

## Prevalence of insomnia and its treatment in Canada

Charles M. Morin, PhD<sup>1</sup>, Mélanie LeBlanc, PhD<sup>2</sup>, Lynda Bélanger, PhD<sup>2</sup>, Hans Ivers,  
PhD<sup>2</sup>, Chantal Mérette, PhD<sup>3</sup>, Josée Savard, PhD<sup>4</sup>

<sup>1</sup>Professor, École de psychologie, Université Laval, Québec, Québec; Researcher,  
Centre d'étude des troubles du sommeil, Centre de recherche Université Laval-Robert-  
Giffard, Québec, Québec.

<sup>2</sup>Research Associate, École de psychologie, Université Laval, and Centre d'étude des  
troubles du sommeil, Centre de recherche Université Laval-Robert-Giffard, Québec,  
Québec.

<sup>3</sup>Professor, Département de Psychiatrie, Université Laval, Québec City, Québec;  
Researcher, Centre de recherche Université Laval-Robert-Giffard, Québec, Québec.

<sup>4</sup>Professor, École de psychologie, Université Laval, Québec City, Québec; Researcher,  
Cancer Research Centre, Hôpital Hôtel-Dieu de Québec, Québec, Québec

**Acknowledgement / Funding:** This research was supported by a Canadian Institutes of  
Health Research grant (no 42504) and approved by the Research Ethics Board of  
Université Laval (2001–098).

**Correspondence:** Dr. C M Morin, 2325, rue des Bibliothèques, École de Psychologie,  
Université Laval, Québec, QC G1V 0A6; [cmorin@psy.ulaval.ca](mailto:cmorin@psy.ulaval.ca)

## Abstract

**Objectives:** To estimate the prevalence of insomnia and examine its correlates (for example, demographics and physical and mental health) and treatments.

**Methods:** A sample of 2000 Canadians aged 18 years and older responded to a telephone survey about sleep, health, and the use of sleep-promoting products. Respondents with insomnia were identified using the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision, and the International Classification of Diseases, Tenth Edition, criteria.

**Results:** Among the sample, 40.2% presented at least 1 symptom of insomnia (that is, trouble falling or staying asleep, or early morning awakening) for a minimum of 3 nights per week in the previous month, 19.8% were dissatisfied with their sleep, and 13.4% met all criteria for insomnia (that is, presence of 1 insomnia symptom 3 nights or more per week for at least 1 month, accompanied by distress or daytime impairment). Insomnia was associated with female sex, older age, and poorer self-rated physical and mental health. Thirteen per cent of respondents had consulted a health care provider for sleep difficulties once in their lifetime. Moreover, 10% had used prescribed medications for sleep in the previous year, 9.0% used natural products, 5.7% used over-the-counter products, and 4.6% used alcohol. There were differences between French and English speaking adults, with the former group presenting lower rates of insomnia (9.5%, compared with 14.3%) and consultation (8.7%, compared with 14.4%), but higher rates of prescribed medications (12.9%, compared with 9.3%) and the use of natural products (15.6%, compared with 7.4%).

**Conclusions:** Insomnia is a prevalent condition, although few people seek professional consultation for this condition. Despite regional differences in the prevalence and treatments used to manage insomnia, prescribed medications remain the most widely used therapeutic option.

**Keywords:** epidemiology, insomnia, prevalence, sleep

## Introduction

Insomnia is characterized by difficulty initiating or maintaining sleep, or nonrestorative sleep, and is associated with impairments of daytime functioning.<sup>1,2</sup> Insomnia may present as a symptom or a disorder on its own. It is the most prevalent sleep disorder and its course may be situational, recurrent, or persistent over time.<sup>3</sup> Epidemiologic studies have documented the prevalence of insomnia in several countries around the world but estimates derived from these studies have been extremely variable, with prevalence rates ranging from 5% to 50%.<sup>4</sup> Although this variability may be explained partly by cultural differences, it is most likely attributable to methodological differences across studies (for example, insomnia definitions and different sampling and assessment methods). Two Canadian surveys have also yielded variable prevalence rates of 13.4%<sup>5</sup> and 24%.<sup>6</sup> Both of these studies used a single question to assess the presence of insomnia (that is, difficulties in initiating or maintaining sleep) but used different response formats, which may explain the 10% discrepancy. Indeed, the first study (13.4%) used response choices assessing both the presence and frequency of the symptoms (that is, none of the time to all of the time), while the latter (24%) used a yes or no format, assessing only the presence of the symptom. Neither of these studies assessed the duration, severity, or impact of sleep difficulties on the person's life, indicators that are all part of the standard diagnostic criteria for insomnia.<sup>1,2</sup>

Using a standard algorithm based on a combination of DSM-IV-TR2 and ICD-107 diagnostic criteria for insomnia, our group sampled French-speaking adults in the province of Quebec and found that 29.9% reported insomnia symptoms and 9.5% met all criteria for an insomnia syndrome.<sup>8</sup> Among adults with an insomnia syndrome, 41.9% reported having used prescribed or over-the-counter medications for sleep in the preceding year. Our paper is based on a second survey conducted across Canada to expand on these early findings. The main objectives were to estimate the prevalence of insomnia syndrome and symptoms and their correlates, and to evaluate the rate of health care consultations for sleep problems and the use of sleep-promoting products in Canada. Our study was part of a larger epidemiologic research program aimed at documenting the prevalence and incidence, risk factors, natural history, and burden of insomnia.

