ORIGINAL ARTICLE

Time-Use Patterns and the Recreational Use of Prescription Medications Among Rural and Small Town Youth

Ariel Pulver, MSc, PhD(c);[1] Colleen Davison, MPH, PhD;[1,2,3] & William Pickett, MSc, PhD[1,2,3]

1 Department of Public Health Sciences, Queen's University, Kingston, Ontario, Canada
2 Kingston General Hospital Research Institute, Kingston, Ontario, Canada
3 Department of Emergency Medicine, Queen's University, Kingston General Hospital, Kingston, Ontario, Canada

Abstract

Purpose: To examine the relationship between rural and small town adolescents' time-use and an increased risk for recreational use of prescription drugs in rural settings.

Methods: Rural students in grades 9 and 10 (n = 2,393) were asked about past-year recreational use of prescription medications and their time-use in structured and unstructured activity contexts in the 2009/2010 Cycle of the Canadian Health Behaviour in School-aged Children survey. Time-use patterns of rural and small town youth from across Canada were examined using multilevel, multivariate Poisson regression analyses to determine whether they may impact the risk of this kind of substance use.

Findings: Peer time outside school hours and nonparticipation in extracurricular activities were significantly associated with rural youths' recreational use of prescription drugs. Peer drug use, unhappy home lives and frequent binge drinking explained most of these associations.

Conclusions: Structured and unstructured activity contexts within rural settings play a role in the nonmedical use of prescription medications. Results support interventions aimed at increasing structured time-use opportunities in addition to focusing on peer contexts and multiple risk-taking behaviors among rural youth.

Key words drug abuse, epidemiology, health disparities, health promotion, social determinants of health.

Substance use among adolescents is a serious public health concern, particularly for rural and small town communities across North America.[1] Recreational use of prescription medications among youth ages 12-17 has increased more than 200% over recent decades, greater than twice the increase among adults.[2] In fact, young people today are at greater risk of nonmedical use of prescription drugs than youth of the same age born in previous generations.[3] Prevalence rates of nonmedical use of prescription drugs in rural and small town settings have escalated well beyond urban areas.[4] Recent studies from the United States and Canada have demonstrated increased risks in nonmedical use of prescription drugs among rural and small town youth, ranging from 1.26 to 3.32 times that of their urban peers.[5,6] Population density and remoteness appear to affect the preferred substance of abuse among rural youth, including elevated use of prescription medications in this group.[1] The central reasons suggested for the increase in nonmedical use in recent years are the increased availability of opioid

analgesics in the general population[7] compounded by the perceived safety of these medications for nonmedical use among teens.[8]

While this increase in nonmedical use of prescription drugs is problematic, risk factors for this emerging type of substance use remain understudied in these contexts. In Canada, the National Advisory Committee on Prescription Drug Misuse released a report in 2013 calling for investigations addressing knowledge gaps surrounding geographically remote and rural populations and the nonmedical use of prescription drugs.

Over the past 40 years, social scientists have focused a great deal of effort on studying young people's familial, peer, school, and community experiences in order to understand risk behaviors such as substance use. Hirschi's Control Theory of Delinquency is one seminal theoretical perspective.[9] This theory emphasizes the importance of social relationships and social or community engagement in the prevention of, or participation in, risk behaviors. The degree to which a youth will exhibit deviant behaviors varies by their commitment to more conventional behaviors such as academics or extracurricular activities.[9] Many researchers have quantified the relationships described by Hirschi, and much empirical work has examined structured and unstructured activity contexts in relation to deviant behavior.[10-12] The following section will outline the contribution of time-use in structured and unstructured contexts to adolescent risk behaviors, including time with family, time with friends after school and in the evenings, and time in organized extracurricular activities.

Time With Family

Familial relationships are highly influential in shaping youth behaviors, with links to dual versus single parenthood,[6,13] parental supervision and involvement,[14,15] and time spent with family.[16] Time spent with family during meals has been identified as a way to operationalize the measurement of parental closeness and monitoring.[17] Mealtimes can offer opportunities for parents to learn about their children's lives, facilitate communication and trust-building, and identify problematic behaviors such as substance use.[17] In a large national study of grade 6 through 12 students in the United States (n = 99,462), frequent family dinners (5-7 times per week) were inversely associated with the occurrence of high-risk behaviors such as frequent illicit drug use and drinking.[18] A recent systematic review identified strong associations between less frequent family meals and the occurrence of risk behavior.[17] While a rural analysis of substance use and the frequency of family meals is lacking, parental monitoring is a concern for rural families as cited in a recent study of rural parent-adolescent dyads.[19]

