

Research papers

An integrative model to predict adolescents' alcohol use: a cross-national study in the Pitkäranta district (Russian Karelia) and in eastern Finland

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ABSTRACT

An integrative model suggested by the social ecology approaches was developed to predict 15-year-old adolescents' alcohol use in the Pitkäranta district (Russia) and in eastern Finland. The data were gathered by self-administered questionnaires from ninth-grade students in ten comprehensive schools in Pitkäranta ($n = 385$) and all ($n = 2098$) students of the same age in 24 schools in eastern Finland. A structural equation modelling (SEM) approach was used to examine and to test whether adolescents' social relationships with parents and teachers, depressive symptoms, and first experiments with alcohol and drunkenness predicted their alcohol use, and whether the predictor variables were similar in the two cultural contexts and between sexes. The theoretical relevance of the integrative approach was demonstrated. Different regression coefficients

revealed that the selected variables were different predictors of adolescents' alcohol use for both boys and girls in Pitkäranta and in eastern Finland. The results supported a mechanism whereby adolescents' alcohol drinking was hypothesised to be shaped by a depressive response to unsuccessful social relationships with parents and school. To improve the efficacy of treatment programmes and interventions in social and health care and school settings, prevention efforts should aim to improve parents' and teachers' relationships with adolescents as relevant to the desired health action.

Keywords: 15-year-old adolescents, alcohol use, cultural differences, structural equation modelling (SEM)

Introduction

Despite the prohibitive laws on underage drinking enforced by policy makers, alcohol use by adolescents is spreading and becoming a cause for great concern in the Western European countries, including Finland (Hibell *et al*, 2000). Children with early alcohol use or intoxication are known to drink most and to come from environments with less family support and more problems in social relationships (Parker *et al*, 1996; Hawkins *et al*, 1997; Hughes *et al*, 1997; Hellandsjo Bu *et al*, 2002). In the Eastern European countries, including Russia, the modernisation and the sweeping socio-political and economic changes may have other contributing influences on children's behaviour (Adeyi *et al*, 1997; Steptoe and Wardle, 2001). In this study, the aim was to explore and to test whether models that integrated socio-environmental, behavioural, and psychological factors as predictors of 15-year-old adolescents' alcohol use would be valid in two socially and politically different cultures, in Pitkäranta (Russian Karelia) and in eastern Finland, and if so, to test whether there were differences in the predictor variables in the study cultures and between the sexes.

The effects of sociocultural contexts on adolescents' wellbeing appear to vary between the stable Western and the unstable Eastern socio-historical contexts (Grob *et al*, 1996; Steptoe and Wardle, 2001). Deteriorating trends in adolescents' health and wellbeing are obvious in Russia. Earlier studies among Russian and American adolescents have shown Russian adolescents to suffer higher levels of stress in everyday life (Jose *et al*, 1998) and a higher prevalence of depression and emotional and behavioural problems (Charman and Pervova, 1996; Jose *et al*, 1998). In Russia, adolescents' social and psychological wellbeing proved to be significantly related to family functioning (Slonim-Nevo and Sheraga, 1997). Among Finnish adolescents, mental disorders were found to be a common but undertreated problem (Suominen *et al*, 1998). One out of four young adults suffered from mental disorders, most of them being depressive. The prevalence of depressive disorders turned out to be higher among Finnish females than Finnish males (Haarasilta *et al*, 2001).

Familial factors, such as family dysfunction and poor parent-child communication, are known to be associated with adolescents' poor performance at school, health behaviour problems and depression (Wang and Chou, 1999; Aseltine and Gore, 2000; Simantov *et al*, 2000). Perceived lack of social support increased the proportion of depressed individuals among Finnish adolescents (Kaltiala-Heino *et al*, 2001). In a study of Soviet-born and Israeli-born adolescents in Israel, family functioning was a major factor predicting a

myriad of psychological symptoms (Slonim-Nevo and Sheraga, 1997). School-related factors, such as poor school performance and low level of teacher support, have turned out to be key variables predicting adolescents' physical and psychological health and health-compromising behaviour (Costa *et al*, 1999; Samdal *et al*, 2000; Laukkanen *et al*, 2001). Among Russian school children in Novosibirsk, academic achievement was positively related to the occurrence of psychosomatic diseases (Knyazev *et al*, 2001). Among Finnish girls, psychosomatic symptoms and problems with teachers were associated with heavy drinking (Laukkanen *et al*, 2001).

