

Institut
de la statistique

Québec



QUÉBEC LONGITUDINAL STUDY
OF CHILD DEVELOPMENT
(QLSCD 1998-2002)

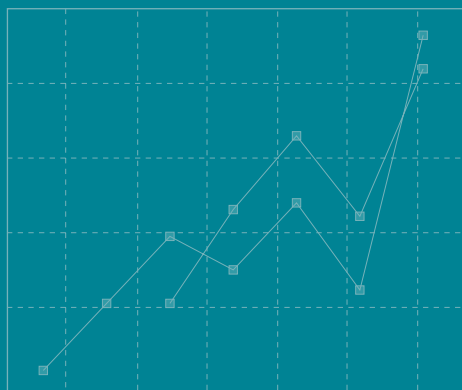
COLLECTION
**Health and
Wellness**

FROM BIRTH TO 29 MONTHS

Sleep : Development and Associated
Factors

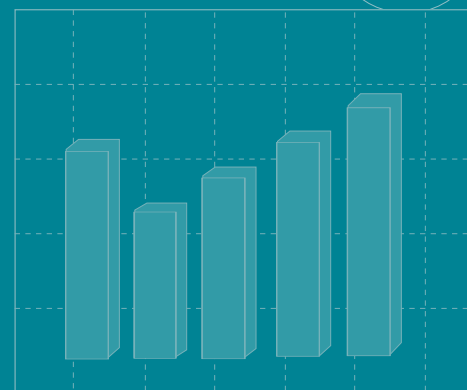
Volume 2, Number 4

9



4

0



8

6



2

For further information on the *Institut de la statistique du Québec (ISQ)* (Québec Institute of Statistics) and the statistics available in its database, contact:

Institut de la statistique du Québec
200 Chemin Sainte-Foy
Québec (Québec)
Canada G1R 5T4
Telephone: (418) 691-2401
or
Toll-free: 1 800 463-4090

Website: **<http://www.stat.gouv.qc.ca>**

This report was produced and published by the *Institut de la statistique du Québec*.

National Library of Canada
Bibliothèque nationale du Québec

ISBN 2-551-21553-6
ISBN 2-551-21556-0
(édition originale) ISBN 2-551-21544-7
ISBN 2-551-21547-1

Copyright © 2002 Government of Québec
All rights reserved.

Reproduction in any form is prohibited except with the expressed permission of the *Institut de la statistique du Québec*.

May 2002

Foreword

The publication of this second volume of the QLSCD 1998-2002 series is the result of close collaboration among university researchers, the public health network and the *Direction Santé Québec*¹ (Health Québec Division) of the *Institut de la statistique du Québec* – ISQ (Québec Institute of Statistics), who have been working on this project since 1996.

Two years after the publication of Volume 1 in this series, an interdisciplinary group of more than 80 researchers contributed to producing this second volume, which presents the very first longitudinal results of our survey. These much-anticipated results describe the environment and development of the children based on the first three data collections conducted when they were 5, 17 and 29 months of age. To fully comprehend the importance of these data on early childhood, I would like to remind the reader of the primary goal of the Québec Longitudinal Study of Child Development 1998-2002 as stated in Volume 1 of this series. The QLSCD will help gain a better understanding of the PRECURSORS of social adjustment by first studying adjustment to school, identifying adjustment PATHS and PROCESSES, and examining the CONSEQUENCES of these later in life.

By analyzing data from the first three years of the survey, the ISQ is pleased to be associated with the development of a such powerful survey and research instrument, and particularly with the accomplishment of a study that will serve both as a preventive tool and an aid in the design of effective early interventions. As Director General, I cannot help but take great pride in the model of partnership which has produced such impressive results, many of which may indeed be harbingers of the future.

Yvon Fortin
Director General

1. Certain French appellation in italics in the text do not have official English translations. The first time one of these appears, the unofficial English translation is shown immediately after it. Following this, for ease in reading, only the official French name appears in the text in italics and it is suggested the reader refer to the Glossary for the English translation.

