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Adolescent substance use, parental monitoring, and leisure-time activities: 12-year outcomes of primary prevention in Iceland

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ABSTRACT

Objective. To examine 12-year changes in alcohol use and cigarette smoking in response to community-based prevention activities among Icelandic adolescents.

Methods. This study used a quasi-experimental, non-randomized control group design to compare outcomes in 4 Icelandic communities ($n=3117$) that participated in community-based substance use prevention activities designed to increase levels of parental monitoring and adolescent engagement in healthy leisure-time activities and a matched group of 7 comparison communities ($n=1,907$). Annual, nationwide, population-based cross-sectional surveys of the prevalence of adolescent substance use were conducted among cohorts of Icelandic adolescents, aged 14–15 years ($N=5,024$), in all communities from 1997 to 2009.

Results. Parental monitoring and adolescent participation in organized sports increased in communities that adopted the intervention program compared to communities that did not, whereas unmonitored idle hours and attendance at unsupervised parties decreased. Over time, alcohol use (OR = 0.89, 95% CI 0.82, 0.98, $p=0.012$) and being intoxicated during the last 30 days (OR = 0.86, 95% CI 0.78, 0.96, $p=0.004$) decreased more in the intervention than control communities.

Conclusion. Community-based prevention designed to strengthen parental monitoring and participation in organized sports may confer some protection against adolescent substance use.

Introduction

Substance use has declined substantially among adolescents in Iceland during the past 12 years (Sigfusdottir et al., 2008). Although similar declines during the same period are evident in some other European countries, the consistency of the decline has been particularly striking in Iceland. Evidence of this decline can be found in the 2007 report of the European School Project on Alcohol and Drugs (ESPAD), a comparative study of substance use among 15-year-old adolescents (Hibell et al., 2009). Iceland was one of only two countries out of 20 to experience reductions in cigarette smoking (during the last 30 days) for all four consecutive study periods from 1995 to 2007 (Hibell et al., 2009), and the only country of 19 to experience consecutive reductions in alcohol use (during the last 30 days) for each of the same four periods (Hibell et al., 2009, p. 123).

It is noteworthy that the decline in substance use in Iceland has coincided with the implementation of several national prevention initiatives during this period. These include national media campaigns aimed at discouraging adolescent alcohol use and cigarette smoking; a national school-based anti-smoking initiative utilizing positive peer influence in the classroom setting to discourage smoking out of school; and legislation to decrease visibility and access to alcohol and tobacco products, including new statutes that mandate the labelling of cigarette packages with anti-smoking messages and a national ban on all alcohol and tobacco-related advertising, display of tobacco products in shops, and smoking in all indoor public places. Moreover, revision of the Legal Maturity Act (nr. 76, 1997), enacted in 1998, raised the legal age from 16 to 18 years.

Paralleling these efforts were those of the Icelandic Centre for Social Research and Analysis (ICSRA), which began working with municipalities throughout Iceland in 1999 to arrest and reverse the trends in adolescent substance use (Sigfusdottir et al., 2009). Since then, ICSRA has conducted annual *Youth in Iceland* surveys of youth risk behaviors and substance use, the results of which have been used by communities

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to develop specific adolescent substance use prevention activities. One of these activities has been a highly publicized annual "Prevention Day," which was launched in 2007 by the President of Iceland, whose goals are to increase time spent by parents with their adolescents, postpone alcohol use among adolescents, and increase their participation in organized youth activities supervised by responsible adults.

This study sought to determine whether the decline in adolescent substance use in Iceland from 1997 to 2009 can be attributed to the national efforts to prevent substance use and to what extent community participation in the ICSRA program has contributed to this decline. We compared trends in substance use between a group of "intervention" municipalities that adopted prevention initiatives developed by ICSRA, which focused on parental monitoring and participation in leisure-time activities, and a group of "control" municipalities that did not participate in the initiatives but had been exposed to the nationwide prevention efforts described above.