Time With Friends

Time spent with friends may occur in structured contexts, such as at school, in a supervised home, or in organized activities. However, between the ages of 10 and 18, youth gain independence and begin to spend more time with friends in unstructured activities,[20] which may increase their risk of problem behavior.[15,21,22] In a study of 438 early adolescents in 3 mid-sized US cities, Pettit et al found that the amount of time spent unsupervised with peers in the *afterschool* period predicted behavioral problems,[15] while links have also been established with substance use.[21] Previous research using data from the Health Behaviour in School-aged Children Study indicated that youth who spent 5 or more evenings out with friends each week were more likely to drink alcohol each month and smoke daily.[22] Other researchers found that youth who spend most time with their friends in street or park settings reported higher rates of substance use than those who spend most time with their friends at school.[14]

Extracurricular Participation

Extracurricular activity contexts differ from unstructured contexts because they are often accompanied by adult supervision, rules, constraints, and goals emphasizing skill-building.[23] Extracurricular participation has been repeatedly linked with positive outcomes in academic performance, school-related affect,[24] self-worth and self-concept,[12] and reduction in adverse behaviors such as violence[11] and smoking.[25]

The opportunity for extracurricular participation in rural schools or communities may be more limited than in larger communities. Schools with fewer opportunities for participation in extracurricular sports display increased signs of high-risk behaviors including arrests, births and the incidence of sexually transmitted infections.[26] A number of studies have indicated that rural adolescents often find their communities lacking in structured recreational opportunities[27,28] and spend much of their leisure time in the home with friends, where they report accessing and using substances and sharing them among peers.[29]

Due to the marked increase in the availability of these prescription medications,[7] the perceived safety of these drugs among youth,[8] and suggestions that this type of substance use is elevated in rural settings[1,6]—an understanding of the risks in a rural setting around this type of substance use is needed. Previous studies indicate that youth who spend time with their parents, peers in structured contexts, and participate in extracurricular activities are at lower risk for using substances in general. This has yet to be specifically studied in a rural context with regard to the recreational use of prescription

medications. Therefore, the aim of this study was to examine the relationship between 4 contexts of rural and small town adolescents' time-use (family meals; time with friends after school; time with friends in the evenings; and extracurricular participation) and the nonmedical use of prescription drugs. It is anticipated that results from this study may help to identify time-use patterns and highlight how these may be affecting the recreational use of prescription medication. These findings can inform priority setting exercises for educational and community policy makers in rural and small town contexts.

Methods

Data Source

The Health Behaviour in School-aged Children Study (HBSC) is an international survey conducted in 43 countries in collaboration with the World Health Organization. The data source for this study was the 2009/2010 cycle of the Canadian HBSC.

Study Sample

There were 10,429 secondary school students ranging from 14- to 16-years old in grades 9 and 10 sampled in the Canadian HBSC. All Canadian provinces were sampled, excluding Prince Edward Island and New Brunswick. The study used a 2-stage cluster sample design where the school was the basic cluster. Active or passive consent was obtained depending on the school boards' policies for conducting classroom-based research. A geographic location for each student was ascertained by school postal code. The HBSC sample included 2,393 students living in rural and small towns as per Statistics Canada definitions (population <10,000).[30]

Exposure Variables

The current study focused on 4 different areas of young people's time-use: time with friends after school and in the evenings, time in extracurricular activities, and time with family. Students indicated how many days per week they spend time with friends right *after school* (*Question: How many days a week do you usually spend time with friends right after school? Answers: 0 d; 1 d; 2 d; 3 d; 4 d; 5d)*. Responses were categorized into few days (0-1), some days (2-3), and most days (4-5). Students also indicated the frequency to which they spend *evenings* out with friends. *(Question: How many evenings per week do you usually spend out with your friends? Answers: 0; 1; 2; 3; 4; 5; 6; 7 evenings)*. Responses were categorized into few evenings (0-1), some evenings (2-4), and most evenings (5-7).

While similar variables and categorizations have been used in studies of unstructured peer time and substance use risk,[22] we acknowledge that time with friends in these hours may indeed occur in structured or supervised contexts. Therefore, some misclassification is plausible, although we expect this would bias our effect estimates towards the null hypothesis.

Time spent in extracurricular activities was determined by asking students if they participate in sport teams, voluntary service, political organizations, religious groups, or other extracurricular activities (*Question: Are you involved in any of these kinds of clubs or organizations? Answers: yes or no for each of the following—I am not involved in any kind of club or organization; sport club or team; voluntary service; political organization; cultural association [music, science or other]; church or religious group; youth club; other club*). Students were considered to be involved in extracurricular activities if they responded yes to at least one type of extracurricular activity; otherwise they were considered as not involved.