Among adolescents, alcohol users have been twice as depressed as non-users (Pullen *et al*, 2000). In longitudinal studies of Finnish adolescents, psychological wellbeing (Pitkänen, 1999), behavioural and emotional problems in childhood (Ebeling *et al*, 1999), and behavioural deviance and depression (Kumpulainen, 2000) were significant predictors of later alcohol use. Longitudinal studies indicate that parental support and parental conflicts are predictive of adolescents' alcohol use (Aseltine and Gore, 2000; Simantov *et al*, 2000).

Early initiation of alcohol use has been shown in many studies to be an important predictor of later alcohol use. In a study of relationships between age at onset of drinking and patterns of use, an association between early onset of alcohol use by age 12 and subsequent alcohol abuse was detected (Gruber *et al*, 1996). Among Swedish females, alcohol intoxication before the age of 15 and psychological problems before the age of 18 increased the risk of alcohol dependence or abuse (Spak *et al*, 2000). Furthermore, a study by Hawkins *et al* (1997) showed that, in the test of the hypotheses predicting alcohol misuse, younger age at alcohol initiation was strongly related to a higher level of alcohol misuse at age 17–18 years, and mediated the effects of proactive parenting, school bonding, and ethnicity.

Some similarity but also notable diversity between different cultures and between the sexes may exist in the patterns of adolescents' alcohol use. In Juang and Silbereise's (1999) study, the effects of supportive parenting on adolescents' adjustment were similar in two cultural contexts. In another study of two ethnic groups, the interrelationships of the acculturation, family, personality, and ecology domains were found to have similar impacts on adolescents' drug use (Brook *et al*, 1997).

The theoretical suppositions for the study presented here were drawn from the theoretical presumptions concerning the social relationships affecting adolescents' health (Mason and Windle, 2001) and from the presumptions of the social ecology theories concerning the importance of family and school and their contribution to the integrative, sociological, psychological,

and health behaviour theories (Bronfenbrenner, 1979; Kumpfer and Turner, 1991). According to these theories, social cognitive factors, other personal factors, and environmental influences operate interactively as determinants of each other (Bandura, 1977, 1986).

These premises encouraged us to study the effects of socio-environmental (parent-child problems, teacher-pupil problems), behavioural (first experiments with alcohol, first experiences of drunkenness, and ninth-graders' alcohol use), and psychological factors (depressive symptoms) on adolescents' alcohol use in the context of politically and socially different cultures. It was suggested that, among adolescents in both Pitkäranta and eastern Finland, and between the sexes, parent-child and teacher-pupil problems increase adolescents' depressive symptoms, experiments with alcohol, and alcohol use both directly and indirectly. Furthermore, as pointed out by Hawkins *et al* (1992), adolescents' drinking seems to be affected, via a depressive response, by unsuccessful social relationships and school. As a first hypothesis, a similar model structure in the two cultures and between the sexes was suggested. As an alternative hypothesis, significant differences in the predictor variables between the two cultures and between the sexes were suggested.

Method

Subjects and procedures

The target group of this study consisted of 15-year-old students, including all ninth-grade students ($n = 385$) in the ten comprehensive schools in the Pitkäranta district in Russia and all ($n = 2048$) ninth-grade students in 24 randomly selected comprehensive schools in eastern Finland. The schools that were selected in eastern Finland were assessed to be representative of typical eastern Finland schools. Pitkäranta district in Russia is one of the 15 districts of the Republic of Karelia and, according to statistics, a relatively typical district (Statistical Office of Karelia, 1991). Informed consent was obtained from parents and local school authorities in both countries.

The data were gathered by means of an anonymous questionnaire produced for the earlier North Karelia Youth projects in eastern Finland by applying psychosocial and other theories (see Tossavainen, 1993; Vartiainen *et al*, 1998). A comparable measure was developed for use in Pitkäranta, where the questionnaire was translated from Finnish into Russian and then back-translated by the local research team members. Possible misinterpretations due to differences in culture and language were assessed together with the

Russian team members, to make sure that the measures were appropriate and culturally acceptable in Pitkäranta and the local school context. The respondents were informed of voluntary participation and assured of the confidentiality of their responses in both study contexts. Also, they were informed about the background and the purpose of the study. The questionnaires were administered by informed teachers in eastern Finland and by researcher colleagues from both countries and local team members in Pitkäranta. All ninth-grade students in each school filled in the questionnaires at the same time during a school lesson. The filled-in questionnaires were then sealed in nameless envelopes by the students. The response rate was 95% in Pitkäranta and 93% in eastern Finland. Non-participants in both countries were mainly students who were absent from school on the day when the study was conducted.