Method

Data sources

This study utilized data from the population-wide cross-sectional *Youth in Iceland* surveys to monitor trends in adolescent substance use (Sigfusdottir et al., 2008, 2009). The surveys were conducted annually among 9th and 10th graders in all secondary schools during February or March from 1997 to 2009. Annual cohorts varied between 7882 and 9278, and respondents numbered between 6346 and 7758 (81% to 90% of the total population). The analyses reported here utilize data from 1997, 2000, 2003, 2006, and 2009. Table 1 shows the total number of participants, response rates, and gender ratios for each year.

Design

All Icelandic municipalities participated in the annual surveys and were exposed to the national community-wide prevention efforts. For purposes of this study, we identified 9 municipalities that were located outside the Reykjavik capital area as potentially eligible for inclusion in an experimental ("intervention") group of communities. However, 5 of these communities were excluded because they had participated only partially in the in ICSRA program (e.g., they received reports but did not form a consultative parent group) and/or participated in the program for one or more, but not all, years. This left 4 remaining municipalities (Reykjanesbaer in the southwest, Arborg and Hvolsvollur in the south, and Isafjordur in the Vestfjords northwest), all of which are located outside the capital area and had participated fully in the ICSRA program, which were suitable for inclusion in the experimental group of communities. Another 7 municipalities located outside the Reykjavik capital area (Borgarnes and Stykkisholmur in the southwest; Hofn in the southeast; Blonduos, Husavik, and Saudarkrokur in the north; and Vestyrbyggd in the Vestfjords northwest), that (apart from the annual *Youth in Iceland* surveys) did not participate in the ICSRA program, constituted the comparison ("control") group of communities. Thus, the total number of survey respondents included in this study was 5024, consisting of 3117 in the intervention group and 1907 in the control group (for a detailed description of the selection criteria see Appendix).

Table 1
Number of participants in the *Youth in Iceland* surveys, 1997, 2000, 2003[a], 2006, and 2009.

Year	*n*	% of population	% males
1997	7758	90	52
2000	6346	82	49
2003	7099	81	52
2006	7430	82	50
2009	7514	84	49

[a] In 2003, the *Youth in Iceland* survey became the Icelandic part of the ESPAD studies (Hibell et al., 2004). Measures on parental monitoring and leisure-time activities are not applicable for that year.

Intervention

The ICSRA program of activities included four main elements:

1. Renewable medium-term contracts (e.g., 5 years) between ICSRA and each of the participating municipalities, with the stated aim of reducing adolescent substance use in the local community.
2. The formation of collaborative coalitions between ICSRA researchers and persons specified by each municipality, including policy makers (elected officials and municipal employees), community leaders, practitioners (e.g., school personnel and youth workers), and parents that became responsible for implementation of local-level activities.
3. Based on ICSRA survey results, the identification of key adolescent risk factors (e.g., idle hours and attendance at unsupervised parties) and protective factors (e.g., parental monitoring and participation in sports), followed by grass-roots action organized by the local community coalition to reduce risk factors and strengthen protective factors.
4. Provision of individualized annual reports supplied by ICSRA to each municipality, describing local trends in substance use, changes between years, and risk and protective factors suggested by analyses of the results for each local community. The findings in these reports are presented and discussed at local meetings with all members of the coalition, and prospective action plans are initiated or revised. This cycle of survey, analysis, reporting, consultation, and action is then repeated annually.

Measures

An identical set of core questions regarding any alcohol use or intoxication during last 30 days and daily smoking was employed in all years. We also collected data on social circumstances and potential risk and protective factors, specifically parental monitoring, leisure-time activities, and going to parties (see Appendix).

Procedures

All data collection procedures included passive parental consent and were approved by the Icelandic authority overseeing the protection of human research subjects. All students who attended school on the day of the survey completed the questionnaires within their regular classrooms and under teacher supervision. Students were instructed to complete the entire questionnaire, but to ask for help if they had any problems or questions for clarification. Students were asked to place their completed questionnaires in sealed envelopes before returning them to the supervising teacher.

Statistical analyses

In order to evaluate changes in prevalence of licit substance use, parental monitoring, and pattern of leisure-time activities in the experimental intervention and control communities, we used logistic regression analyses with time (survey year) as the independent variable and interaction terms for treatment vs. control effects (Pampel, 2000). We also modeled the respective change for Iceland as a whole.

