Association of Socio-economic Factors with Health Risk Behaviours Among High School Students in Rural Nova Scotia

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ABSTRACT

Objective: To determine the association of socio-economic (SES) factors with risk behaviours among adolescents.

Methods: A cross-sectional survey was carried out on students in four high schools in northern Nova Scotia, Canada. Associations between SES variables and substance use behaviours, having early intercourse and suicide attempt in the past year were examined using multivariate analysis (logit regression). Negative binomial regression was performed for associations of SES with a total risk score summing risk behaviours.

Results: Participants included 2,198 students (48% males; 52% females) ranging in age from 14 to 20 years. Almost 25% of youth smoked regularly, 19% of males smoked marijuana ≥ 10 times monthly, more than 40% of males regularly drank excessively, and 10% of students > 14 years old had had intercourse before age 15. Smoking was the behaviour most often associated with lower SES in both genders. Mother's not being employed was protective against all substance use variables except driving after drinking. Living both with lone mother and in any family arrangement other than with both parents was associated with smoking, using marijuana, and early sex. Higher risk score was associated with living with a lone mother or other family arrangement. Lower risk score was associated with father having more than high school education and mother not working.

Interpretation: Lower socio-economic status is associated with adolescent risk behaviours. These findings point to the importance of these factors to risk-taking in youth, their relevance to social policy, and also their importance as factors to consider in targeted interventions.

La traduction du résumé se trouve à la fin de l'article.

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Adolescence is a time of experimentation, increasing risk of poor sexual health, smoking, substance use, and psychological distress.^{1,2} Pregnancy occurs in approximately 4% of Canadian females aged 15-19 annually,³ and sexually transmitted diseases (STDs) are most common among younger Canadians.⁴ Early intercourse is associated with motherhood before 18,⁵ and increased STD risk.⁶ Adolescent alcohol and tobacco use are both felt to predict other drug use, and most smokers start before age 19.^{7,8} Marijuana use is associated with decreased school performance, and both alcohol and marijuana use are associated with sexual risk-taking.^{9,10} Suicide is an increasing cause of death among adolescents.^{11,12}

Though associations between socio-economic status (SES) and adolescent health and risk-related behaviours have been established elsewhere,^{13,14} Canadian studies are few, despite data linking SES to well-being in Canadian children¹⁵⁻¹⁷ and adults.¹⁸ This may be due to the literature's focus on early child development, and the fact that Canadian databases have either missing, or no, adolescent information.¹⁹⁻²¹ In the current study, all students in grades 10 to 12 at four high schools in northern Nova Scotia were asked to complete surveys measuring health status, to allow ongoing assessment of school-based health services. The counties are rural; each has a population of approximately 50,000, and the county seats have $\leq 10,000$ citizens. Less than 2% of the population represents visible minorities, compared with 3.5% seen in the province overall, and average education and income are slightly less than provincial levels.²² The study's purpose was to examine associations of risk behaviours with family socio-economic (SES) status measures.

METHODS

All students in grades 10-12 at all four schools were asked to participate in a health behaviour survey which included questions about substance use, sexual behaviour, self-harm behaviour and socio-economic status. Substance use information included whether or not, during the past month, the adolescent had: smoked on ≥ 10 days; drank ≥ 5 drinks during one setting more than once; used marijuana on ≥ 10 occasions; or driven while drunk. Sexual intercourse before age 15 (early sex)

and suicide attempt in the previous twelve months were also examined. Obtaining family income from adolescents is difficult,²³ but parental education and work patterns are known to correlate well with household income.²⁴ Socio-economic data included: family structure (two-parent family, lone-mother family, or other); parental education (completion of <high school, high school, or >high school); and parental employment (not employed, employed full time, or employed part time). Substance use and suicide questions were adapted from the CDC Youth Risk Factor Surveillance instrument.²⁵ Sexual health and SES questions were formulated by the investigators. Face and content validity for these were established by a national panel consisting of Canadian experts in sexual health survey research. Reliability was established by repeat questionnaire administration to 31 students at another school. Kappa statistics ranged from 0.76 to 1.0.²⁶

Surveys were administered during May-June, 2000, by trained teachers during regular class time, with research team members providing assistance. All students in all four schools were given the opportunity to participate. Teacher training included a one-hour workshop in which survey con-