The authors of Volume 2 Number 4 of QLSCD 1998-2002 are:

Dominique Petit, Évelyne Touchette, Jean Paquet and Jacques Montplaisir
Centre d'étude du sommeil et des rythmes biologiques, Hôpital du Sacré-Cœur de Montréal et Département de psychiatrie, Université de Montréal (Centre for the Study of Sleep and Biological Rhythms, Sacred Heart Hospital of Montréal and Department of Psychiatry of *Université de Montréal*)

With the professional and technical assistance of:

Martin Boivin, analysis editing, *Direction Santé Québec, ISQ*
Nathalie Plante and Robert Courtemanche, analysis editing, *Direction de la méthodologie et des enquêtes spéciales* (Methodology and Special Surveys Division), *ISQ*
Gaétan Poirier, computer specialist, *Centre d'étude du sommeil et des rythmes biologiques, Hôpital du Sacré-Cœur de Montréal*
France Lozeau and Lucie Desroches, publications layout, *Direction Santé Québec, ISQ*

External readers:

Marie-Josée Challamel, *Explorations neurologiques, Centre Hospitalier Lyon-Sud* (Neurological Explorations, South Lyon Hospital, Lyon)
Charles Morin, *École de psychologie* (School of Psychology), *Université Laval*
Yvonne Navelet, *Service d'explorations fonctionnelles neurologiques, Centre hospitalier de Bicêtre* (Neurology Department, Bicêtre Hospital Centre, France)

Volume 2 Number 4 of QLSCD 1998-2002 was translated by:

James Lawler

Volume 2 of QLSCD 1998-2002 was produced by:

Direction Santé Québec, ISQ

QLSCD 1998-2002 was funded by the:

Ministère de la Santé et des Services sociaux du Québec (MSSS) / Ministry of Health and Social Services
Canadian Institutes of Health Research (CIHR formerly the NHRDP)
Social Sciences and Humanities Research Council of Canada (SSHRC)
Fonds québécois de la recherche sur la société et la culture (ancien CQRS) / Québec Fund for Research on Society and Culture (formerly the CQRS)
Fonds québécois de la recherche sur la nature et les technologies (ancien FCAR) / Québec Fund for Research on Nature and Technology (formerly the FCAR)
Fonds de la recherche en santé du Québec (FRSQ) / Health Research Fund of Québec
Molson Foundation
Ministère de la Recherche, de la Science et de la Technologie (MRST) par le biais du programme Valorisation recherche Québec (VRQ) / Ministry of Research, Science and Technology
Human Resources Development Canada (HRDC)
Canadian Institute for Advanced Research (CIAR)
Health Canada
National Science Foundation (NSF of USA)
Université de Montréal
Université Laval
McGill University

QLSCD 1998-2002 is supervised by:

Mireille Jetté, Coordinator, *Direction Santé Québec, ISQ*
Hélène Desrosiers, *Direction Santé Québec, ISQ*
Richard E. Tremblay, Scientific Director, Canada Research Chair in Child Development, *Université de Montréal*
Ghyslaine Neill, *Direction Santé Québec, ISQ*
Josette Thibault, *Direction Santé Québec, ISQ*
Lucie Gingras, *Direction Santé Québec, ISQ*

For further information on the contents of this publication, contact:

Direction Santé Québec
Institut de la statistique du Québec
1200 McGill College Avenue
Montréal (Québec)
Canada H3B 4J8
Telephone: (514) 873-4749 or
Toll-free :1 877 677-2087
Fax: (514) 864-9919
Website: <http://www.stat.gouv.qc.ca>

Suggested citations:

PETIT, D., É. TOUCHETTE, J. PAQUET and J. MONTPLAISIR (2002). "Sleep: Development and Associated Factors" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 4.

This analytical paper is also available in French. (Ce numéro est aussi disponible en version française sous le titre de « Le sommeil : évolution et facteurs associés » dans *Étude longitudinale du développement des enfants du Québec (ÉLDEQ 1998-2002) – De la naissance à 29 mois*, Québec, Institut de la statistique du Québec, vol. 2, n° 4).

<p>A Word of Caution, Symbols and Abbreviations can be found in Section "Review of the Methodology and Caution"</p>
--

Acknowledgements

Given that the QLSCD 1998-2002 has been in existence for more than six years, the task of thanking each person who has collaborated on the project seems daunting, and frankly, nearly impossible. Each year new colleagues join those who have been with us from the very beginning, and they in turn have faced innumerable logistical and methodological challenges, whether in terms of the contents of the survey or navigating their way through a world of knowledge which is in a state of constant progress.