Results

Fig. 1 shows the trends in substance use. Panel A shows the trend in *any alcohol use in the last 30 days* for Iceland and for the intervention and control groups. The odds ratio (OR) for any alcohol use in Iceland was 0.84 (95% CI 0.82, 0.85, $p = 0.000$). For the intervention group, the OR was 0.77 (95% CI 0.73, 0.81, $p = 0.000$), and for the control group the OR was 0.86 (95% CI 0.80, 0.92, $p = 0.000$). The interaction term for time × intervention between the intervention and control groups had an OR of 0.89 (95% CI 0.82, 0.98, $p = 0.012$), indicating that the reduction in any alcohol use was significantly greater in the intervention group than it was in the control group.

Panel B shows the trends in *alcohol intoxication during the last 30 days*. The OR for the trend for Iceland was 0.79 (95% CI 0.77, 0.80, $p = 0.000$), 0.69 (95% CI 0.65, 0.74, $p = 0.000$) for the intervention group, and 0.80 (95% CI 0.74, 0.87, $p = 0.000$) for the control group. The interaction term for time × intervention had an OR of 0.86 (95% CI 0.78, 0.96, $p = 0.004$),

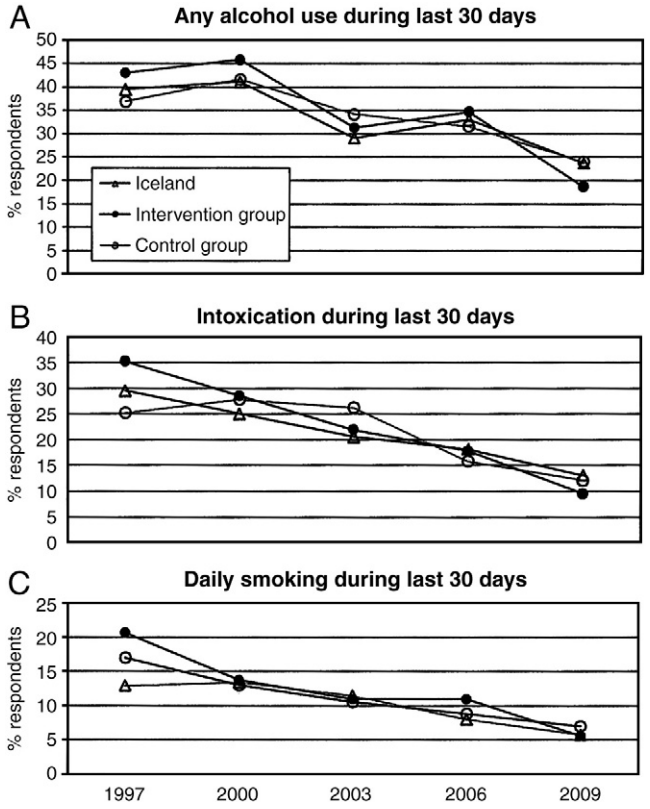

Fig. 1. Trends in prevalence of licit substance use among adolescents aged 14–15 years in the whole of Iceland and in the intervention and comparison groups.

indicating that the reduction over time in alcohol intoxication was significantly greater in the intervention group than in the control group.

Panel C shows the trends in *daily smoking*. The OR for the trend for Iceland was 0.78 (95% CI 0.76, 0.80, $p = 0.000$), 0.73 (95% CI 0.67, 0.79, $p = 0.000$), for the intervention group, and 0.81 (95% CI 0.73, 0.91, $p = 0.000$) for the control group. The interaction term for time × intervention had an OR of 0.90 (95% CI 0.77, 1.00, $p = 0.099$). Although not statistically significant, the direction of the reduction in daily smoking over time is consistent with the other findings.

Fig. 2 shows trends in two indicators of *parental monitoring*. Panel A shows the trend on parents knowing whom their adolescents are with in the evenings. The OR for the trend for Iceland was 1.26 (95% CI 1.24, 1.28, $p = 0.000$), 1.36 (95% CI 1.28, 1.44, $p = 0.000$) for the intervention group, and 1.22 (95% CI 1.13, 1.33, $p = 0.000$) for the control group. The interaction term time × intervention had an OR of 1.11 (95% CI 1.00, 1.22, $p = 0.044$); this result is also consistent with greater beneficial change over time for the intervention group compared to the control group.