## Method

### Definition of Insomnia

An algorithm based on a combination of DSM-IV-TR<sup>2</sup> and ICD-10<sup>7</sup> insomnia diagnostic criteria was used to classify people with an insomnia syndrome or with symptoms. Criteria for an insomnia syndrome were: dissatisfaction with sleep; presence of symptoms of initial, middle, or late insomnia at least 3 nights per week for a minimum of 1 month; and significant distress or daytime impairment related to sleep difficulties. Initial insomnia was defined by sleep onset latency of greater than 30 minutes, middle insomnia was defined by a period of wakefulness after sleep onset lasting more than 30 minutes, and late insomnia was defined by a final awakening occurring more than 30 minutes before the desired wake time combined with a total sleep time of less than 6.5 hours. People reporting insomnia symptoms or sleep dissatisfaction without meeting all criteria for an insomnia syndrome were classified as having insomnia symptoms.

### Sample Selection

The target population consisted of people aged 18 years or older residing in one of the main Canadian regions (that is, British Columbia, the Prairies, Ontario, the Maritimes, and Quebec). A random digit dialing method programmed to generate geographically stratified phone numbers (listed and unlisted phone numbers) according to the last Canadian Census (2006) was used to obtain a representative sample of these 5 regions. The Kish method<sup>9</sup> was then used to identify the interviewee in each household. This method allows for the random selection of participants while taking into consideration the number of residents, their sex, and age. When there was no response in a household, the same phone number was dialed again up to 10 times at different times of the day before being replaced. People who declined to participate in the survey on first contact were called a second time before exclusion.

People were excluded if they did not speak English or French well enough to complete the interview, or suffered from any condition (for example, hearing or cognitive impairment) that might prevent them from completing a telephone interview. Among the 4869 productive phone numbers dialed, 2000 (41%) people accepted to complete the interview. Among those, 1068 were French speaking and 933 were English speaking. Participants were distributed as follows across the main Canadian regions: British Columbia ( $n = 200$ ), Prairies ( $n = 200$ ), Ontario ( $n = 200$ ), Maritimes ( $n = 200$ ), and

Quebec ( $n = 1200$ ). The province of Quebec was oversampled for the purpose of another study that involved an overnight evaluation of sleep.

### **Interview**

Interviews were conducted in French or English by a professional poll company. Interviewers received training and a pilot test was conducted on 44 people (not included in the final sample) to improve the items wording and provide feedback on the interview flow. The 2000 interviews were completed within 4 months (Spring 2007) and the average interview time was 13 minutes.

After obtaining verbal consent, the interviewer proceeded to ask questions about sleep schedules and difficulties, consultations for sleep problems, and the use of products to promote sleep, physical and mental health status, and demographics.

*Sleep and Insomnia.* The first part of the interview covered sleep difficulties in the preceding month, including type of insomnia symptoms, their severity, duration, and impact. Standard questions from the ISI were asked.<sup>10</sup> Respondents rated the severity of their difficulty falling asleep, staying asleep, or waking up too early using a 5-point scale (that is, no difficulty to very severe difficulty). These questions were followed by estimates of weekly frequency of: sleep onset latency exceeding 30 minutes, time awake after sleep onset of greater than 30 minutes, final morning awakening occurring at least 30 minutes before the planned time, and total sleep time of less than 6.5 hours. Participants rated their sleep quality using a 4-point scale (that is, very refreshing to not refreshing) and the weekly frequency of experiencing non refreshing sleep. Sleep satisfaction was then evaluated using a 5-point scale (that is, very satisfied to very dissatisfied). Finally, for people dissatisfied or very dissatisfied with their sleep, or those reporting sleep problems (yes or no question), the duration was recorded and the consequences (that is, impairment of daytime functioning, fatigue, and mood disturbance), noticeability to others, and the level of concern about the difficulties were rated using a 5-point scale (that is, not at all to very much). Participants were also asked if a health care professional had ever diagnosed a sleep disorder other than insomnia (for example, sleep apnea or restless legs syndrome).