In the questionnaire, ordinal-level measures were used. The frequency of adolescents' alcohol use was inquired by using a nine-point scale from 'I do not drink' to 'I drink daily'. Adolescents' drinking styles were measured on a scale by asking them to assess their experiences of different levels of drunkenness in the last 12 months. Six alternatives from 'I did not drink' to 'I passed out' were involved. To find out when the adolescents had first experimented with alcohol and when they had first experienced drunkenness, a five-point ordinal scale ranging from 'sixth grade or earlier' to 'never' was used. Social relationships with parents were measured with two items eliciting mother-child and father-child problems by asking whether the adolescents had problems with their mothers or fathers. Six alternatives, 'a lot', 'a great deal', 'some', 'very few' or 'no', and 'no mother or father', were provided. The values of those who did not have a mother (2.0%; $n = 7$ in Pitkäranta, and 1.3%; $n = 25$ in Finland) or a father (12.3 %; $n = 43$ in Pitkäranta, and 0.5%; $n = 9$ in Finland) were replaced by the means for the series. One question measured teacher-pupil problems. The adolescents were asked whether or not they had problems with their teachers. The mother/father scale without the last alternative was used. The adolescents' depressive responses were assessed with 11 items pertaining to psychosomatic symptoms. Six of them were used in the final analyses after exploratory and confirmatory factor analyses. The alternatives provided were 'repeatedly', 'occasionally', and 'never'. The percentage of missing values in these items varied from 3.8% to 4.3% in Pitkäranta and from 0.7% to 1.6% in eastern Finland. Missing values were replaced by the means for the series. The missing data were assumed to be missing at random, and the applied imputation method did not reduce the variance significantly.

Data analysis

The structural equation modelling (SEM) technique was used to construct theoretical models and to test the study hypotheses (Jöreskog, 1993; Hoyle, 1995; Kline, 1998). Analysis of Moment Structures (AMOS 9.01 software) produced by SmallWaters Corporation was used to specify and modify models, to estimate parameters, to compare different models, and to test the study hypotheses (Arbuckle and Wothke, 1999). AMOS is a statistical package for random samples and therefore not normally applicable to school-based samples. However, schools in both Finland and Russian Karelia are very homogeneous owing to the state-sponsored educational system of comprehensive education for children of all social classes. The correlation matrices of the variables used in the models were computed with SPSS 9.0 for Windows.

Development of SEM models

Theoretical assumptions of the psychosocial approach and the notation of the earlier studies were used to construct the original model of this study. A procedure of cross-validation was implemented because no independent sample was available for model validation. Two random samples were drawn from the whole data. The first was used as a development ($n = 1098$) and the second as a validation sample ($n = 1052$). An asymptotically distribution-free estimation method (ADF) was used with respect to the multivariate normality of the data (Kline, 1998). The sufficiency of the model was examined by using the fit indices produced by the AMOS program. Comparative fit index (CFI) and root mean square error of approximation (RMSEA), which are less sensitive to sample size, were also used by comparing the χ^2 differences.

It was ensured that the variables included in the model were mutually correlated (see Table 1). A latent alcohol use variable, formed from the variables representing the frequency of alcohol drinking and the level of drunkenness, was used as the dependent variable. A latent variable of the first experiments with alcohol and the first experiences of drunkenness was used as an endogenous variable to predict adolescents' alcohol use. The variables of problems with the mother and the father, allowing for correlation, were used as exogenous variables. Problems with teachers were used as an endogenous variable affected by problems with parents. Only this direction was examined as an appropriate connection. In the case of depressive symptoms, the two-step structural equation modelling technique suggested by Jöreskog (1993) was used. The fit of the factorial construct of the depressive symptoms scale (Model A) was tested in the development and validation samples and in the

study subsamples before it was used as a structural part of the SEM models. The rationale was to assess whether the measurement model was culturally appropriate in the form of confirmatory factor analysis (CFA) statistics (Jöreskog, 1993).