For time spent with family, students specified the number of times per week their family sits down at the table together for family dinners (*Question: On average, how many times per week does your family sit down at the table together for dinner/supper? Answers: 0; 1; 2; 3; 4; 5; 6; 7)*. Responses were grouped into few (0-1), some (2-4), and most (5-7). This categorization has been used previously in a large cross-sectional survey of family meals and the occurrence of risk behaviors among adolescents.[18]

Outcome Variable

Nonmedical use of prescription drugs was ascertained by asking students if they have used either pain relievers, stimulants or sedative medications "to get high" in the past 12 months, and examples of each drug class were given. (*Questions: Have you ever taken one or several of these drugs in the last 12 months? Medication to get high: pain relievers [eg, Percodan, Demerol, Oxycontin, Codeine]; stimulants [eg, Ritalin, Concerta, Adderall]; sedatives/tranquillizers [eg, Valium, Ativan, Xanax]. Answers: never, 1-2 times, 3-5 times, 6-9 times, 10-19 times, 20-39 times, 40 times or more)*. If they indicated they had used at least one of the medications they were classified into "any use," and otherwise "no use."

Covariates and Other Potential Explanatory Variables

Demographic variables including age, gender, and socioeconomic status (SES; low, average, and high) have been identified as important determinants of the nonmedical use of prescription drugs and are thus included as covariates.[5,31] Additionally, based on a review

of pertinent literature, factors associated with adolescent substance use and/or time-use were examined as explanatory factors in the relationships between the time-use variables and drug use outcome. These factors include items surrounding peer drug use or personal use of other substances,[32] emotional factors,[33] family structure,[6] cohesion,[31] and community features.[27,34]

Specific covariates assessed in this study were: peer drug use (never/rarely, sometimes, often, I don't know); binge drinking (never or rarely, less than once per month, 2-4 times per month, more than twice per month); and past-year cannabis use (more than once or no use). Emotional well-being covariates included life satisfaction (Cantril ladder ranked 0-10; low life satisfaction ≤6, high life satisfaction ≥7)[35] and school connectedness (based on an 8-item scale of attitudes toward school categorized into low, medium, or high). Family related covariates included having at least 2 adults living in the home (Y/N) and a self-reported happy home life (happy, unhappy, or neither).

Earlier work demonstrated variability in substance use by the distance between rural municipalities and urban centers.[36] For this study, students living in rural and small town locations were classified into living in Metropolitan Influenced Zones (MIZ) as first defined by the Geography Division of Statistics Canada.[30] MIZ classifications relate to the degree to which urban centers influence rural and small town municipalities. They are measured by commuting flows and are founded upon principles of distance, adjacency and accessibility. "Strong" MIZ are rural and small town census subdivisions where 30%-50% of the employed labor force commutes to work in an urban center. "Moderate" MIZ (5%-30% commuting flow) and "Weak" MIZ 0.1% to <5% were also identified. In a "No Metropolitan Influenced Zone," none of the employed labor force commuted to work.[30] Areas of Weak and No Metropolitan Influence were combined into one group.

Finally, because some rural youth describe a lack of recreational opportunities in their communities,[27] we investigated whether or not students' perceptions of whether there were places within their community to spend free time confounds the relationship between time-use and recreational prescription drug use (agree, neither agree nor disagree, disagree). Further measurement details about covariates can be found in the most recent HBSC National Report.[34]

Survey Weights and Statistical Analysis

Data were weighted by grade and province/territory at the analysis stage to ensure the sample remained nationally representative (weights ranged from 0.017 to 3.655).

Multilevel, multivariate Poisson regression was used to estimate relative risks (RR), employing generalized linear mixed models. The modeling philosophy was to build explanatory rather than predictive models of the relationships between rural adolescents' time-use and risk of recreational prescription drug use. Each time-use construct was therefore examined for its independent contribution to the outcome. Separate models were also conducted to avoid issues of collinearity between exposure variables.

Time-use predictors (frequency of spending time after school with friends per week, in the evenings with friends per week, family dinners per week, and involvement in ≥1 extracurricular activities), sociodemographic covariates (age, gender, SES) and other potential explanatory risk factors (peer drug use, happy home life, life satisfaction, family structure, cannabis use, binge drinking, good places available to spend free time in community, school connectedness, metropolitan influence) were initially screened bivariately with the outcome variable of interest. We then investigated whether the bivariate relationships for our time-use predictors and nonmedical use of prescription drugs persisted or changed when adjusted for sociodemographic covariates.