TABLE I**Proportion of Respondents with Demographic Characteristics by Gender**

Demographic Characteristic	Females (N=1141)		Males (N=1057)		p-value
	Number Responding	%	Number Responding	%	
Grade	1141		1057		NS
10		33.9		38.2	
11		34.1		31.1	
12		32.0		30.7	
Family Structure	1137		1053		
Both natural parents		65.9		71.2	
All other living arrangements		34.1		28.8	<0.01
Mother only*		16.3		13.0	<0.05
Mother's Education†	1086		971		<0.05
Did not complete high school		10.2		8.9	
Completed high school		35.2		40.4	
Completed post-secondary education		54.6		50.8	
Father's Education†	1014		934		NS
Did not complete high school		15.4		15.3	
Completed high school		34.0		33.2	
Completed post-secondary education		50.6		51.5	
Father's Employment†	1074		1005		NS
Employed full time		87.9		85.8	
Not employed full time		12.1		14.2	
Mother's Employment†	1124		1031		NS
Employed full time		60.1		61.6	
Not employed full time		39.9		38.4	

* Does not sum to 100% since "Mother Only" also appears in "All Other Arrangements".

† One response option for these items was "Don't Know".

tents/application were discussed, and techniques for maintaining confidentiality were demonstrated. Informed consent was obtained from students. Ethical approval was granted by the Dalhousie University Health Sciences Human Research Ethics Board.

Analysis was performed using SPSS Version 10 and Stata Version 7.0. First,

univariate analysis using the χ^2 statistic examined relationships between individual risk behaviours and SES factors. Second, logistic regression was performed to ascertain relationships between individual risk behaviours and SES factors controlling for gender, age, grade and school. Finally, each of the six risks was given a score of "one" if present in the individual and "zero" if not

TABLE II**Proportion of Adolescents Grades 10-12 with Risk Behaviours, by Gender and Grade**

	Males				Females			
	Grade 10 (n=404)	Grade 11 (n=329)	Grade 12 (n=324)	p-value	Grade 10 (n=387)	Grade 11 (n=389)	Grade 12 (n=365)	p-value
Smoked ≥ 10 days past month	25.1	21.3	28.1	NS	21.1	25.7	25.2	NS
Used marijuana ≥ 10 times past month	20.2	19.5	18	NS	4.4	8.0	9	<0.05
Five or more drinks on >1 occasion past month	31.6	45.1	50.2	<0.001	23.4	26.0	33.2	<0.01
Drove after drinking at least once past month	7.0	11.3	14.2	<0.01	4.7	6.2	4.7	NS
Vaginal sex before age 15*	14.2	10.9	10.3	NS	14.1	10.9	10.2	NS
Made suicide attempt in past year	2.8	3.1	2.8	NS	6.8	7.7	4.4	NS

* calculated for those >14 years of age for all students, whether sexually experienced or not

TABLE III**Proportions of Male Students with Risk Behaviours by SES Factors**

	Living With			Mother's Completed Education Level			Father's Completed Education Level			Mother Employed			Father Employed		
	Both Parents	Any Other	Mother Only	<High School	High School	Post-Secondary	<High School	High School	Post-Secondary	Full Time	Part Time	No	Full Time	Part Time	No
Smoked ≥ 10 days past month	21.8	32.7***	32.7*	30.6	29.1	19.8**	31.5	25.7	20.6*	24.6	26.6	22.7	23.5	39.5	28.2*
Marijuana ≥ 10 times past month	16.1	27.4***	27.7**	26.7	21	16.9	22.4	18.2	17.9	20.0	20.1	15.1	18.9	30.2	19
≥ 5 drinks in one setting															
> once past month	40.9	43.2	42.9	48.2	43.7	40.4	45.5	47.6	38.9*	43.7	31.2	42.8**	41.6	39.5	45.6
Drove after drinking at least once past month	9.9	12.3	9.8	16.3	11.5	9.0	16.8	11.1	8.3*	10.8	7.2	13.4	9.9	9.3	17.7
Vaginal sex before age 15†	9.4	18.6***	14.8	18.8	13.9	9.4*	14.6	15.2	8.6*	12.5	12.3	9.8	12.1	14.3	10.3
Suicide attempt in past year	2.7	3.3	0.9	4.7	2.6	2.6	3.5	3.3	2.5	2.9	2.9	2.7	2.6	2.3	5.1

