency of use. One study investigated the effect of the program on lifetime drunkenness and concluded that there was no significant effect (Bodin and Strandberg, 2011).

### 4.3. Key considerations

Although parental attitudes were influenced by the program in Estonia, it is not clear why this did not translate into an effect on adolescents’ alcohol use. Reasons for this could include the program starting too late – around 30% of the participants had already initiated alcohol use at T1; thus, they might have influenced other classmates. At the same time, evidence suggests that despite the increasing influence of peers’, the role of parents does not decrease over time (Wood et al., 2004). Furthermore, due to low participation rate in the meetings, many parents did not have direct contact with other parents and trainers and thereby lacked behavioral practice (Michie et al., 2014), although all parents received the summaries and newsletters, irrespective of their participation. Another reason could be having parents as the main target group, as combining student- and parent-oriented programs have shown more promising results (Newton et al., 2017; Van Ryzin et al., 2016). To predict future behavior, attitudes have to be stable over time (Glasman and Albarracín, 2006), nevertheless it has been shown that when adolescents mature, parents become more lenient towards adolescents’ alcohol use (Glatz et al., 2012; Kelly et al., 2011; Özdemir and Koutakis, 2016; Prins et al., 2011; Zehe and Colder, 2014). However, the results from the current trial show that parents in the control group did not become more lenient over time, but compared to the intervention group still had a significantly lower prevalence of restrictive attitudes. Also, if attitudes play a part in changing behavior,

there might be other factors involved (e.g., behavioral intentions, perceived behavioral control, subjective norms) (Ajzen and Fishbein, 2005). Additionally, adolescents’ alcohol use is a multifaceted behavior, influenced by several factors in addition to family’s role, e.g., personal characteristics, environmental, social and cultural factors (Koning et al., 2009; Maggs and Staff, 2018; Velleman et al., 2005). Finally, the main focus of the program was on alcohol, while several researchers (Bo et al., 2018; Foxcroft and Tsertsvadze, 2011a; Kuntsche and Kuntsche, 2016; Robertson et al., 2003; Stocking et al., 2016) have suggested that increasing awareness of substance use is very common, but prevention should be universal in its content and focus more on reducing risk factors and enhancing protective factors.

### 4.4. Limitations and strengths

This study has some limitations. A limitation was using non-random sampling, as only schools from the NHPS, who were willing to participate, were included. Thus, the participants may not be representative of students and parents in Estonia, but taking into consideration that these schools were motivated to participate, the results should rather overestimate the outcome than the opposite. In addition, participation rates in the trial and meetings were low. Of all the adolescents and parents, only 44% and 35% participated at T1, respectively. Low participation rates among adolescents were mainly due to parents not giving consent for their children to participate in the study or not sending the form back at all. Instead of using the traditional active consent (parents’ signature required to confirm/refuse participation), an alternative (passive) consent approach (signature needed only to deny the participation) could have resulted in higher participation rates (Frissell et al., 2004). Parents might also have disliked the approach of using unique numbers that are linked to participants’ names. Adolescents whose home conditions (e.g., high parental alcohol use, violence) could have put them more at risk might have been excluded from the study. Also, it is possible that children whose parents attended meetings did not participate in the trial and vice versa. Due to the aforementioned reasons, the study could have been underpowered; however, the Bayes factor estimate supports the null hypothesis, suggesting that study power was not a limiting factor. Low participation in the meetings can also influence the dose-response relationship outcome as the dose reflects the number of meetings that took place (e.g., five meetings took place, but the participation rate was low). Another limitation was using adolescents’ self-reported alcohol use. Although longitudinally assessed self-reports on initiation age have been shown to increase (Engels et al., 1997), results from several studies on validity and reliability confirm that students can be trusted to accurately report alcohol use (Donovan et al., 2004; Hibell et al., 2012; Molinaro et al., 2012; Wagenaar et al., 1993). Finally, parents’ own alcohol use was not measured, and this can have a significant influence on adolescents’ alcohol use (Rossow et al., 2016; Yap et al., 2017).

Despite the limitations, the study had several strengths. First, follow-up rates among students were high, more than 80% at both follow-ups. Second, follow-up times were long, meaning that the time lag (Sutton, 2004) between parental attitudes and adolescents’ behavior was sufficient to see any change in the behavior. Third, using different approaches to take into account missing data showed that similar results to complete case analysis were obtained.

## 5. Conclusions

“Effekt” program has received a high rating in the registry of evidence-based prevention programs, Xchange (European Monitoring Centre for Drugs and Drug Addiction, 2017) and in the Blueprints for Healthy Youth Development database (Blueprints for Healthy Youth Development, 2018). At the same time the findings are contradictory, and this article in combination with others (Bodin and Strandberg, 2011; Koning et al., 2009) provide evidence that targeting parental

attitudes is not sufficient to delay and/or reduce adolescents' alcohol use. It is important to understand how the program works in different countries and cultural contexts, but also to allow the program to be adjusted to the local situation. It has been suggested that parent-oriented programs may be effective in preventing and reducing adolescents' alcohol use, but this may depend on various factors, such as adolescents' age, parents' characteristics and intensity of the program (Kuntsche and Kuntsche, 2016). Future research should focus on combining parent and adolescent programs, starting the program earlier, addressing more general protective factors, such as life skills and less alcohol-related awareness. Ensuring high participation rates is another crucial part of universal prevention programs because reaching only the people who have the necessary skills and knowledge is not enough to see a change. Additional attention should be directed to the qualitative assessment of the interventions to obtain a better understanding of potential barriers (e.g., low participation rates), but also components that work.

### Conflict of interest

No conflict declared.

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### Contributors

M. T-Ö contributed to adaptation, implementation and management of the intervention programme, study design, data collection and data analysis and manuscript writing. F.N and S.S contributed to data analysis, manuscript writing and critical revision. All authors contributed to the writing and have approved the final manuscript.

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### Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.drugalcdep.2018.10.024>.

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