Indeed, the network of university researchers associated with the QLSCD now stretches across Québec to include the rest of Canada and beyond our nation's borders. Hence the wealth of data from this survey is being disseminated through a variety of channels, whether in post-doctoral work being pursued by young researchers outside of Québec, or the multiplier effect of seasoned veterans constantly establishing new international working relationships in this era of the globalization of knowledge. This multiplication of partnerships is closely linked to the exceptional leadership shown by the scientific director of the QLSCD. In addition to contributing to the advance of knowledge, our "conglomerate" of research teams has resulted in the injection of significant funds devoted to analyzing the wealth of data being generated. Indeed, the pooling of research funds obtained through the excellence of the scholars involved has maximized the investment in the QLSCD 1998-2002 by the *ministère de la Santé et des Services sociaux*, sole sponsor of the project's 10 data collections, surveys and pretests.

New partners in our public health network are constantly joining this ever-expanding group of researchers. Increasing numbers of health professionals are becoming actively involved in the QLSCD, coming from the *ministère de la Famille et de l'Enfance* (Ministry of Family and Child Welfare), the education network, etc.

The increase in the number of external experts and growing complexity of this first provincial longitudinal study has led to more ISQ staff devoting their time, in whole or in part, to the QLSCD. New statisticians from

the *Direction de la méthodologie et des enquêtes spéciales – DMES* are now associated with the survey. Their tasks include addressing all questions related to the sample design, analyzing the results of the annual data collections in terms of response rates, and producing the weights required to infer the results to the population of children targeted by this large-scale survey. They also provided support to QLSCD researchers in conducting statistical analyses published in this report. With regards to the *Direction Santé Québec (DSQ)*, chief architect of the QLSCD, it was necessary to hire two people experienced in longitudinal analyses to consolidate the rather small team who have been overseeing the surveys year after year, with all the intense concentration of energy this implies. By coordinating the work of numerous partners, developing new tools and instruments to understand the real world of the growing child, closely collaborating with the survey firm collecting the data, and participating in the dissemination of knowledge by publishing original analyses, the seven members of the *Direction Santé Québec* QLSCD team have accomplished their mission with remarkable success.

Over the years, another partnership that continues to flourish is the one we have with the coordinators of the National Longitudinal Study of Children and Youth (NLSCY, Canada). The fact that these pioneers allowed the QLSCD to use certain instruments administered by the CAPI (Computer Assisted Personal Interview) has meant that our Québec longitudinal study is complementary and comparable to this large-scale Canadian study, and at a reasonable cost.

Québec hospitals, who continually face many challenges because of increasing demands for efficiency, are also important partners in our study, as are birthing centres. They manage to weather whatever storms they face by continuing each year to provide certain data from the medical records of the mothers and children. These data are sent to us with the strict proviso that the mothers have furnished prior written consent.

The *Bureau d'interviewers professionnels (BIP)*, the survey firm, continues to be an indispensable partner in arranging and conducting this first large-scale survey of a cohort of Québec children. BIP, masterfully managed with a hands-on approach by its president, is responsible for organizing and ensuring the smooth functioning of the annual data collections in both the pretests and surveys. Their data is of invariably high quality, and the data banks they produce biannually retain a high degree of reliability. BIP's team of interviewers² and recruiters, skilfully supervised by a seasoned veteran of field work, has become expert in winning and maintaining the loyalty of the some 2,000 families who annually participate.

Finally, we would like to single out the exceptional participation of Québec families. We truly believe that the success of the QLSCD comes first and foremost from the hours of precious time they grant us every year, during which we feel privileged to share moments in the lives of their little munchkins who, in 2000, were 2½ years of age.

Acknowledging how difficult it is to truly thank everyone who contributed to the day-to-day accomplishment of this Québec first, we would like to cite the words of Serge Bouchard:

Progress is a totally collective process in both time and space. We owe so much to others... We desire a society of good people..., because there is a link between individual and collective excellence.³

A heartfelt thank-you!



Mireille Jetté
Coordinator
*Direction Santé Québec,
Institut de la statistique du Québec*

2. All the interviewers in this survey were women.

3. BOUCHARD, Serge (2001). "Je ne suis pas seul sur terre", *Le Devoir Édition Internet*, 23 juillet. (Unofficial translation).

Introduction to QLSCD 1998-2002

When this second report is published, the children in the QLSCD study will have begun their fifth year on this planet. Despite the use of extraordinary tools to closely monitor their development, it is obvious that, in early childhood, development is too fast for science to keep up with.

In our first report, we described our observations concerning the data collected five months after birth. Because of the cross-sectional nature of these observations, our study was limited to describing the characteristics of the children and their families. We mainly wanted to describe the situation of babies born in Québec in 1997 and 1998. Bursting with enthusiasm and eager to understand things, the researchers who, at the time, provided the broad strokes of analyses to explain the observed characteristics were fully aware those were just the first in a long series of analyses designed to provide a deeper understanding of children's development.