* p<0.05

** p<0.01

*** p<0.001

† calculated for those >14 years

TABLE IV

Proportions of Female Students with Risk Behaviours by SES Factors

	Living With			Mother's Completed Education Level			Father's Completed Education Level			Mother Employed			Father Employed		
	Both Parents	Any Other	Mother Only	< High School	High School	Post-Secondary	< High School	High School	Post-Secondary	Full Time	Part Time	No	Full Time	Part Time	No
Smoked ≥ 10 days past month	18.3	35.6***	30.6**	31.2	26.1	21.3*	35.1	25.6	18.6***	26.6	19.6	20.3*	22.3	32.1	34.4**
Marijuana ≥ 10 times past month	5.3	10.6**	10.3*	9.9	7.6	6.8	10.3	6.7	6.4	8.0	5.3	5.8	6.8	5.5	10.4
≥ 5 drinks in one setting >once past month	25.2	31.7*	29.9	28.8	28.1	27.2	30.1	32.4	23.8*	28.6	26.2	25.2	28.2	16.1	27.1
Drove after drinking at least once past month	5.7	4.1	3.5	3.6	5.8	4.7	5.1	6.4	4.1	6.2	2.2	4.9	5.5	1.8	6.3
Vaginal sex before age 15†	8.3	18.5***	17.9***	20.7	11.1	10.2**	24.8	12.2	6.5***	11.6	11.1	13.4	10.3	21.4	17.9**
Suicide attempt in past year	4.6	9.9**	9.0*	11.1	3.7	6.6*	7.8	6.5	5.1	5.7	6.3	7.2	6	9.1	9.4

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$ † calculated for those > 14 years

TABLE V

Odds Ratios (95% CI) for Individual Risks, Both Sexes

	Smoked > 10 Days Past Month (N=2073)	Marijuana ≥ 10 Times Past Month (N=2085)	≥ 5 Drinks at One Setting > Once Past Month (N=2083)	Drove After Drinking at Least Once Past Month (N=2085)	Vaginal Sex Before Age 15† (N=2069)	Suicide Attempt in Past Year (N=2091)
Female	1.02 (0.82-1.26)	0.35 (0.25-0.45)*	0.52 (0.43-0.63)*	0.47 (0.33-0.66)*	1.00 (0.75-1.32)	2.07 (1.33-3.22)**
Age	1.67 (1.43-1.95)*	1.62 (1.34-1.97)*	1.49 (1.28-1.72)*	1.35 (1.07-1.69)**	1.34 (1.10-1.64)**	1.01 (0.74-1.37)
Grade (Grade 10 is base)						
11	0.60 (0.44-0.81)**	0.68 (0.46-1.00)	0.99 (0.75-1.30)	1.27 (0.78-2.05)	0.56 (0.38-0.82)**	1.21 (0.68-2.14)
12	0.40 (0.26-0.61)*	0.42 (0.25-0.71)**	0.89 (0.61-1.29)	0.92 (0.47-1.74)	0.36 (0.21-0.61)*	0.72 (0.32-1.67)
School (School D is base)						
A	1.06 (0.79-1.41)	0.35 (0.22-0.57)***	1.93 (1.49-2.50)*	0.77 (0.47-1.26)	1.63 (1.14-2.33)**	0.90 (0.51-1.59)
B	0.88 (0.62-1.23)	0.80 (0.51-1.14)	1.92 (1.45-2.53)*	1.24 (0.78-1.97)	0.93 (0.60-1.45)	0.70 (0.36-1.39)
C	1.68 (1.27-2.23)*	0.54 (0.36-0.82)**	1.07 (0.81-1.41)	0.87 (0.54-1.41)	1.05 (0.70-1.57)	1.01 (0.57-1.79)
Living With (Both parents is base)						
Lone mother	1.39 (1.01-1.93)***	1.77 (1.07-2.67)**	1.22 (0.89-1.67)	0.75 (0.42-1.33)	1.67 (1.11-2.50)***	1.15 (0.60-2.20)
Other living arrangement	1.55 (1.05-2.28)***	2.38 (1.51-3.77)**	1.39 (0.95-2.02)	0.92 (0.48-1.74)	1.71 (1.05-2.78)***	1.59 (0.79-1.11)
Mother's Education (High school is base)						
< High school	1.03 (0.71-1.50)	1.30 (0.81-2.01)	1.07 (0.75-1.53)	0.89 (0.50-1.61)	1.52 (0.97-2.36)	2.48 (1.25-4.93)**
> High school	0.74 (0.58-0.94)***	0.74 (0.53-1.01)	0.92 (0.74-1.15)	0.82 (0.56-1.20)	0.90 (0.65-1.25)	1.64 (0.98-2.77)
Father's Education (High school is base)						
< High school	1.24 (0.89-1.73)	1.31 (0.85-2.02)	0.94 (0.68-1.28)	1.36 (0.83-2.23)	1.38 (0.93-2.03)	0.96 (0.50-1.84)
> High school	0.87 (0.67-1.13)	1.26 (0.89-1.78)	0.73 (0.58-0.92)**	0.80 (0.53-1.21)	0.59 (0.42-0.85)**	0.69 (0.42-1.16)
Mother's Employment (Employed full time is base)						
Not employed	0.67 (0.49-0.91)**	0.59 (0.39-0.88)***	0.67 (0.52-0.90)**	0.96 (0.62-1.48)	0.70 (0.65-1.42)	1.29 (0.75-2.21)
Employed part time	0.91 (0.69-1.19)	0.91 (0.64-1.29)	1.02 (0.80-1.30)	0.57 (0.34-0.93)***	1.12 (0.79-1.61)	1.18 (0.70-1.99)
Father's Employment (Employed full time is base)						
Not employed	1.59 (1.02-2.47)***	1.39 (0.78-2.49)	0.92 (0.59-1.44)	1.47 (0.76-2.84)	1.17 (0.66-2.06)	1.83 (0.89-3.78)
Employed part time	1.57 (1.00-2.49)***	1.42 (0.78-2.59)	0.65 (0.40-1.06)	0.60 (0.23-1.54)	1.35 (0.76-2.40)	1.14 (0.47-2.75)