Good fit and cross-validation indices for the model were found. In the analyses of the models with free (Model A1) and invariant (Model A2) path coefficients, both the hypothesis about a similar factor structure and the hypothesis about similar factor loadings were accepted for the development and validation samples. Single-group analyses in the subsamples of boys and girls in Pitkäranta and in eastern Finland revealed that the factorial construct of depressive symptoms fitted the data and could be used in further analyses. The summary of fit statistics in model development is shown in Table 2.

The initial SEM model (Model B) was constructed based on the theoretical notations of the predictors of adolescents' alcohol use. The modification of the model led to the removal of two regression paths. The direct path from depressive symptoms to alcohol use did not reach the requisite significance level to be retained in the models. The direct path from teacher-pupil problems to alcohol use was also removed, as it was different in the development and validation samples. The regression paths from father-child and mother-child problems to alcohol use and the first experiments with alcohol and drunkenness were, in all cases, allowed to remain in the models to ensure generality in the study subsamples. Good fit for Model B was found both in the development and in the validation sample (see Table 2). The results revealed no discrepancy between the development and validation samples (see Cudeck and Browne, 1983; MacCallum *et al*, 1994; Kline, 1998).

Results

The summary of the fit statistics of the study hypotheses is shown in Table 3. Congruently with the theoretical assumptions, parent-child and teacher-pupil problems increased adolescents' depressive symptoms, experiments with alcohol, and alcohol use both directly and indirectly. The hypothesis about similar model structure was accepted for both boys and girls in Pitkäranta and in eastern Finland. The hypothesis about similar path coefficients between the two country samples was rejected for both sexes.

The selected solution of the SEM model (Model B) with its standardised regression coefficients for the whole data is shown in Figure 1. The squared multiple correlations for the predictor and the dependent variable are shown in Table 4.

Table 1 Spearman's correlation matrix of the variables used in structural equation models of drinking predictors in Pitkäranta (above the diagonal, $n = 349$) and in eastern Finland (under the diagonal, $n = 1901$)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Adolescent's sex	1.000	0.000	0.059	-0.017	0.088	-0.287**	-0.196**	0.033	-0.105	0.126*	-0.352**	-0.175**	0.325**	-0.076
2 Frequency of alcohol drinking	-0.024	1.000	0.736**	0.604**	0.611**	0.219**	0.107*	0.161**	0.115*	0.058	0.072	0.063	0.119*	0.090
3 Experiences of different levels of drunkenness	-0.039	0.718**	1.000	0.570**	0.727**	0.173**	0.098	0.189**	0.093	0.083	0.064	-0.017	0.119*	0.069
4 First experiments with alcohol	0.034	0.478**	0.400**	1.000	0.588**	0.194*	0.095	0.211**	0.069	0.009	0.128*	0.083	0.088	0.128*
5 First experiments with drunkenness	-0.024	0.629**	0.716**	0.537**	1.000	0.132*	0.100	0.234**	0.094	0.068	0.020	-0.023	0.119*	0.081
6 Mother-child problems	-0.188**	0.175**	0.200**	0.105**	0.138**	1.000	0.399**	0.225**	0.137*	0.199**	0.274**	0.141**	0.251**	0.167**
7 Father-child problems	-0.222**	0.165**	0.186**	0.107**	0.140**	0.545**	1.000	0.245**	0.065	0.134*	0.219**	0.097	0.169**	0.020
8 Teacher-pupil problems	0.134**	0.317**	0.316**	0.200**	0.291**	0.260**	0.222**	1.000	0.111*	0.046	0.104	0.119*	0.120*	0.069
9 Nightmares	-0.222**	0.048*	0.114**	0.060**	0.104**	0.138**	0.122**	0.073**	1.000	0.231**	0.109*	0.275**	0.190**	0.107*
10 Accelerated heart rate	-0.071**	0.064**	0.068**	0.063**	0.060**	0.135**	0.120**	0.086**	0.121**	1.000	0.192**	0.187**	0.199**	0.136*
11 Depression	-0.307**	0.132**	0.158**	0.081**	0.129**	0.245**	0.278**	0.133**	0.220**	0.214**	1.000	0.277**	0.447**	0.217**
12 Insomnia	-0.130**	0.095**	0.132**	0.074**	0.096**	0.115**	0.152**	0.089**	0.177**	0.156**	0.307**	1.000	0.261**	0.173**
13 Tenseness and nervousness	-0.143**	0.114**	0.175**	0.109**	0.119**	0.207**	0.192**	0.130**	0.213**	0.240**	0.391**	0.292**	1.000	0.224**
14 Sweaty palms	-0.034	0.080**	0.092**	0.080**	0.062**	0.133**	0.095**	0.114**	0.120**	0.227**	0.206**	0.191**	0.331**	1.000