This second report, however, is based on the collective data gathered when the children were respectively 5, 17 and 29 months old. At last, we can now describe the changes that occur in the lives of children and their families from birth to the third year. This is the first time that such a large sample of Québec newborns has been studied as intensively during early childhood. As far as we know, this is the very first time since science began studying children's developmental that researchers have tried to understand the factors leading to academic success or failure by collecting data as frequently as this from such a large sample of such young children.

Researchers now have available more data than ever before about this stage of life. But this abundance of data has a perverse effect. If cross-sectional studies allow us to draw conclusions on the causes of problems observed, why shouldn't we go ahead and indulge in longitudinal data as well? When one has access to data available to no one else, it is easy to forget the limitations of such data. However, while the researchers involved in drafting this report tried to obtain the maximum benefit from prospective longitudinal data collected at three different stages

during early childhood (at 12-month intervals), they also accepted to respect the limitations of this data.

This prospective longitudinal study allows us to describe the changes over time for each measured variable concerning each individual. The researchers thus recorded the changes during the first three years of the children's lives. Profiles of children, parents and families as well as some developmental trajectories were drawn based on the data collected during these three stages. These original results should facilitate discerning the beginning of the course taken by the children and their families. However, it is important to remember that these results only described the first three points of a curve that ideally should comprise fifteen points of time. Since in most cases, it is not very likely that behaviour is consolidated at 2½ years, we asked the authors to primarily limit themselves to describing the development of observable changes. It is obviously too early in the child's life for us to attempt causal analyses in order to identify determinants, especially since these would only be associations. Finally, whenever we approach a problem, our questions are generally much too simplistic. Longitudinal studies such as the QLSCD indicate that there are many ways to observe a problem and that it is dangerous to draw definitive conclusions after the first analyses, no matter how brilliant these appear to be.

It is important to remember that the main objective of the QLSCD is to understand the paths during early childhood that lead to success or failure once the child enters the school system. In order to successfully reach this objective, we must obviously wait for information collected once the child begins school. The QLSCD children will complete their first school year in the spring of 2005. At the time when this report will be published, they will be old enough to enter Junior Kindergarten, which some of them will do in September 2002. Data collection is also planned for the end of Junior Kindergarten year (spring 2003) and at the end of Senior Kindergarten (spring 2004). If, as desired, these significant data collections are funded, the information generated will allow us to check the level of preparation for school at the entry into the first cycle of elementary school. Later during

this longitudinal study, description of the developmental trajectories of these children is planned throughout their school years. If, following the example of many researchers in Québec, the Québec Government confirms its financial involvement in pursuing QLSCD throughout the children's elementary and secondary school, we can increase our understanding of the factors that lead to academic success and therefore be in the best possible position to improve support to the all-too-many children for whom school is an endless succession of failures.

Through recent discoveries about the development of the human brain, we have come to see the importance of investing early in children's development, just as it is important to invest early in our pension plans. Longitudinal studies on the development of children must obviously be based on the same principle. They must begin as soon as possible, and this is what the *ministère de la Santé et des Services sociaux* did as early as 1997, by investing nearly \$5 million in a study on Québec children aged 5 to 54 months old. And obviously, just like for a pension plan, in order for these investments to bear fruit and provide the best possible returns, they must be maintained and even increased.



Richard E. Tremblay, Ph. D., MSRC
Canada Research Chair in Child Development
Université de Montréal

Table of Contents

1. Introduction	19
1.1 Review of the Literature.....	19
1.1.1 Sleep Characteristics and Problems in Young Children	19
1.1.2 Persistence of Sleep Problems	22
1.1.3 Factors Associated with “Poor” Sleep	23
1.2 Objectives and Instruments.....	24
2. Methodological Aspects	27
2.1 Target Population	27
2.2 Statistical Analyses.....	27
3. Results	29
3.1 Description and Evolution of Sleep Characteristics.....	29
3.2 Prevalence and Trajectories of Parasomnias.....	33
3.3 Trajectories of “Good” and “Poor” Sleepers from 5 to 29 Months.....	36
3.4 Sleeping Through the Night at 17 Months and 29 Months – Certain Associated Factors	37
4. Discussion	39
4.1 Prevalence and Persistence of Sleep Problems.....	39
4.2 Determinants of Good or Poor Sleep	40
5. Conclusion	43
Annex	45
References	59
Glossary	63