* $p < 0.001$ ** $p < 0.01$ *** $p < 0.05$ † calculated for those > 14 years

present, creating a score ranging from 0 to 6. Negative binomial regression was performed for total risk score, again controlling for gender, age, grade and school.

RESULTS

In May 2000, 2,832 students were registered in grades 10-12 at the four schools. Thirty-one students could not provide consent, and 7 were refused participation by parents. Of the remaining 2,794 students,

2,198 (48% males; 52% females; 79% of registered students) participated. The mean age of males and females was 16.8 (s.d. 1.1 and 1.0 respectively; range 14 to 20).

Distribution of school and SES factors by gender is seen in Table I. Females were significantly more likely to live with other than both natural parents and to have mothers who had completed post-secondary education.

Risk behaviours by gender and grade are seen in Table II. Smoking was consistent

across grades for both genders. Marijuana use, though less prevalent in females, increased after grade 10 in young women. Heavy drinking increased with grade in both genders, and as with marijuana use, was more frequent in males. Drinking and driving increased with grade level in males. Grade had no association with having sex before age 15 or with suicide attempt.

Associations of risk behaviours with socio-economic factors for males are seen in Table III. Living with other than both

natural parents, and lower paternal education were most often associated with risk behaviours. Smoking was associated with all SES variables except mother's employment. Heavy drinking and driving after drinking were associated with lower paternal education, while marijuana use was associated with family structure. Early sexual intercourse in males was associated with living with other than both parents and parental education for both genders. No associations were seen with SES factors and suicide attempt.

Table IV indicates similar associations for young women. Associations with risk behaviours were most often seen with family structure. As with males, smoking was most often associated with variables indicating lower SES. Though females tended to use marijuana and alcohol less than males, similar associations were seen with SES factors. Intercourse before age 15 in females was associated with all factors except mother's employment. Suicide attempt was associated with family structure, and with mother's education.