Next, a multivariate regression model using a backwards selection criteria of $P < 0.2$ identified a parsimonious list of risk factors related to the recreational use of prescription medications. Through the final 4 explanatory models, we tested the contributions of each of the time-use predictors independently, while accounting for identified risk factors in the previous step, as well as age, gender and SES. Adjusted risk ratio (RR) estimates and 95% confidence intervals were generated to estimate the measures of effect. Models specified the hierarchical sampling design, accounting for the nested and clustered nature of the study sample, with students nested within schools. Random intercepts were assumed for schools, and fixed effects for the determinants of interest. All statistical procedures were performed using SAS software Version 9.3 (SAS Institute Inc., Cary, NC, USA).

Results

Participant Characteristics

Six percent (n = 143) of the HBSC rural and small town sample reported past year recreational use of prescription drugs, in comparison to 5.0% of urban youth. In the HBSC, the most commonly reported medications used recreationally were pain relievers, followed by stimulants and sedative medications, as has been reported earlier.[37] Table 1 displays a description of the rural and small

Table 1 Characteristics of Student Sample From Rural and Small Towns in the 2009-2010 Cycle of the Canadian HBSC Survey ($n = 2393$) and Proportions of Those Who Used Prescription Medications Recreationally

			Total Sample	Proportion of Past-Year Recreational Use
	Variable		n (%)[a]	% (95% CI)[b]
Demographics	Age	≤14[c]	851 (35.6)	5.2 (3.8–7.0)
		15	1,153 (48.2)	6.2 (4.9–7.9)
		≥16	389 (16.3)	7.0 (4.8–10.3)
	Gender	M	1,128 (47.1)	5.6 (4.3–7.2)
		F	1,265 (52.9)	6.3 (5.1–7.9)
	SES	High	1,251 (53.5)	4.3 (3.3–5.7)
		Average	889 (38.0)	6.1 (4.7–8.0)
		Low	200 (8.5)	**15.8 (11.2–22.2)**
Potential explanatory risk factors/confounders	There are good places to spend free time	Agree	1,134 (49.6)	4.6 (3.5–6.0)
		Neither	493 (21.6)	**7.9 (5.8–10.8)**
		Disagree	658 (28.8)	**7.0 (5.2–9.3)**
	Past year cannabis use	Never	1,690 (73.4)	3.2 (2.4–4.2)
		At least once	614 (26.7)	**13.5 (11.0–16.6)**
	Binge drinking	Never	1,077 (47.3)	3.6 (2.6–5.0)
		≤1 times/month	762 (33.4)	**5.6 (4.2–7.7)**
		2–4 times/month	373 (16.4)	**11.2 (8.3–15.1)**
		2+ times/week	66 (2.9)	**22.6 (13.1–34.8)**
	Life Satisfaction	High	1,735 (73.8)	4.5 (3.6–5.6)
		Low	616 (26.2)	**10.6 (8.2–13.3)**
	Peer drug use	Never/rarely	1,309 (55.9)	2.1 (1.4–3.1)
		Sometimes	577 (24.6)	**8.4 (6.4–11.2)**
		Often	313 (13.4)	**18.9 (14.6–23.8)**
		Don't know	143 (6.1)	**5.2 (2.2–10.3)**
	School connectedness	High	538 (23.6)	4.5 (3.0–6.7)
		Middle	935 (40.9)	4.2 (3.0–5.8)
		Low	814 (35.6)	**8.7 (6.9–11.0)**
	Adults in the home	2+	1,899 (80.2)	5.1 (7.2–12.9)
		<2	468 (19.8)	**9.6 (4.1–6.2)**
	Happy home life	Agree	1,660 (72.3)	4.2 (3.3–5.3)
		Neither	421 (18.3)	**6.8 (4.6–9.7)**
		Disagree	216 (9.4)	**18.2 (13.3–24.1)**
	Proximity to urban center	Weak/No MIZ	656 (27.4)	6.5 (4.7–8.7)
		Moderate MIZ	1,660 (69.4)	5.4 (4.4–6.7)
		Strong MIZ	77 (3.2)	14.2 (7.0–23.9)
Time-use variables	After school with friends	Few	827 (35.3)	4.3 (3.1–6.0)
		Some	973 (41.5)	6.0 (4.6–7.7)
		Most	544 (23.2)	**8.4 (6.2–11.1)**
	Evenings with friends	Few	770 (32.8)	3.7, (2.6–5.5)
		Some	1,182 (50.3)	**6.3, (5.1–8.0)**
		Most	395 (16.8)	**9.1 (6.5–12.6)**
	Dinners per week	Most	1,285 (56.6)	5.5 (4.3–6.9)
		Some	610 (26.9)	5.5 (3.9–7.7)
		Few	375 (16.5)	**8.4 (5.9–11.8)**
	Extracurriculars	Involved	1,790 (74.8)	4.7 (3.7–5.8)
		Not involved	603 (25.2)	**9.8 (7.7–12.7)**

[a]Proportions are accurate within ±3 percentage points, 19 times out of 20.
[b]Bold values signify statistically significant differences compared to the reference group at $\alpha = 0.05$.
[c]The first category for each listed variable represents the reference group for statistical comparisons.

town study sample of youth, as well as proportions of nonmedical use of prescription drugs by 4 time-use variables, demographic variables and other potential explanatory risk factors or covariates.