Adolescent's sex: boys = 1, girls = 2

Frequency of alcohol drinking: range from 1 (drink daily) to 9 (do not drink)

If used alcohol in the last 12 months, experiences of levels of drunkenness: range from 1 (passed out) to 6 (did not drink)

First experiments with alcohol: range from 1 (sixth grade or earlier) to 5 (never)

First experiments with drunkenness: range from (sixth grade or earlier) to 5 (never)

Mother-child problems: range from 1 (a lot) to 5 (no). Alternative 6 (no such a person) was replaced with the series mean

Father-child problems: range from 1 (a lot) to 5 (no). Alternative 6 (no such a person) was replaced with the series mean

Teacher-pupil problems: range from 1 (a lot) to 5 (no)

Variables 9-14 measuring depressive symptoms: range 1 (repeatedly), 2 (occasionally), and 3 (never)

*: $P < 0.005$; **: $P < 0.001$

Table 2 Summary of the fit statistics of the selected confirmatory factorial model for depressive symptoms and the SEM model in model development

Type of analysis	χ^2	df	<i>P</i>	CFI	RMSEA
Testing of model fit for model A (confirmatory factorial model for depressive symptoms)					
Single-group analyses to test model fit					
Development sample (<i>n</i> = 1098)	24.2	9	<0.001	0.989	0.039
Validation sample (<i>n</i> = 1052)	17.3	9	<0.05	0.968	0.028
Multiple-group analyses for cross-validation (<i>n</i> = 1098, <i>n</i> = 1052)					
Model A1, free path coefficients	43.4	23	<0.01	0.957	0.020
Model A2, invariant path coefficients	41.5	18	<0.001	0.950	0.024
Model A2 – Model A1	1.94	5	ns		
Single-group analyses to test model fit in study subsamples					
Pitkäranta boys (<i>n</i> = 171)	8.64	9	ns	1.00	0.000
Pitkäranta girls (<i>n</i> = 178)	13.8	9	ns	0.908	0.055
Eastern Finland boys (<i>n</i> = 920)	18.6	9	<0.05	0.943	0.034
Eastern Finland girls (<i>n</i> = 946)	24.9	9	<0.01	0.915	0.043
Testing of model fit for Model B (SEM model)					
Single-group analyses to test model fit					
Development sample (<i>n</i> = 1098)	139.9	55	<0.001	0.959	0.038
Validation sample (<i>n</i> = 1052)	156.8	55	<0.001	0.952	0.040
Multiple-group analyses for cross-validation (<i>n</i> = 1098, <i>n</i> = 1052)					
Model B1, free path coefficients	296.7	110	<0.001	0.956	0.027
Model B2, invariant path coefficients	312.9	129	<0.001	0.956	0.025
Model B2 – Model B1	16.2	19	ns		

ns: not significant

The comparisons of the direct, indirect, and total effects on adolescent boys' and girls' alcohol use are presented in the Tables 5 and 6, respectively. Marked sex-related cultural differences emerged. The first experiments with alcohol and drunkenness were the most important predictor of adolescents' alcohol use in every subsample. Teacher–pupil problems, indirectly, turned out to be an important predictor of boys' alcohol use in both country samples. Father–child problems in Pitkäranta and mother–child problems in eastern Finland increased boys' alcohol use. Depressive symptoms increased boys' alcohol use in eastern Finland, but not in Pitkäranta, where a small reverse effect was found. Among girls, mother–child problems constituted a predictor of alcohol use in both country samples, but the effect was even more

obvious in Pitkäranta. For girls, a reverse effect of father–child problems was found in Pitkäranta. A significant effect of fathers and teachers was found among girls in eastern Finland, but not among their counterparts in Pitkäranta.