Table V shows results of logistic regression of SES factors on each risk behaviour, controlling for age, gender, grade and school. Age was positively associated with all risk behaviours except for suicide attempt. Females were less likely to use substances, but more likely to have attempted suicide. Those whose mothers had less than high school education were more likely to have attempted suicide, and those whose mothers had more than high school were less likely to smoke. More paternal education was protective for heavy drinking and early sex. Mother's not being employed was protective against all substance use behaviours except driving after drinking, and father's not being employed was associated with smoking. Living both with lone mother and in any family arrangement other than with both parents was associated with smoking, using marijuana, and early sex.

Total risk score was examined using negative binomial regression to assess SES factors for both genders combined (Table VI). Being male and being older were associated with higher risk score. Living with a lone mother or other family arrangement, as compared with living with both parents, was associated with a higher risk score. Having a father with greater than high

TABLE VI

Negative Binomial on Risk Score (0 to 6) All Individuals

Variable	Coefficient	z	P> z	[95% C.I.]	
Female	-0.275	-5.02	0.000	0.382	-0.167
Age	0.278	7.15	0.000	0.202	0.354
Grade (Grade 10 is base)					
11	-0.170	-2.21	0.027	-0.322	-0.019
12	-0.397	-3.82	0.000	-0.601	-0.193
School (School D is base)					
A	0.107	1.45	0.148	-0.038	0.254
B	0.071	0.86	0.389	-0.091	0.233
C	0.047	0.61	0.543	-0.105	0.199
Live With (Both parents is base)					
Lone mother	0.210	2.47	0.014	0.043	0.378
Other	0.310	3.11	0.002	0.115	0.505
Mother's Education (High school is base)					
< High school	0.144	1.51	0.132	-0.043	0.332
> High school	-0.118	-1.88	0.061	-0.2413	0.005
Father's Education (High school is base)					
< High school	0.102	1.21	0.227	-0.063	0.269
> High school	-0.162	-2.42	0.015	-0.294	-0.031
Mother's Employment (Full time is base)					
Not employed	-0.198	-2.56	0.010	-0.349	-0.046
Part time	-0.042	-0.60	0.547	-0.181	0.096
Father's Employment (Full time is base)					
Not employed	0.186	1.60	0.109	-0.041	0.415
Part time	0.042	0.34	0.735	-0.205	0.290

Number of obs = 2045

LR chi² = 163.73

Prob > chi² = 0.0000

Log likelihood = -2681.0784

school education and a mother who was not working were protective.

DISCUSSION

In this study, almost 25% of youth reported regular smoking, 19% of males smoking marijuana ≥ 10 times per month, and more than 40% of males regularly drinking excessively. Drinking and driving were common. These findings are similar to previous Canadian²⁷ and Nova Scotian studies.²⁸ The proportion of those who reported suicide attempt (4.7%) was lower than reported elsewhere. In British Columbia, 7% of youth in grades 7-12 reported a suicide attempt in the previous 12 months.²⁷ The U.S. Youth Risk Behavior Surveillance Survey found that 8.3% of grade 9-12 students reported a suicide attempt in the past year.²⁹ More than 10% of students overall (i.e., whether sexually experienced or not) indicated having had intercourse at $\leq$ age 14, similar to findings from the 1996 National Population Health Survey.³⁰

Parental education and employment were related to substance use. Logistic regression for both genders combined revealed that, for smoking, mother's having more than high school was protective. Father's having more education was protective for heavy drinking, while father's not being employed full time increased risk of smoking. Mother's not being employed

was protective for smoking, marijuana use, and drinking. These findings contribute to the little that is known about associations of SES with adolescent substance use. Using the Canadian National Population Health Survey (NPHS), Curtis demonstrated that adolescents in low-income families were more likely to smoke and drink regularly.¹⁹ Similarly, Blum found that smoking was less common among affluent U.S. youth, and that drinking was slightly more frequent among affluent older youth.³¹

Family structure was also associated with increased substance use. Living with other than both parents, including with a lone mother, was associated with smoking and marijuana use. Findings from the NPHS indicated that living with both parents was associated with fewer substance risk behaviours. The authors of that study argued that living apart from parents might be associated with a context in which risk behaviours would be explored.³² Our finding that adolescents living in lone-mother households experience increased risk of smoking and marijuana use indicates that factors other than living independently may be operative.