Demographics

Approximately half of the study sample was 15 years of age, 35.6% were younger and 16.3% were older. The sample was 52.9% female, and 53.5% were of high socioeconomic status, 38.0% average and 8.5% low socioeconomic status. Most students lived in Moderate MIZ (69%) where <30% of the working population commutes to an urban center.

Time-Use Variables

Twenty-three percent of young people from rural and small town settings reported spending most days (4-5 d) with their friends after school, 41.5% some days (2-3 d), and 35.3% few days (0-1 d). With respect to time spent with friends in the evenings, 16.8% of rural and small town youth reported spending most evenings (5+ evenings) out; 50.3% spent some (2-4 evenings), and 32.8% spend few (0-1 evenings) out with their friends. Most youth reported participating in at least 1 extracurricular activity (74.5%). Over half of the sample ate dinner with their families most nights of the week (5+; 56.6%), and 16.5% reported eating dinners with their families once or zero times per week.

Covariates

Twenty-seven percent of rural and small town youth reported past-year cannabis use. Sixteen percent reported binge drinking 2-4 times per month, and 2.9% reported binge drinking multiple times per week. The large majority of youth reported a happy home life (72.3%) and high life satisfaction (73.8%). Approximately 37.0% of the sample indicated that those in their peer group use drugs, sometimes (24.6%) or often (13.4%). A greater proportion of youth reported feelings of low school connectedness (35.6%) than high connectedness (23.6%). Most rural and small town youth reported living with at least 2 adults (80.2%). Twenty-nine percent of youth said good places to spend free time did not exist in their communities.

Regression Analyses

Following regression analyses using backwards selection, our list of covariates included frequency of binge drinking, having a happy home life and peer drug use.

Cannabis use, life satisfaction, school connectedness, living with 2 adults, places to spend free time, and proximity to an urban center were not associated with recreational use of prescription drugs ($P > 0.05$) after accounting for the other covariates. Age, gender and SES were kept in the regression models due to previous literature suggesting strong links with nonmedical prescription drug use.[5,31] Results from the regression models adjusted for age, gender and SES are presented in Table 2. Results from the final models, adjusted for sociodemographics as well as identified risk factors (frequency of binge drinking, having a happy home life and peer drug use) are presented in Table 3.

Time With Friends

Spending most afternoons with friends, as compared to few, was associated with a 1.73 (95% CI: 1.10-2.73) times increase in the risk of recreational use of prescription medications following adjustment for age, gender and SES (See Table 2). The association disappeared after further adjustment for binge drinking, happy home life and peer drug use. Those with peers who use drugs often were 6.74 (95% CI: 3.84-11.82) times more likely to report past-year recreational use than those whose peers never or rarely use drugs. Students reporting an unhappy home life or frequent binge drinking were 2.46 (95% CI: 1.52-3.98) and 2.2 (95% CI: 1.13-4.83) times more likely to report use (see Table 3).

Spending most evenings out with friends was associated with a 2.16 times increase in recreational use of prescription drugs, compared to spending ≤1 evenings with friends per week, adjusted for age, gender, and SES (95% CI: 1.30-3.60; see Table 2). However, this association was no longer statistically significant after adjustment for peer drug use, happy home life and binge drinking. Frequent peer drug use predicted a 6.78 times increase in reports of past-year recreational use of prescription drugs compared to those students with rare or no peer drug use (95% CI: 3.86-11.89). Students with unhappy home lives were 2.43 times more likely to report recreational use of prescription drugs (95% CI: 1.50-3.93). Those who reported binge drinking 2 or more times per week had 2.26 times the risk of use than those who reported never or rarely binge drinking (see Table 3).

Dinners With Family

Students who ate dinner with their families never or only once per week reported higher rates of recreational use of prescription medication than those who ate most dinners with their family (8.5% vs 5.5%). This association was not apparent after adjusting for age, gender and SES (see Table 2).