*Consultations and Products Used for Sleep Problems.* Respondents were asked if they had ever consulted a health care provider specifically for sleep problems and, if so, the type of provider and if the consultation had occurred in the last year. They were asked if they had used any of the following products to promote sleep in the preceding year: prescription medications (for example, zopiclone), over-the-counter

medications (for example, Nytol), natural products (for example, valerian), and alcohol. They were asked to estimate their weekly use during the preceding month.

*Health.* Respondents were asked to rate their physical and mental health on 5-point scales (that is, excellent to poor). They were also asked if they had experienced general health or psychological problems in the last month (yes or no). Symptoms of anxiety (that is, “In the last month, have you been worrying and feeling nervous most of the time in your daily life?”) and depression (that is, “In the last month, did you go through a period of at least 2 weeks during which you felt depressed or lost interest in things most of the time?”) were also assessed. The interview concluded with sociodemographic questions.

### **Data Analysis**

Based on the 2006 national census, data were weighted by region and sex to adjust for the oversampling of respondents from the province of Quebec and to ensure adequate representation of different subgroups. Sample sizes reported in tables and figures refer to the actual number of respondents, and percentages refer to weighted data. Confidence intervals (95%) were calculated for prevalence rates. Weighted chi-square tests were used to examine the associations between insomnia and demographic and clinical variables, and between insomnia prevalence, health care consultations, and the use of sleep aids, and the Canadian regions. Significant chi-squares comparing the regions were followed by post hoc comparisons (critical *P* values adjusted using Bonferroni correction), comparing each region with the others in 2 × 2 contingency tables.<sup>11,12</sup>

Weighted univariate odds ratios were calculated to evaluate the risk of having an insomnia syndrome according to different demographic and clinical characteristics. *T* tests were computed to examine group differences on total sleep time and insomnia severity. Analyses were performed using SPSS version 13.0 (SPSS Inc, Chicago, IL) and SAS version 9.1 (SAS Institute, Cary, NC) and an alpha level of 5%.

## **Results**

### **Sample**

The 2000 participants were aged between 18 and 99 years (mean 48.6, SD 18.1). After weighting, the sample included 51% women and 49% men (compared with unweighted 60.5% and 39.5%, respectively). The majority of participants (92.9%) had completed at least a high school degree, were married or living with a partner (60.1%), working full time (64.3%), and lived in an urban area (42.8%) (demographics are

presented in the sample description column of Table 1). Among all interviews, 53.4% were completed in French. Missing data were unrelated to sex but were related to age. Participants with missing data ( $n = 33$ ; 1.7%) were significantly older (58.7, compared with 48.9) than those without missing data;  $t = 2.76$ ,  $df = 1998$ ,  $P = 0.006$ .

### **Prevalence of Insomnia**

Figure 1 shows that 19.8% (95% CI 18.1% to 21.6%) of the sample was dissatisfied with their sleep and 40.2% (95% CI 38.2% to 42.5%) presented at least 1 insomnia symptom, at least 3 nights per week. The combination of at least 2 symptoms (that is, mixed insomnia) was the most frequent presentation (47.2%), followed by initial insomnia (27.9%) (Table 2). Nonrestorative sleep was reported by 36.5% of respondents and, of those, 71.1% ( $n = 428$ ) also reported another insomnia symptom. The combination of sleep dissatisfaction with 1 insomnia symptom was reported by 16.0% (95% CI 14.4% to 17.6%) of the sample. Conversely, 24.2% (95% CI 22.4% to 26.1%) reported at least 1 insomnia symptom despite being satisfied or neutral about their sleep. Finally, 13.4% (95% CI 11.9% to 14.9%) of the sample met the full criteria for an insomnia syndrome.

The total ISI score for participants presenting an insomnia syndrome ( $n = 232$ ) averaged 13.94 (SD 3.67; range 7 to 24), suggesting moderately severe insomnia. Reported total sleep time was significantly lower for people with insomnia (mean 6.32 hours, SD 6.47), compared with the rest of the sample (mean 7.40, SD 4.67);  $t = 3.14$ ,  $df = 1971$ ,  $P < 0.01$ . Regarding other sleep disorders, 3.4% of the sample reported having received a diagnosis of sleep apnea, 5.1% a diagnosis of periodic limb movements or restless legs syndrome, and 1.5% reported hypersomnia or narcolepsy.

### **Demographic and Clinical Correlates**

Table 1 presents prevalence rates of insomnia syndrome according to demographic variables. There were significant differences in the proportion of people with an insomnia syndrome according to sex, age, marital status, education, and family income. Occupation and living area were not associated with prevalence. Odds ratios showed that women were 1.50 times more at risk ( $P = 0.02$ ) to present an insomnia syndrome than men. Compared with the group aged 18 to 29 years, the groups aged 30 to 39 and 50 to 59 years were 1.65 and 1.66 times, respectively, more at risk of having insomnia ( $P < 0.01$ ); the risk of older age groups was not significantly different. Divorced, separated, and widowed respondents were more likely to report insomnia than singles (OR 1.81 and 1.99,  $P < 0.01$ , respectively), as were people with lower education (that is,

elementary or less, OR 1.67; junior college degree, OR 1.86,  $P < 0.01$ ), compared with respondents with a university degree.