Discussion

Predictors of adolescents' alcohol use were constructed in Pitkäranta, Russia, and in eastern Finland, and the two sets were then compared. In congruence with the theoretical assumptions, adolescents' alcohol use was predicted by the direct and indirect effects of their first experiments with alcohol, social relationships with

Table 3 Summary of the fit statistics of SEM models in testing the study hypotheses

Type of analysis	χ^2	df	P	CFI	RMSEA
Testing of study hypotheses for Model B (SEM model)					
Single-group analyses to test model fit for separate subsamples					
Pitkäranta boys (<i>n</i> = 171)	57.8	55	ns	0.991	0.017
Pitkäranta girls (<i>n</i> = 178)	87.5	55	<0.01	0.892	0.058
Eastern Finland boys (<i>n</i> = 920)	118.3	55	<0.001	0.961	0.035
Eastern Finland girls (<i>n</i> = 946)	148.4	55	<0.001	0.947	0.042
Multiple-group analyses to test similarities between country samples separately for both sexes					
Pitkäranta boys (<i>n</i> = 171) and Eastern Finland boys (<i>n</i> = 920)					
Model B1, free path coefficients	176.3	110	<0.001	0.966	0.024
Model B2, invariant path coefficients	255.5	129	<0.001	0.935	0.030
Model B2 – Model B1	79.3	19	<0.001		
Pitkäranta girls (<i>n</i> = 178) and Eastern Finland girls (<i>n</i> = 946)					
Model B1, free path coefficients	236.0	110	<0.001	0.939	0.032
Model B2, invariant path coefficients	331.1	129	<0.001	0.903	0.037
Model B2 – Model B1	95.1	19	<0.001		

ns: not significant

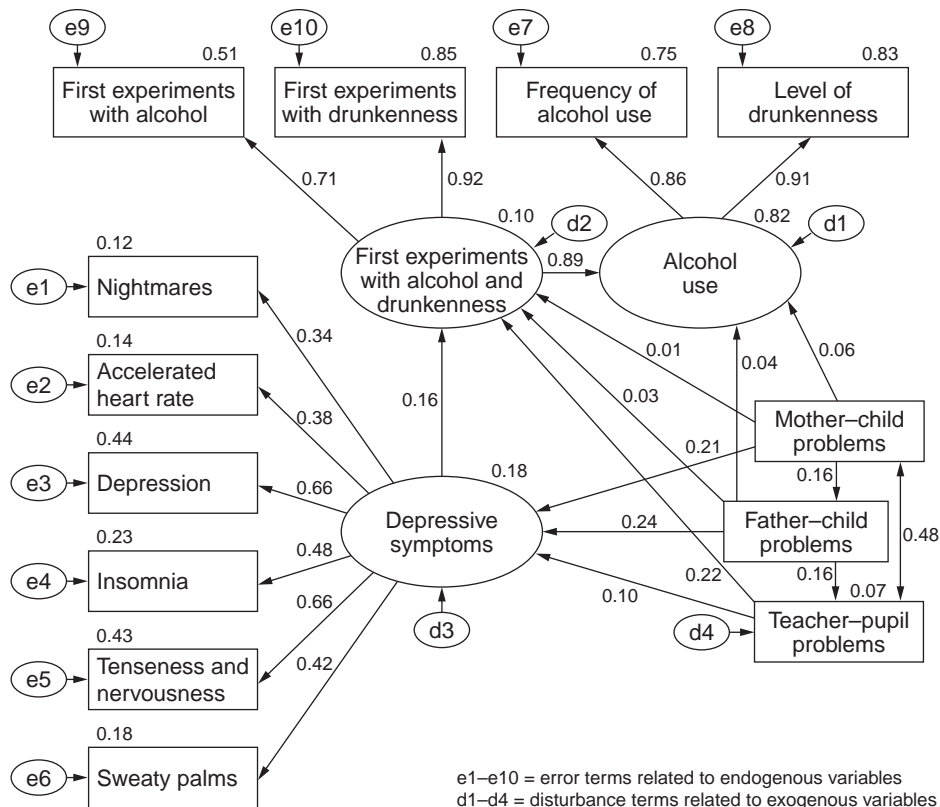


Figure 1 Standardized estimates of parameters in a social ecology model predicting ninth-grade adolescents' alcohol use in Pitkäranta and in eastern Finland for whole data