Table 2 Multilevel, Multivariable Poisson Regression for the Association Between Each of the 4 Time-Use Contexts and the Recreational Use of Prescription Drugs From the Rural and Small Town Sample of the 2009/2010 Cycle 6 of the Canadian HBSC Adjusted by Age, Gender and SES

	Time-use variable		Recreational Use of Prescription Drugs	
			RR 95% CI[a]	P
Adjusted for age, gender, SES only and no other potential explanatory risk factors or confounders				
Model 1	Evenings with friends (ref: few)	Some evenings	**1.74 (1.12–2.72)**	**0.01**
		Most evenings	**2.16 (1.30–3.60)**	**<0.01**
Model 2	Afternoons with friends (ref: few)	Some afternoons	**1.46 (0.95–2.24)**	**0.08**
		Most afternoons	**1.73 (1.10–2.73)**	**0.02**
Model 3	Family dinners (ref: most)	Some dinners	1.06 (0.70–1.62)	0.78
		Few dinners	1.34 (0.86–2.10)	0.20
Model 4	Extracurricular (ref: involved)	Not involved	**1.86 (1.30–2.65)**	**<0.01**

[a]Bold values signify statistically significant differences compared to the reference group at $\alpha = 0.05$.

Extracurricular Participation

Youth who do not participate in extracurricular activities were more likely to report recreational use of prescription drugs, adjusted for age, gender, and SES (RR: 1.86; 95% CI: 1.30-2.65; see Table 2). This pattern remained even after adjusting further for peer drug use, happy home life, and binge drinking (RR: 1.50; 95% CI: 1.03-2.18; see Table 3).

Discussion

The aim of this study was to determine the relationship between rural and small town adolescents' time-use and nonmedical use of prescription drugs. Time-use was measured by looking at time spent with friends outside of school, frequency of family meals and time spent in extracurricular participation. Time spent in structured and unstructured contexts was identified as an important factor associated with nonmedical prescription drug use among rural and small town youth. The findings of this study suggest that time spent with friends after school and in the evenings is associated with nonmedical use of prescription drugs. It was obvious, however, that peer drug use, having an unhappy home life, and frequent binge drinking contribute substantially to those relationships. Teens who do not participate in extracurricular activities are also at greater risk, even after accounting for other factors. We found no effect of the frequency of family dinners on rural youth's recreational use of prescription drugs. This finding is contrary to earlier studies of family dinners and adolescent risk behaviors,[17,18] and it may be explained in a number of ways. Family cohesion has been described as a "double-edged sword" in rural contexts.[28] While rural communities are certainly not homogeneous, particular forms of substance use, such as prescription drugs, have been described as

relatively acceptable in some rural communities in the United States.[4] Rural youth have cited that while close family relationships can be beneficial in avoiding risky situations, some youth were first offered a substance by an adult family member.[28,29] A more robust measure of family time may have revealed an association with drug use. For example, a study using a composite score of family time (eating dinner, celebrating or going on trips with family, etc) found a significant negative association with smoking, alcohol and other drug use, delinquency, and sexual activity.[16] In that study, peer drug use and having an unhappy home were not accounted for, which we found to be significant predictors of use.

In our study, time with friends in both the afternoons and evenings was associated with recreational prescription drug use. These findings align with earlier research using HBSC data linking the frequency of evenings with friends with increased risk of smoking or alcohol use,[22] as well as other studies identifying increased risk of substance use in youth with high levels of peer time.[14,15,21] Our results indicated, however, that the amount of time spent with friends outside of school hours was not associated with the risk of recreational use of prescription drugs after accounting for peer substance use, an unhappy home life and binge drinking. These characteristics may therefore be more important in determining whether or not youth will use prescription drugs recreationally, regardless of time spent with friends. These results add to a large body of work linking substance use among youth to peer substance use[14,38] and nonmedical use of prescription drugs.[32] The context in which peers are spending time together unsupervised is important, as it may provide youth with opportunities to experiment with substances, both in the home and the community.[14,29]

We found that rural youth who reported having an unhappy home life were at increased risk for nonmedical

Table 3 Multilevel, Multivariable Poisson Regression for the Association Between 4 Time-Use Variables and the Recreational Use of Prescription Drugs From the Rural and Small Town Sample of the 2009/2010 Cycle 6 of the Canadian HBSC, Adjusted by Age, Gender, SES and Explanatory Risk Factors