Table 3 presents insomnia syndrome prevalence rates according to physical and mental health variables. These rates were significantly higher in people with poor self-rated physical health (35.6%) and among those reporting physical health problems in the month preceding the interview (26.5%). Likewise, people who rated their mental health as poor or who reported psychological problems in the prior month also presented higher prevalence rates (41.4% and 40.2%, respectively). People who reported anxiety symptoms in the previous month were also more likely to have insomnia (31.8%, compared with 7.6%), but there was no significant difference for people with depressive symptoms, compared with those without (15.2%, compared with 24.2%). Finally, odds ratios ranged from 1.68 (depressive symptoms in the last month) to 6.45 (poor self-rated mental health), with higher risks for people reporting physical or mental health problems, compared with those without (with the exception of depressive symptoms).

### **Consultations for Sleep Problems**

Thirteen per cent (95% CI 11.7% to 14.7%) of all respondents reported having consulted a health care provider for sleep problems at least once in their lifetime, including 55.5% who had consulted in the year preceding the interview. The most frequently consulted health care provider was a family physician (74.1%), followed by a psychiatrist (14.2%). Among participants with an insomnia syndrome, 37% reported at least 1 lifetime consultation, with 23.9% having consulted in the year preceding the interview.

Demographic and clinical variables significantly associated with consultation were the same as those associated with insomnia (that is, sex, age, occupation, marital status, and physical and mental health), with the exception of education and income, which were not associated with consultation. People who had consulted a health care provider presented more severe insomnia (mean ISI score 15.2, SD 3.2) than those who had not (mean ISI score 12.90, SD 3.7),  $t = 4.9$ ,  $df = 248$ ,  $P < 0.01$ .

### **Medications and products used to promote sleep**

In the year preceding the survey, 10% (95% CI 8.7% to 11.3%) of the sample had used prescribed medications for sleep, 9.0% (95% CI 7.8% to 10.3%) had used natural products, 5.7% (95% CI 4.7% to 6.7%) had used over-the-counter medications, and 4.6% (95% CI 3.7% to 5.5%) had used alcohol. People using prescribed medications (59.2%) and natural products (51.7%) used them regularly (that is, 3 nights



or more per week), while people using over-the-counter medication (22.2%) and alcohol (16.7%) reported regular use. Variables associated with regular use of prescribed medication were sex (that is, women;  $\chi^2 = 5.37$ ,  $df = 1$ ,  $P < 0.05$ ,  $n = 232$ ), education (that is, primary;  $\chi^2 = 12.76$ ,  $df = 3$ ,  $P < 0.01$ ,  $n = 232$ ), poor physical health ( $\chi^2 = 4.73$ ,  $df = 1$ ,  $P < 0.05$ ,  $n = 232$ ), and older age ( $t = 6.17$ ,  $df = 259$ ,  $P = 0.001$ ). Perceived psychological status was not associated with regular use of prescribed medication and none of the demographic or clinical variables were associated with over-the-counter medication or natural products.

### **Comparisons across Canadian regions**

There were significant differences across regions regarding the proportion of people with insomnia symptoms ( $\chi^2 = 14.52$ ,  $df = 4$ ,  $P < 0.01$ ,  $n = 1983$ ) and syndrome ( $\chi^2 = 10.51$ ,  $df = 4$ ,  $P < 0.03$ ,  $n = 1966$ ) (Table 4). Post hoc comparisons showed lower proportions of people with insomnia symptoms and syndrome in Quebec, compared with Ontario and the Prairies. French-speaking respondents (pooled across all regions) presented lower prevalence rates than English-speaking respondents both for insomnia symptoms (34.5%, compared with 44.3%;  $\chi^2 = 10.56$ ,  $df = 2$ ,  $P < 0.001$ ,  $n = 1242$ ) and syndrome (9.5%, compared with 14.3%;  $\chi^2 = 6.43$ ,  $df = 2$ ,  $P < 0.01$ ,  $n = 1224$ ).

Rates of consultations for insomnia were lower in Quebec (9.1%) than in the Prairies (16.9%) ( $\chi^2 = 12.49$ ,  $df = 4$ ,  $P < 0.05$ ,  $n = 1990$ ). French-speaking people reported a lower rate of lifetime consultation than English-speaking people (8.7%, compared with 14.4%;  $\chi^2 = 9.14$ ,  $df = 1$ ,  $P = 0.003$ ,  $n = 1996$ ), although this difference was no longer significant when considering only people with an insomnia syndrome (26.3%, compared with 38.8%).