Panel B shows the trend on parents knowing where adolescents are in the evenings. For Iceland, this indicator increased positively for most of the study period, with an OR of 1.19 (95% CI 1.17, 1.21, $p = 0.000$). The OR for the intervention group was 1.28 (95% CI 1.21, 1.36, $p = 0.000$) and 1.17 (95% CI 1.09, 1.26, $p = 0.000$) for the control group. The interaction term time × intervention had an OR of 1.10 (95% CI 1.00, 1.20, $p = 0.059$), also directionally consistent with our other results.

Fig. 3 shows the trends for *participation in sports* (either in a sport club or with a team 4 times per week or more often) and *going to parties* at least once each week. In Panel A, the OR for the trend in *participation in sports* for Iceland was 1.12 (95% CI 1.10, 1.14, $p = 0.000$), indicating a significant increase in this leisure-time activity during the study period. The trend in sports participation in the intervention group was 1.13 (95% CI 1.07, 1.20, $p = 0.000$) and for the control group it was 1.02 (95% CI 0.95, 1.09, $p = 0.619$). The OR for the interaction term for time × intervention was 1.11 (95% CI 1.02,

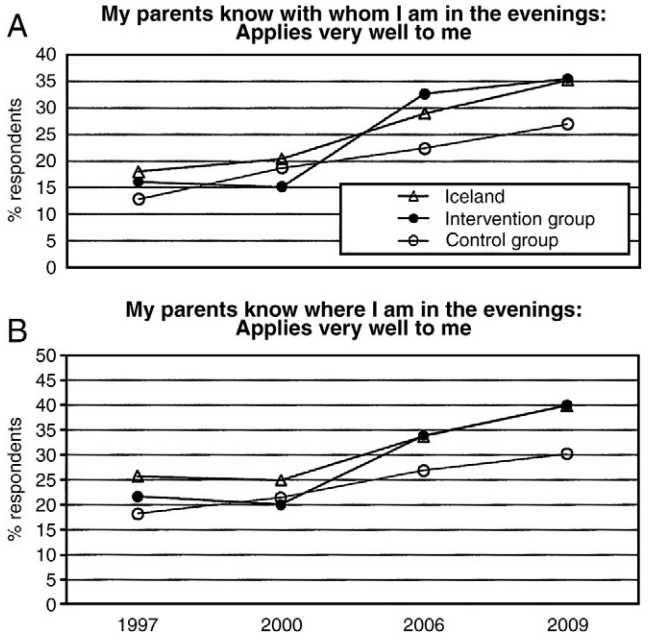

Fig. 2. Trends in prevalence of indicators of parental monitoring among adolescents aged 14–15 years in the whole of Iceland and in the intervention and comparison groups.

1.21, $p = 0.015$), indicating a greater increase in participation in sports for the intervention group than for the control group.

Panel B shows the prevalence of *going to parties* at least once every week. For Iceland, the OR for trend was 0.81 (95% CI 0.78, 0.83, $p = 0.000$), while the OR for the intervention group was 0.72 (95% CI 0.66, 0.79, $p = 0.000$) and 0.85 (95% CI 0.75, 0.96, $p = 0.010$) for the control group. The OR for the interaction term for time × intervention was of 0.85 (95% CI 0.73, 0.99, $p = 0.034$), indicating a greater decrease in going to parties for the intervention group than for the control group.