Living with other than both parents increased risk of early sex, while father's having more than high school decreased same. The U.S. National Longitudinal Study of Adolescent Health found that liv-

ing in a single-parent family was associated with sexual experience regardless of income.³¹ In addition, Santelli, using the 1992 Youth Risk Factor Survey data, found that greater parental education and living in a two-parent family were independently associated with never having had intercourse.³³

The only SES variable associated with suicide attempt was lower maternal education. SES has been associated with teenage suicide attempts in the U.K.,³⁴ and a longitudinal study in the U.S. found that suicide attempt was associated with lower family income when gender was controlled.³⁵ Though our analysis was limited by relatively low prevalence, our finding indicates that SES may also be a factor for youth suicidal behaviour in Nova Scotia.

This study provides evidence of the importance of family socio-economic conditions, including family structure, with risk-taking in youth. When SES factors were regressed against risk score, family structure other than living with both parents and decreased paternal education were associated with higher risk score, while mother's not working was associated with lower score. This latter finding might be related to SES, since mothers able to remain at home may have higher SES. Our study attempted to control for SES, but it should be recognized that even with excellent measures of such status, this is done imperfectly. Such a relationship could also be explained by decreased parental supervision, which has been associated with increased adolescent substance use.^{36,37} With respect to sexual behaviours, Ku found that adolescent males whose mothers were employed during their childhood were more likely to have had intercourse than those whose mothers had not worked.³⁸ Studies in New Brunswick and British Columbia, Canada, have demonstrated that where women on social assistance were given employment, their adolescent children's substance use increased.³⁹ Our findings add weight to the importance of carefully considering approaches such as "workfare" as answers to complex social problems.

This study was limited to an essentially rural region, and may not reflect conditions in urban areas. Only adolescents attending school were represented, and the schools were chosen because of their inter-

est in establishing school-based health services. In addition, all schools were rural. However, with the large sample size and high participation rate, the results probably reflect accurately the situation among young people attending school in the communities examined, and to the extent that they are similar to other rural areas in Nova Scotia, behaviours elsewhere in the province.

Social class is a strong predictor of poorer health status,⁴⁰ and here was seen in association with many adolescent risk behaviours. Despite the cross-sectional nature of the data, these findings point to the importance of these factors to risk-taking in youth, their relevance to social policy, and their potential importance as factors to consider in targeted interventions.

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RÉSUMÉ

Objectif : Déterminer les liens entre les facteurs socio-économiques et les comportements à risque chez les adolescents.

Méthode : Nous avons mené une enquête transversale auprès des élèves de quatre écoles secondaires du nord de la Nouvelle-Écosse. Les liens entre les variables socio-économiques et la consommation de drogues, les relations sexuelles précoces et les tentatives de suicide au cours de l'année précédente ont été examinés à l'aide d'une analyse multivariable (régression logistique). Nous avons procédé par régression binomiale négative pour déterminer les liens entre les facteurs socio-économiques et le score total du risque (l'addition des comportements à risque).

Résultats : L'enquête a porté sur 2 198 élèves (48 % de garçons et 52 % de filles) de 14 à 20 ans. Près du quart des jeunes fumaient régulièrement, 19 % des garçons fumaient de la marijuana 10 fois par mois ou plus, plus de 40 % des garçons avaient régulièrement des épisodes de consommation excessive d'alcool, et 10 % des élèves de plus de 14 ans avaient eu des relations sexuelles avant l'âge de 15 ans. Le tabagisme était le comportement le plus souvent associé aux statuts socio-économiques inférieurs pour les deux sexes. Le fait que la mère ne travaille pas protégeait contre toutes les variables liées à la consommation de drogues, sauf l'alcool au volant. Le fait de vivre seulement avec sa mère ou dans toute configuration familiale autre qu'avec ses deux parents était associé au tabagisme, à la consommation de marijuana et aux relations sexuelles précoces. Les scores de risque élevés étaient associés au fait de vivre seulement avec sa mère ou dans une autre configuration familiale atypique. Les faibles scores de risque étaient associés au fait d'avoir un père ayant poussé ses études après l'école secondaire et une mère ne travaillant pas.

Interprétation : Un statut socio-économique inférieur est associé aux comportements à risque chez les adolescents. Les constatations de l'étude montrent l'importance des facteurs recensés dans la propension à prendre des risques chez les jeunes, leur pertinence pour la politique sociale, ainsi que l'importance d'en tenir compte dans les mesures d'intervention ciblées.