Significantly fewer Ontario residents were using prescribed sleep medications (6.7%) relative to residents from Quebec (11.5%), the Prairies (12.8%), or British Columbia (12.8%) ( $\chi^2 = 15.81$ ,  $df = 4$ ,  $P < 0.01$ ,  $n = 1986$ ). More residents from Quebec used natural products than from Ontario (13.0%, compared with 7.9%;  $\chi^2 = 15.81$ ,  $df = 4$ ,  $P < 0.05$ ,  $n = 1983$ ), while more residents from the Prairies than Ontario used alcohol (7.4%, compared with 3.4%;  $\chi^2 = 11.21$ ,  $df = 4$ ,  $P < 0.05$ ,  $n = 1988$ ). Use of over-the-counter medications did not differ across regions. There were fewer English-speaking relative to French-speaking people using prescribed medications (9.3%, compared with 12.9%;  $\chi^2 = 4.7$ ,  $df = 1$ ,  $P = 0.03$ ,  $n = 1987$ ), and natural products (7.4%, compared with

15.6%;  $\chi^2 = 26.2$ ,  $df = 1$ ,  $P < 0.001$ ,  $n = 1984$ ), but a higher proportion of English-speaking people using over-the-counter medications (6.2%, compared with 3.5%;  $\chi^2 = 4.6$ ,  $df = 1$ ,  $P = 0.03$ ,  $n = 1990$ ). There were no differences regarding alcohol use.

### **Discussion**

The findings indicate that insomnia is a prevalent condition, age and sex-related, and strongly associated with physical and mental health status. Prevalence rates in our study are slightly higher than those previously reported for the province of Quebec<sup>8</sup> but lower than those obtained throughout Canada<sup>5,6</sup> or elsewhere in the world.<sup>4,13-15</sup> The lower figures in our study are most likely due to the use of a more stringent case definition; nonetheless, insomnia remains a prevalent condition whether the definition is in terms of symptoms or disorder. Despite its high prevalence, few people seek treatment and, when treatment is initiated, it usually involves prescribed medications.

The association between insomnia and demographic variables (for example, sex, marital status, education, or income) is consistent with previous studies,<sup>4,8,13,14</sup> with the exception that, in our study, insomnia was associated with middle-age rather than with older age. While older adults are more likely to experience insomnia symptoms, they may be less likely to perceive and report such symptoms as problematic (that is, distressing and interfering with daytime functioning), possibly because of an adjustment during the chronic course of their sleep problem. Insomnia was strongly associated with physical and mental health, with people reporting poorer health being more likely to present an insomnia syndrome. For example, people reporting psychological problems in previous months were 5 times more likely to also experience insomnia, compared with those without such problems. These findings, along with the observation that mixed insomnia is the most prevalent subtype of insomnia, are consistent with previous studies<sup>16-21</sup> and suggest a high rate of comorbid psychiatric and medical disorders among people with insomnia.

Only 13% of the sample (37% of people with an insomnia syndrome) had consulted a health care provider specifically for sleep. With increasing evidence documenting the burden of chronic insomnia,<sup>20-24</sup> it is surprising that consultation rates remain so low. Limited knowledge about other therapeutic options other than medications for insomnia and the lack of providers with adequate training to treat this condition with non pharmacological methods might partially explain why so few people seek treatment. Given that consultation was associated with insomnia severity, people

with insomnia may delay seeking treatment until their sleep disturbance has reached a more severe and persistent course.

Despite low consultation rates, 10% of the sample had used a prescribed sleep medication in the preceding year, 9% had used a natural product, and 6% had used an over-the-counter product as a sleep aid. These figures suggest that many people may resort to self-help strategies in the absence of professional health care consultations, a practice that is not ideal considering the unknown risks and benefits of products that are not regulated by government health agencies.<sup>25</sup>

Regional and language differences were observed regarding consultations and use of sleep-promoting products. Residents from Quebec and French-speaking people across Canada reported lower rates of consultations than residents from other provinces and English-speaking people; paradoxically, a higher proportion of French-speaking people reported having used natural products for sleep. These differences may reflect different cultural perspectives on the management of sleep difficulties. Cultural differences in sleep patterns in ethnic and (or) minority groups have been observed in previous studies.<sup>18</sup> It is possible that both sleep patterns and treatment strategies for insomnia are influenced more by culture (reflected by spoken language) than by regional living area (rural, compared with urban), or economic status, per se, although these may also reflect different lifestyles. Future studies are needed to better understand the influence of culture on sleep patterns and treatment seeking.