		Model 1 Evenings With Friends (ref: few)		Model 2 Afternoons With Friends (ref: few)			Model 3 Family Dinners (ref: most)		Model 4 Extracurriculars (not involved vs. involved)	
		RR (95% CI)[a]	P	RR (95% CI)[a]	P		RR (95% CI)[a]	P	RR (95% CI)[a]	P
	Some	1.31 (0.81–2.11)	0.26	1.29 (0.83–2.01)	0.26	Some	0.93 (0.60–1.44)	0.75	**1.50 (1.03–2.18)**	**0.03**
	Most	1.09 (0.62–1.91)	0.77	1.14 (0.70–1.85)	0.60	Few	0.92 (0.57–1.49)	0.72		
Age (ref: ≤14)	15	1.20 (0.79–1.81)	0.39	1.18 (0.78–1.79)	0.43		1.21 (0.79–1.84)	0.38	1.17 (0.78–1.76)	0.46
	≥16	1.31 (0.76–2.25)	0.33	1.32 (0.76–2.26)	0.32		1.36 (0.78–2.35)	0.27	1.24 (0.72–2.12)	0.44
Gender (ref: male)	Female	1.19 (0.81–1.73)	0.38	1.20 (0.82–1.75)	0.35		1.17 (0.80–1.72)	0.41	1.14 (0.78–1.66)	0.49
SES (ref: high)	Low	1.59 (0.93–2.74)	0.09	1.60 (0.93–2.76)	0.09		1.50 (0.85–2.65)	0.16	1.57 (0.91–2.70)	0.10
	Average	0.93 (0.61–1.40)	0.72	0.91 (0.61–1.38)	0.67		0.91 (0.60–1.38)	0.67	0.88 (0.58–1.32)	0.53
Peer drug use (ref: never/rarely)	Often	**6.78 (3.86–11.89)**	**<0.01**	**6.74 (3.84–11.82)**	**<0.01**		**6.39 (3.63–11.24)**	**0.01**	**6.37 (3.66–11.09)**	**<0.01**
	Sometimes	**3.54 (2.11–5.96)**	**<0.01**	**3.48 (2.07–5.86)**	**<0.01**		**3.38 (2.01–5.68)**	**0.01**	**3.42 (2.05–5.72)**	**<0.01**
Happy home life (ref: happy)	Neither	1.20 (0.75–1.92)	0.45	1.19 (0.74–1.90)	0.48		1.17 (0.72–1.89)	0.53	1.15 (0.72–1.84)	0.55
	Unhappy	**2.43 (1.50–3.93)**	**<0.01**	**2.46 (1.52–3.98)**	**<0.01**		**2.44 (1.49–4.02)**	**<0.01**	**2.22 (1.37–3.60)**	**<0.01**
Binge drinking (ref: never/rarely)	≤1 times/month	1.04 (0.64–1.68)	0.89	1.06 (0.66–1.71)	0.80		1.13 (0.70–1.81)	0.63	1.12 (0.70–1.79)	0.63
	2–4 times/month	1.22 (0.70–2.11)	0.49	1.25 (0.74–2.13)	0.40		1.33 (0.78–2.26)	0.30	1.28 (0.76–2.17)	0.35
	2+ times/week	**2.26 (1.14–4.48)**	**0.02**	**2.22 (1.13–4.38)**	**0.02**		**2.22 (1.08–4.58)**	**0.03**	**2.22 (1.13–4.36)**	**0.02**

[a]Bold values signify statistically significant differences compared to the reference group at $\alpha = 0.05$.

use of prescription drugs. Earlier studies using slightly different measures to characterize family life have found similar links. For example, weak familial bonds have been found to be a significant predictor of nonmedical use of prescription drugs.[31] Our result, specific to nonmedical use of prescription drugs, is expected given the strong links between relational aspects of family such as family cohesion, closeness and conflict, and problem behaviors including other forms of substance use.[39]

In contrast to the other time-use contexts, even when accounting for other explanatory risk factors, rural teens' extracurricular participation remained a significant determinant for the risk of nonmedical prescription drug use. We found that those with no extracurricular participation were at increased risk of using prescription drugs nonmedically. While one previous study showed no effect of extracurricular participation on smoking and illicit substance use,[16] our result is consistent with much research supporting the benefits of extracurricular participation for youth,[23,38,40] some of which has focused on rural youth specifically.[41,42] The results of our study point to the significance of structured activity contexts in rural settings in particular. This is relevant because limited recreational opportunities have been identified as a principal contributor to mental health issues and engagement in risk behaviors for rural youth.[27,28] In contrast, some research suggests that suburban and urban schools do not offer more activities than rural schools, but that the types of activities offered may differ (eg, urban schools may offer more academic and service activities and rural schools may offer more vocational activities),[43] which may be germane for rural youth with respect to problem behaviors.