Table 4 Squared multiple correlations of the observed and unobserved predictor variables and of the dependent variable for boys and girls in Pitkäranta and in eastern Finland

Environmental variable	Country sample for boys		Country sample for girls	
	Pitkäranta	Eastern Finland	Pitkäranta	Eastern Finland
Observed variable				
Teacher–pupil problems	0.191	0.089	0.079	0.102
Unobserved variables				
Depressive symptoms	0.067	0.161	0.188	0.166
Experiments with alcohol	0.150	0.156	0.169	0.126
Alcohol use	0.667	0.823	0.866	0.804

Table 5 Standardised direct, indirect, and total effects of selected environmental variables on alcohol use among boys in Pitkäranta and in eastern Finland

Environmental variable	Direct effect		Indirect effect		Total effect	
	Pitkäranta	Eastern Finland	Pitkäranta	Eastern Finland	Pitkäranta	Eastern Finland
Experiments with alcohol	0.808	0.896	0.000	0.000	0.808	0.896
Teacher–pupil problems	0.000	0.000	0.278	0.298	0.278	0.298
Mother–child problems	–0.010	0.040	–0.012	0.153	–0.022	0.193
Father–child problems	0.038	0.012	0.187	0.044	0.225	0.056
Depressive symptoms	0.000	0.000	–0.048	0.117	–0.048	0.117

$\chi^2 = 176.3$, $df = 110$, $P < 0.001$

CFI (comparative fit index) = 0.966

CMIN/DF (minimum discrepancy divided by its degrees of freedom) = 1.603

RMSEA = .024 (90% confidence interval = 0.017–0.030)

Squared multiple correlation for alcohol use: in Pitkäranta 67%, in eastern Finland 82%

parents and teachers, and depressive symptoms. The SEM approach was an appropriate methodology to obtain precise estimates of the predictors. It helped us to discover the cultural differences by allowing comparisons of the integrated and complex models, as suggested by many authors (e.g. Kumpfer and Turner, 1991; Stevens, 2001). The good fit and cross-validation indices and the signs of the parameters supported the study hypotheses. The same models were found to hold in Pitkäranta and in eastern Finland. This indicated that the measures were culturally acceptable, and that the models could be used in comparisons of two different cultures. The results of this study supported the hypothesised presumptions of adolescents' alcohol use being affected by depressive

responses to unsuccessful social relationships with parents and teachers (Hawkins *et al*, 1992). Hence, similarities, but also notable differences, in the predictor variables in Pitkäranta and eastern Finland and between the sexes were found. This enhanced our understanding of the cultural diversity in adolescents' alcohol drinking behaviour.

In cultural comparisons, a number of factors may affect the validity and reliability of the results. In retrospective reporting, some of the information may be inaccurate due to intentional and unintentional errors of recall by the respondents (Dufour, 1999; Golub *et al*, 2000). The most serious problem in comparative settings is systematic error, which means that information may be reliable but incorrect. The

Table 6 Standardised direct, indirect, and total effects of selected environmental variables on alcohol use among girls in Pitkäranta and in eastern Finland

Environmental variable	Direct effect		Indirect effect		Total effect	
	Pitkäranta	Eastern Finland	Pitkäranta	Eastern Finland	Pitkäranta	Eastern Finland
Experiments with alcohol	0.920	0.859	0.000	0.000	0.920	0.859
Teacher–pupil problems	0.000	0.000	−0.008	0.214	−0.008	0.214
Mother–child problems	0.054	0.104	0.335	0.026	0.389	0.130
Father–child problems	−0.101	0.067	0.057	0.174	−0.044	0.241
Depressive symptoms	0.000	0.000	0.147	0.143	0.147	0.143

$\chi^2 = 236.0$, $df = 110$, $P < 0.001$

CFI (comparative fit index) = 0.939

CMIN/DF (minimum discrepancy divided by its degrees of freedom) = 2.146

RMSEA = .032 (90% confidence interval = 0.026–0.038)

Squared multiple correlation for alcohol use: in Pitkäranta 87%, in eastern Finland 80%

adolescents in Pitkäranta, because of the transient social atmosphere, may tend to give more socially desirable answers compared to their counterparts in eastern Finland (Embree and Whitehead, 1993).