It is also interesting to note that rates of sleep aid use reported in Canada were similar to those reported in France<sup>26–28</sup> and Norway,<sup>29</sup> and lower than in the United Kingdom<sup>28,30</sup> and Germany.<sup>28</sup> Whether these differences are a function of cultural differences, different health care systems, or other factors remains unclear. In our study, however, there was no significant relation between consultation and either education or income.

Two methodological issues may limit the interpretation of the findings. First, the lack of a more detailed interview precludes establishing a clear relation between insomnia and comorbid medical and psychiatric disorders. Second, it is plausible that prevalence estimates, as in most insomnia surveys, were inflated by people with other undiagnosed sleep disorders (for example, sleep apnea) that might present as insomnia. In the absence of polysomnographic recordings or a clinical interview to rule out these disorders, current estimates of insomnia most likely include people with other sleep disorders.

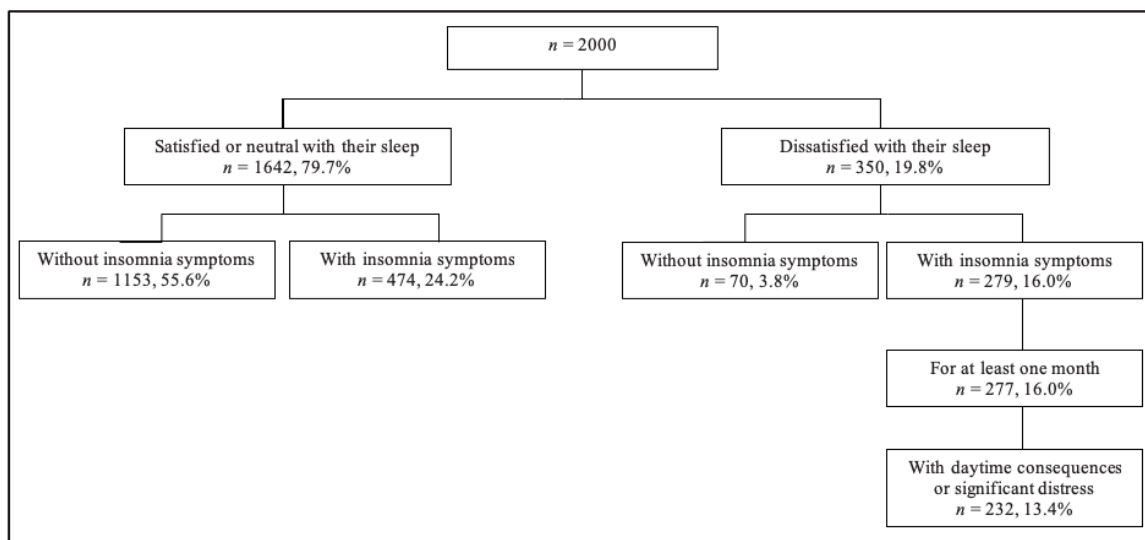
Two methodological issues may limit the interpretation of the findings. First, the lack of a more detailed interview precludes establishing a clear relation between insomnia and comorbid medical and psychiatric disorders. Second, it is plausible that prevalence estimates, as in most insomnia surveys, were inflated by people with other undiagnosed sleep disorders (for example, sleep apnea) that might present as insomnia. In the absence of polysomnographic recordings or a clinical interview to rule out these disorders, current estimates of insomnia most likely include people with other sleep disorders.

**Table 1 Sample description and prevalence of insomnia syndrome according to demographic variables (n = 2000)**

Characteristic	Sample description		Insomnia prevalence		$\chi^2$	df	P	OR	95% CI
	%	n	%	n					
Sex					9.06	1	0.02		
Male (reference)	49.0	790	11.0	68				1.00	
Female	51.0	1210	15.6	164				1.50	1.15–1.95
Age groups, years					15.37	5	<0.01		
18–29 (reference)	14.6	279	11.1	26				1.00	
30–39	18.9	336	17.1	41				1.65	1.04–2.59
40–49	23.2	409	12.0	45				1.09	1.09–1.75
50–59	17.7	391	17.2	64				1.66	1.05–2.63
60–69	12.0	294	10.1	34				0.90	0.51–1.57
≥70	13.5	291	10.2	22				0.91	0.53–1.57
Marital status					14.86	3	<0.01		
Single (reference)	24.3	505	12.0	53				1.00	
Married or common-law	60.1	1092	12.3	123				1.03	0.74–1.43
Divorced or separated	7.8	209	19.7	30				1.81	1.11–2.94
Widowed	7.8	178	21.3	24				1.99	1.21–3.24
Education					15.23	3	<0.01		
≤Primary	7.1	167	16.4	21				1.67	1.01–2.83
Secondary	35.2	665	12.1	73				1.19	0.84–1.68
Junior college	26.9	527	17.8	71				1.86	1.32–2.62
University (reference)	30.8	624	10.4	65				1.00	
Occupation					1.92	3	0.59		
Working (reference)	64.3	1176	12.9	131				1.00	
Student	3.9	104	11.7	7				0.90	0.44–1.83
Nonworking	10.3	210	15.9	38				1.28	0.85–1.94
Retired	21.5	497	14.4	54				1.14	0.82–1.57
Living area					0.68	2	0.71		
Rural (reference)	27.8	528	13.2	60				1.00	
Urban	42.8	797	14.5	97				1.12	0.81–1.54
Suburbs	29.4	609	13.2	69				1.00	0.70–1.43
Family income, \$					15.59	4	<0.01		
<20 000 (reference)	14.6	314	14.0	39				1.00	
20 000–39 999	22.4	456	18.5	58				1.40	0.89–2.20
40 000–59 999	22.5	375	9.1	35				0.62	0.37–1.03
60 000–79 999	13.5	221	14.5	28				1.05	0.62–1.77
>80 000	27.0	350	11.7	32				0.81	0.51–1.30