Previous research has shown a protective effect of participation in *school-based* activities (eg, student council and Future Farmers of America) and *religious involvement* on rural youths' substance use, while there was no benefit for those participating in *community-based* activities (eg, 4-H and Scouts).[41] Limited involvement in sports or paid work may not confer as much benefit to preventing problem behaviors for rural youth in comparison to heavy involvement in school and in multiple kinds of activities.[10] Unfortunately, the sample size of the present did not allow for disaggregation by different types of extracurricular activities.

Our study was novel in that very few studies have specifically examined risk and protective factors among rural youth for the recreational use of prescription medications, and none have focused on time-use patterns. Other strengths of this study include a relatively large, representative sample size of rural and small town youth in Canada, as well as the use of a multilevel modeling strategy to estimate population-level risk while accounting for similarities of youth within schools.

Limitations

Our study also has a number of limitations that warrant comment. We were underpowered to examine differences across types of extracurricular activities. This may be important because previous studies have indicated that the likelihood of risk behavior can vary by type of activity.[10,41,42] For activity participation to promote positive youth development, it must also involve motivation and concerted engagement occurring over time directed toward a goal.[23] We were unable to assess these factors, and therefore we expect some heterogeneity of the involved group, likely resulting in an underestimation of effect. Somewhat of a lack of variation in other exposure variables could have conceivably led to a ceiling effect. Such a ceiling effect may have attenuated the risk estimates beyond what they may have been in a more heterogeneous, but likely nonrepresentative, sample.

We believe that time spent eating meals with families indeed represents supervised, structured time, as does participation in the extracurricular activities listed in the HBSC survey (sports clubs, religious groups, political organizations, etc). A large body of literature has examined the benefits of youth involvement in these types of structured and supervised activities, focusing on organized activity contexts.[10,44] Our assumptions surrounding unstructured and structured peer activity contexts follow from earlier work,[14,20] suggesting that youth gain increasing independence throughout adolescence and begin to spend less time in structured contexts and more time unsupervised with friends, creating more opportunities for risk behaviors. However, some participants who indicated spending time with friends outside of school may have been in well-supervised and structured settings, particularly in the after school period. Peer time may indeed occur in structured or unstructured contexts, such as in school, in extracurricular activities, or in a young person's home or local neighborhood. For this reason our results may have been attenuated and the true relationship may be more disconcerting than the one we observed. Ideally, more detail would have been collected concerning the structure, monitoring and nature of the activities undertaken with peers.

It is possible that there may be some diversity in time-use patterns unaccounted for by grouping rural and small town youth together. Youth who live in the countryside or on farms, as compared to those who reside in towns, may have differential time-use patterns due to part-time farming work, as well as reduced access to

recreational facilities, perhaps explaining differences in drug use patterns between youth living in variable rural settings found in previous research.[36,37] In this study, however, proximity to urban centers and perceived availability of places to spend free time were not found to be important predictors of nonmedical prescription drug use or confounders of the focal relationships examined.

Another limitation stems from the cross-sectional nature of our data, as we cannot infer a causal or a temporal relationship between time-use variables and reports of nonmedical use of prescription drugs. Moreover, our study sample does not include young people living on First Nations reserves, incarcerated youth, home-schooled students, students without consent, students absent on the day of the survey, and those attending private schools. These youth may be more vulnerable and thus we may be underestimating the true prevalence of nonmedical use of prescription drugs by excluding these groups. Information about drug use was obtained through self-report, which may be subject to social desirability bias and recall error, resulting in some misclassification of our outcome variable. However, it is arguable that self-reports from self-administered questionnaires produce more accurate estimates of substance use among adolescents than other data collection methods.[45]

Conclusions and Implications

In summary, we found that time spent with friends after school and in the evenings was associated with nonmedical use of prescription drugs, following adjustment for age, gender and SES. However, there is indication that other factors such as peer substance use, an unhappy home life and heavy binge drinking may explain this relationship. In addition, rural youth who do not participate in extracurricular activities seem to be at greater risk, even after accounting for other leading risk factors. We found no effect of the frequency of family dinners on rural youth's recreational use of prescription drugs, adjusted for demographic factors. The results of our study not only add to the literature on young people's time-use in structured and unstructured activity contexts and substance use risk, but provide a rural lens through which to examine the issue of nonmedical use of prescription drugs. Effective interventions to reduce the increased risk of recreational use of prescription drugs in rural settings may include more emphasis on creating extracurricular opportunities and encouraging greater participation, particularly among youth displaying signs of problem behaviors or those from more unstable families.

A more detailed examination of structured and unstructured activity contexts in the rural setting, including adult supervision outside of school hours, as well as a disaggregated analysis of types of extracurricular activities, would help to inform our understanding of nonmedical use of prescription drugs among rural youth and enable tailoring of prevention efforts.

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