List of Tables and Figures

Tables

1.1 Classification of dyssomnias in young children	22
3.1 Main factors associated with sleeping through the night by age, Québec 1999 and 2000	38

Figures

1.1 Schematic representation of sleep development in young children	20
3.1a Distribution of children by whether or not they were sleeping through the night around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000	29
3.1b Distribution of children by changes in sleeping patterns (through the night or not) between different ages, Québec, 1998, 1999 and 2000	29
3.2a Distribution of children by number of night wakings around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000	30
3.2b Distribution of children by changes in number of night wakings between different ages, Québec, 1998, 1999 and 2000	30
3.3a Distribution of children by time taken to fall asleep around the age 5, 17 and 29 months, Québec, 1998, 1999 and 2000	30
3.3b Distribution of children by changes in time taken to fall asleep between different ages, Québec, 1998, 1999 and 2000	30
3.4a Distribution of children by number of hours of consecutive night sleep around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000	31
3.4b Distribution of children by changes in number of hours of consecutive night sleep between different ages, Québec, 1998, 1999 and 2000	31

3.5a Distribution of children by number of consecutive hours of day sleep around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000	31
3.5b Distribution of children by changes in number of consecutive hours of day sleep between different ages, Québec, 1998, 1999 and 2000	31
3.6 Distribution of children by parental behaviour at bedtime around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000	32
3.7 Distribution of children by parental behaviour at night wakings around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000	32
3.8 Typical day in the life of a 29-month-old child, Québec, 2000	34
3.9a Prevalence of various parasomnias at around 17 months and by whether the child was sleeping through the night or not, Québec, 1999	34
3.9b Prevalence of various parasomnias at around 29 months and by whether the child was sleeping through the night or not, Québec, 2000	35
3.10 Trajectory of "good" and "poor" sleepers by age, Québec, 1998, 1999 and 2000	37

Review of Methodology and Caution

The Québec Longitudinal Study of Child Development (QLSCD 1998-2002), launched in 1998, is being conducted on a cohort of nearly 2,000 children surveyed annually from the age of 5 months to approximately 4 years. This second volume covers longitudinal data from the first three rounds when the children were approximately 5, 17 and 29 months of age respectively.

The longitudinal analyses of data collected in the 1998, 1999 and 2000 rounds allow inferences to be made to the population of children born in Québec in 1997 and 1998 (singleton births) who in 2000 were still living in Québec or who had only left the province temporarily. Therefore, in terms of the methodological approach, choosing not to sample children from those who arrived in Québec after birth limits inferences to this population.

Participation of families in the 1999 and 2000 rounds of QLSCD was excellent. Indeed, 94% of families who participated in the 1998 round continued to participate in the second and third rounds, for a 71%¹ longitudinal response rate for the two main questionnaires, the Interviewer Completed Computerized Questionnaire (ICCQ) and the Interviewer Completed Paper Questionnaire (ICPQ). Response rates for the Self-Administered Questionnaire for the Mother (SAQM) and Self-Administered Questionnaire for the Father (SAQF) remained stable from 1998 to 2000, namely 96% for the former and 90% for the latter, among annual respondents to the ICCQ. However, since respondent families were not necessarily the same from one round to the next, the weighted proportion of families who participated in all the rounds was lower, namely 92% for the SAQM and 83% for the SAQF, among respondents to the ICCQ in all three rounds (n = 1,985). The longitudinal response rates of these instruments, obtained by multiplying the weighted proportion of longitudinal respondents to the SAQM or SAQF by the longitudinal response rate of the ICCQ, were 65% and 59% respectively.

It was decided to minimize potential biases induced by non-response by adjusting the weights based on characteristics differentiating respondents from non-respondents for the five major instruments of QLSCD – the ICCQ, ICPQ, SAQM, SAQF and the IST (Imitation Sorting Task testing cognitive development). Since only respondents to the 1998 round were eligible for longitudinal study, longitudinal weights were based on the cross-sectional weights of the ICCQ calculated in 1998. In addition, for longitudinal analyses involving data from the SAQM, SAQF or IST, an additional adjustment to the weights was required to compensate for overall longitudinal non-response in each of these instruments. Unfortunately, in the third round as in the first, even though the response rates of non-resident fathers improved, it was impossible to weight their data since response rates to the SAQFABS were still too low.