n refers to actual number of respondents and %, OR, and 95% CI refer to weighted data.

**Figure 1** Insomnia prevalence in the adult Canadian population



**Table 2** Distribution of subtypes of insomnia symptoms

Subtypes	People with insomnia symptoms, %	
	<i>n</i> = 756	95% CI
Initial insomnia ( <i>n</i> = 237)	27.9	24.8–31.0
Middle insomnia ( <i>n</i> = 127)	15.0	12.5–17.4
Late insomnia ( <i>n</i> = 60)	9.9	7.8–12.0
Mixed insomnia ( <i>n</i> = 333)	47.2	43.8–50.7
Initial + middle + late ( <i>n</i> = 104)	14.3	11.9–16.7
Initial + middle ( <i>n</i> = 119)	17.9	15.2–20.5
Initial + late ( <i>n</i> = 40)	5.9	4.3–7.6
Middle + late ( <i>n</i> = 69)	9.2	7.2–11.2

*n* refers to actual number of respondents and % and 95% CI refer to weighted data.

**Table 3 Prevalence of insomnia according to physical and mental health variables**

Variable	Sample description <i>n</i> = 2000		Insomnia prevalence <i>n</i> = 232		$\chi^2$	<i>df</i>	<i>P</i>	OR	95% CI
	%	<i>n</i>	%	<i>n</i>					
Self-rated physical health									
Good (reference)	84.1	1701	9.1	139	160.2	1	<0.01		
Poor	15.9	290	35.6	92				5.53	4.15–7.35
Physical health problem in the last month									
No (reference)	79.8	1548	9.7	132	77.71	1	0.01		
Yes	20.2	436	26.5	96				3.35	2.53–4.43
Self-rated mental health									
Good (reference)	89.4	1814	9.9	165	161.87	1	<0.01		
Poor	10.6	170	41.4	65				6.45	4.70–8.85
Psychological problem in the last month <sup>a</sup>									
No (reference)	94	1871	11.5	192	78.53	1	<0.01		
Yes	6	111	40.2	37				5.16	3.47–7.67
Anxiety symptoms									
No (reference)	2	31	7.6	8	5.61	1	0.01		
Yes	4.6	80	31.8	31				2.66	1.17–6.05
Depressive symptoms									
No (reference)	3	50	15.2	15	2.07	1	0.1		
Yes	3.6	60	24.2	24				1.68	0.83–3.42

*n* refers to actual number of respondents and %,  $\chi^2$ , and 95% CI refer to weighted data.

<sup>a</sup> Anxiety and depressive symptoms are not in mutually exclusive categories and respondents could report both symptoms.

**Table 4 Prevalence of insomnia syndrome and symptoms, consultation rates, and sleep-promoting products use across the 5 regions of Canada**