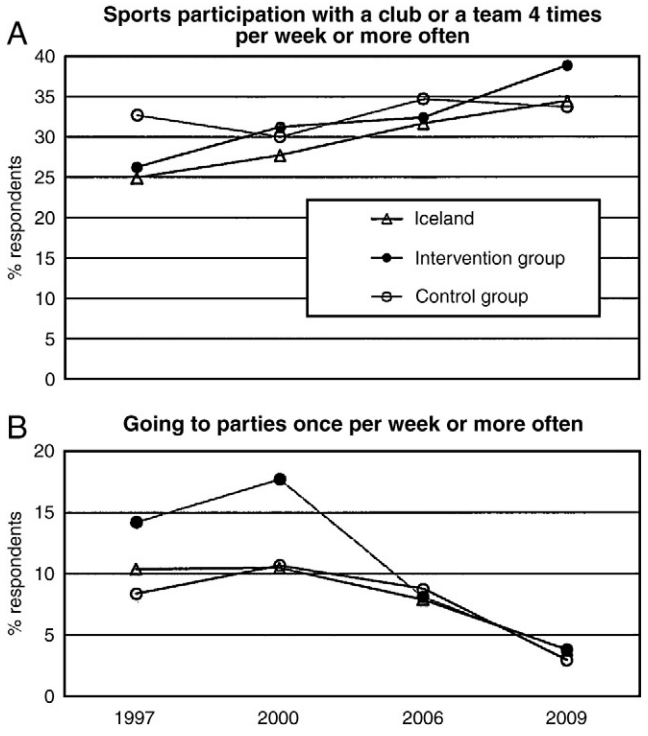

Fig. 3. Trends in prevalence of leisure-time activities among adolescents aged 14–15 years in the whole of Iceland and in the intervention and comparison groups.

Discussion

Our results show a consistent pattern of improvement over time in those communities that participated in ICSRA programs. Parental monitoring and adolescent participation in organized sports increased throughout the period, whereas alcohol use, smoking, and going to unsupervised parties declined, suggesting that overall prevention efforts have been effective. However, our comparison of the matched communities suggests that, in communities where the ICSRA prevention activities were also implemented, the decline in substance use was steeper than in comparison communities during the 12-year period, while the increase in protective factors (i.e., parental monitoring and participation in sports) and decrease in prevalence of risk factors (e.g., attending unsupervised parties) was greater.

These findings are consistent with previous studies demonstrating that responsible supervision and monitoring by parents confers protection against adolescent substance use (Kristjansson et al., 2006; Thorlindsson and Vilhjalmsson, 1991; Thorlindsson et al., 1998; Thorlindsson et al., 2007). Parental monitoring not only decreases the likelihood of substance use but also increases the likelihood of adolescents choosing friends who are not substance users (Thorlindsson and Bernburg, 2006; Warr, 1993). Similarly, previous research has found that participation in supervised leisure-time activities confers protection against substance use (Kristjansson et al., 2008; Thorlindsson and Vilhjalmsson, 1991; Thorlindsson et al., 1998; Thorlindsson et al., 2007).

There are, however, several important limitations of this study and its quasi-experimental design that suggest caution in interpreting the results. First, we relied on data that were self-reported by adolescents. Despite a previous study (Bjarnason, 1995) that showed the veracity of reported use of licit or illicit drugs among Icelandic adolescents, we did not corroborate substance individual reports of substance use. Second, we cannot rule out the possibility that the changes observed over time reflect cohort changes in perceptions and reporting patterns, rather than actual change in adolescent and parent behavior *per se*. Moreover, it is possible that the observed outcomes may be peculiar to Iceland and its relatively small and homogenous population. Third, it is difficult to assess the potential influence of contamination and co-intervention in the communities we studied. Thus, when these limitations are taken into consideration, we are unable to rule out the possibility that the differences observed in the trends between the intervention and control communities are due to factors beyond the nationwide implementation of the prevention initiative or the ICSRA intervention.

In conclusion, the 12-year outcomes point to significant success in preventing adolescent substance use, especially in the context of the prevalence of use that had been reported for the years immediately preceding the period of study. Not only were the declines in adolescent substance use substantial, key determinants of use were identified, including an increase in protective factors (parental monitoring and adolescent participation in organized sports) and a decrease in risk factors (idle hours and attendance at unsupervised parties). However, although we believe it is possible the observed changes resulted from the combination of actions associated with the population-wide campaign to heighten awareness of the dangers of adolescent substance use and a focused program of data-driven community prevention activities, the findings of this study must be interpreted cautiously in light of several methodologic limitations.

Conflict of interest statement
The authors declare there is no conflict of interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ypmed.2010.05.001.

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