The results concerning the major causal effects of the first experiments with alcohol and drunkenness on adolescents' alcohol use warrant some caution because of the cross-sectional research design. There may be some speculation as to whether these concepts are quite identical. However, no concern about the modification indices arose to support the uniqueness of the concepts. The findings of indirect effects mediated by the first experiments with alcohol also supported the idea of separate concepts. It must be kept in mind that a relatively small proportion of the predictor variables were explained by the selected variables. There is hence a need to study the factors that predict the first experiments with alcohol more comprehensively.

However, a good overview of the theoretically and practically important predictors of adolescents' alcohol use in two different cultures was obtained. An important finding was that both family- and school-related factors had an influence on adolescents' depressive symptoms and alcohol use in both country samples. The results supported the earlier findings on the connections between adolescents' social relationships, depression, first experiments with alcohol, and alcohol use (Ebeling *et al*, 1999; Pitkänen, 1999; Aseltine and Gore, 2000; Kumpulainen, 2000; Hellandsjo Bu *et al*, 2002). Indirect influences were highlighted. The findings were consistent with those reported by Hawkins and colleagues (1997), who, in their SEM

study of the predictors of alcohol misuse, found a powerful effect of early age at alcohol initiation on later alcohol misuse. The earlier findings of an association between a lack of social support and depression (Kaltiala-Heino *et al*, 2001), between early initiation of alcohol use and depression (Costello *et al*, 1999), and between school-related factors and depression (Glieb and Pine, 2002) were also confirmed.

In the comparisons of direct, indirect, and overall effects, broad sex-related cultural differences emerged. In earlier studies, sex (Barber *et al*, 1998) and cultural background (Graham, 1996; Kloep *et al*, 2001) turned out to be significant predictors of adolescents' alcohol use. An interesting finding in this study was that depressive symptoms increased girls' alcohol use in both country samples, while among boys, they only increased alcohol use in eastern Finland. This difference may be explained by cultural factors, but also by the U-shaped relationship between depressive symptoms and alcohol use. In a study of adults, similar characteristics of a higher level of depression and anxiety were seen in hazardous drinkers and abstainers (Rodgers *et al*, 2000). Windle and Davies (1999) found similar connections among adolescents. In a study of Norwegian youths, early intoxication was related to symptoms of poor mental health in young adulthood among females, but the U-shaped association between the first intoxication and psychological problems among males implied that both early and late male beginners had more such problems than those who followed the mainstream (Pape and Hammer, 1996). The results pertaining to adolescents' psychological health and wellbeing in Russia (Charman and

Pervova, 1996; Jose *et al*, 1998) and Finland (Suominen *et al*, 1998; Aalto-Setälä *et al*, 2002) challenge health promotion practitioners to focus on broader approaches in adolescents' health promotion in social and healthcare and schools.

Another cultural difference discovered in this study was that problems with the father rather than with the mother predicted boys' drinking in Russian Karelia, whereas problems with the mother rather than with the father predicted drinking among boys in eastern Finland. To better understand the cultural diversity in adolescents' drinking, we should explore beyond the traditional predictors of adolescents' alcohol use. In future research, attention should be given to a multitude of socio-cultural and historical factors as a key influence on adolescents' drinking (Herd, 1994; Johnstone *et al*, 1996; Kloep *et al*, 2001).

As in many other studies, family- and school-related factors turned out to be the key variables for adolescents' health and health-compromising behaviour (Slonim-Nevo and Sheraga, 1997; Samdal *et al*, 2000; Kaltiala-Heino *et al*, 2001; Laukkanen *et al*, 2001; Konu *et al*, 2002). Improvement of adolescents' family and school environments is an important task in enhancing adolescents' wellbeing in Russia and Finland. Co-operation between teachers, parents, researchers, and policy makers is necessary. The results of the study could be used to develop effective and appropriate health promotion strategies in healthcare and school settings in both the western and the eastern parts of Europe.

Conclusions

In future research, multilevel and integrative approaches, as suggested by the proponents of the socio-ecological perspective, are essential in viewing adolescent health. This study challenges policy makers, teachers, and health promotion practitioners in social and healthcare to identify depressed adolescents and adolescents with problems in social relationship. It urges them to recognise the need to maintain adolescents' psychological wellbeing in order to prevent alcohol use. Enhancement of the quality of social relationships, quality of life, and living environment of these adolescents could probably reduce later alcohol misuse and other related problems.

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CONFLICTS OF INTEREST

None.

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