Variable	Total <i>n</i> = 2000		British Columbia <i>n</i> = 200		Maritimes <i>n</i> = 200		Ontario <i>n</i> = 200		Prairies <i>n</i> = 200		Quebec <i>n</i> = 1200		$\chi^2$	<i>df</i>	<i>P</i>
	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>			
Insomnia symptoms	40.4	756	35.7 <sup>ab</sup>	74	45.5 <sup>ab</sup>	94	44.6 <sup>a</sup>	90	38.3 <sup>ab</sup>	76	35.9 <sup>b</sup>	422	14.52	4	0.01
Insomnia syndrome	13.4	232	10.7 <sup>ab</sup>	23	12.6 <sup>ab</sup>	25	14.6 <sup>ab</sup>	29	17.1 <sup>a</sup>	35	10.3 <sup>b</sup>	120	10.51	4	0.03
Health care consultation	13.2	1762	12.1 <sup>ab</sup>	174	16.0 <sup>ab</sup>	166	14.0 <sup>ab</sup>	170	16.9 <sup>a</sup>	164	9.1 <sup>b</sup>	111	12.49	4	0.01
Prescribed-medication use	10.0	254	12.8 <sup>a</sup>	27	11.2 <sup>ab</sup>	23	6.7 <sup>b</sup>	15	12.8 <sup>a</sup>	28	11.5 <sup>a</sup>	161	15.81	4	<0.01
Natural products use	9.0	231	7.6 <sup>a</sup>	16	7.7 <sup>ab</sup>	17	7.9 <sup>a</sup>	16	7.7 <sup>a</sup>	16	13.0 <sup>b</sup>	166	11.62	4	0.02
Over-the-counter medication use	5.7	101	6.8 <sup>ab</sup>	14	6.3 <sup>ab</sup>	14	6.0 <sup>ab</sup>	12	6.2 <sup>ab</sup>	14	4.0 <sup>ab</sup>	47	3.41	4	0.49
Alcohol use	4.6	88	6.1 <sup>ab</sup>	11	4.8 <sup>ab</sup>	9	3.4 <sup>a</sup>	7	7.4 <sup>b</sup>	13	3.6 <sup>ab</sup>	48	11.21	4	0.02

*n* refers to actual number of respondents with the condition; and % and  $\chi^2$  refers to weighted data  
<sup>a,b</sup> Percentages on the same row with different subscripts are significantly different on the  $\chi^2$  test



## Références

1. American Academy of Sleep Medicine. International classification of sleep disorders: diagnostic and coding manual. 2nd ed. Westchester (IL): American Academy of Sleep Medicine; 2005.
2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Text revision. Washington (DC): American Psychiatric Association; 2000.
3. Morin CM, Belanger L, LeBlanc M, et al. The natural history of insomnia: a population-based 3-year longitudinal study. *Arch Intern Med.* 2009; 169:447-453.
4. Ohayon MM. Epidemiology of insomnia: what we know and what we still need to learn. *Sleep Med Rev.* 2002; 6:97-111.
5. Tjepkema M. Insomnia. *Health Rep.* 2005:9-25.
6. Sutton DA, Moldofsky H, Badley EM. Insomnia and health problems in Canadians. *Sleep.* 2001; 24:665–670.
7. World Health Organization. The ICD-10 classification of mental and behavioral disorder: diagnostic criteria for research. 10th ed. Geneva (CH): WHO; 1992.
8. Morin CM, LeBlanc M, Daley M, et al. Epidemiology of insomnia: prevalence, self-help treatments, consultations, and determinants of help-seeking behaviors. *Sleep Med.* 2006;7:123-130.
9. Kish L. Survey sampling. New York (NY): John Wiley and Sons Inc; 1965.
10. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Med.* 2001; 2:297-307.
11. Gardner R. Psychological statistics using SPSS for windows. Upper Saddle River (NJ): Prentice Hall; 2000.
12. Macdonald P, Robert C. Type I error rate comparisons of post hoc procedures for  $I \times J$  chi-square tables. *Educ Psychol Meas.* 2000; 60:735-754.
13. Ancoli-Israel S, Roth T. Characteristics of insomnia in the United States: results of the 1991 National Sleep Foundation Survey. I. *Sleep.* 1999; 22: S347-S353.
14. Leger D, Guilleminault C, Dreyfus JP, et al. Prevalence of insomnia in a survey of 12,778 adults in France. *J Sleep Res.* 2000; 9: 35-42.
15. Soldatos CR, Allaert FA, Ohta T, et al. How do individuals sleep around the world? Results from a single-day survey in ten countries. *Sleep Med.* 2005; 6: 5-13.
16. Taylor DJ, Lichstein KL, Durrence HH, et al. Epidemiology of insomnia, depression, and anxiety. *Sleep.* 2005;28: 1457-1464.

17. Roth T, Jaeger S, Jin R, et al. Sleep problems, comorbid mental disorders, and role functioning in the national comorbidity survey replication. *Biol Psychiatry*. 2006; 60:1364-1371.
18. Taylor DJ, Mallory LJ, Lichstein KL, et al. Comorbidity of chronic insomnia with medical problems. *Sleep*. 2007; 30: 213-218.
19. Ford DE, Kamerow DB. Epidemiologic study of sleep disturbances and psychiatric disorders. An opportunity for prevention? *JAMA*. 1989; 262: 1479-1484.
20. Pearson NJ, Johnson LL, Nahin RL. Insomnia, trouble sleeping, and complementary and alternative medicine: analysis of the 2002 national health interview survey data. *Arch Intern Med*. 2006; 166: 1775-1782.
21. Simon GE, VonKorff M. Prevalence, burden, and treatment of insomnia in primary care. *Am J Psychiatry*. 1997; 154: 1417-1423.