Moreover, given QLSCD's complex sample design, it was important that the variance associated with the estimates was correctly identified. This required using a software program that could take into account the complex sample design, otherwise the variance would tend to be underestimated, thereby resulting in a threshold of statistical significance that would be too low. SUDAAN (Survey Data Analysis; Shah *et al.*, 1997) was therefore used for prevalence estimates, chi-square tests, repeated measures analyses of variance, linear regressions, logistic regressions and Cox regressions. The threshold of significance for these statistical tests was set at 0.05. With regards to other tests not supported by SUDAAN such as the McNemar, the threshold was lowered to 0.01 to prevent identifying results as significant that might not be, given the complex sample design.

All the data presented that have a coefficient of variation (CV) higher than 15% are accompanied by one or two asterisks to clearly indicate their variability.

N.B. For further information on the survey's methodology, please read Number 1 of both Volume 1 and Volume 2. For more detailed information on the sources and justifications of questions used in the first three rounds of QLSCD as well as the components of the scales and indexes, please read Number 12 of both Volume 1 and Volume 2.

1. The unweighted number of families who responded to QLSCD went from 2,120 in 1998 to 2,045 in 1999, to 1,997 in 2000. The number of families who participated in the three rounds of the survey was 1,985 (namely 94% of the 2,120 families in the first round).

Caution

Unless indicated otherwise, “n” in the tables represents the sum of the individual weights reset to the size of the initial sample. This quantity is used to estimate the prevalences, and is slightly different from the real sample, namely the number of children in a given sub-group. In the body of the text, the number presented to describe the sample size also represents the sum of the individual weights reset to the size of the initial sample. This occurs when an analysis concerns a particular sub-group. The weighted frequency in these cases serves only as a link with the tables. The real sample size, and coefficient of variation remain the quantity to interpret as far as the precision of the estimates is concerned.

Because the data were rounded off, totals do not necessarily correspond to the sum of the parts.

Unless explicitly stated otherwise, all the differences presented in this report are statistically significant to a confidence level of 95%.

To facilitate readability, proportions higher than 5% were rounded off to the nearest whole unit in the text, and to the nearest decimal in the tables and figures.

Symbols

.. Data not available
... Not applicable (N/A)
- Nil or zero
p < Refers to the threshold of significance

Abbreviations

CV Coefficient of variation
Not signif. Not significant

Sleep: Development and Associated Factors

In
2002...
I'll be 5 years old!

1. Introduction

Sleep problems represent one of the most frequent reasons for consulting a physician in clinical pediatrics. Studies estimate that between a quarter and a third of young children present difficulties in going to bed, falling asleep or sleeping through the night (Johnson, 1991; Pollock, 1994; Richman *et al.*, 1985). Sleep problems can lead to stress, fatigue, or tension in the family, that can ultimately result in the parents separating/divorcing or physical abuse of the child (Chavin and Tinson, 1980). Moreover, a tendency to wake frequently during the night can show significant continuity from the age of six months to school age (Jenkins *et al.* 1984; Richman *et al.*, 1982). The consequences of poor sleep are many and can affect all aspects of child development. For example, it has been demonstrated that in children of school age, inconsistent bedtimes and shorter sleep periods are associated with lower attention capacities and poor performance (Billon-Descarpentries, 1997). In addition, it has been shown that sleep regulation is directly associated with emotional and behavioural control in children (Dahl, 1998). Thomas and Chess (1984) report that children with irregular sleep and eating patterns are at higher risk of developing behavioural problems later in life.

Knowledge of the normal development of sleep in young children and identifying factors likely to facilitate or hinder the establishment of beneficial sleep are of great importance in any study of child development and in the implementation of effective intervention programs.

Many studies have attempted to elucidate the possible causes of sleep problems and a wide diversity of results have been reported. This diversity be explained in large part by the sampling methods used and the type of data collected. Indeed, in many of these studies, the subjects were recruited either through advertising or in pediatric clinics, and therefore cannot be considered as representative of

the population concerned. Moreover, the data collected generally do not allow for a clear understanding of the environment in which the child is living.

The few studies that have explored sleep problems in a larger context, namely by considering individual characteristics of the child, living conditions and parenting practices, agree in their conclusions that the interactions of various factors associated with sleep problems in children are very complex. Sadeh and Anders (1993) emphasize that the lack of longitudinal studies on young children's sleep limit the development of a systemic approach to the subject, one which would take into account the environment and living conditions of the child. Pediatricians and other health professionals treating the problem should indeed take these into account when establishing a treatment plan (Ferber, 1995; Navalet, 1996).

The strength of the QLSCD 1998-2002 lies in its epidemiological character, diversity of variables and longitudinal nature, which allow for distinguishing between time-specific and long-term associations with poor sleep.

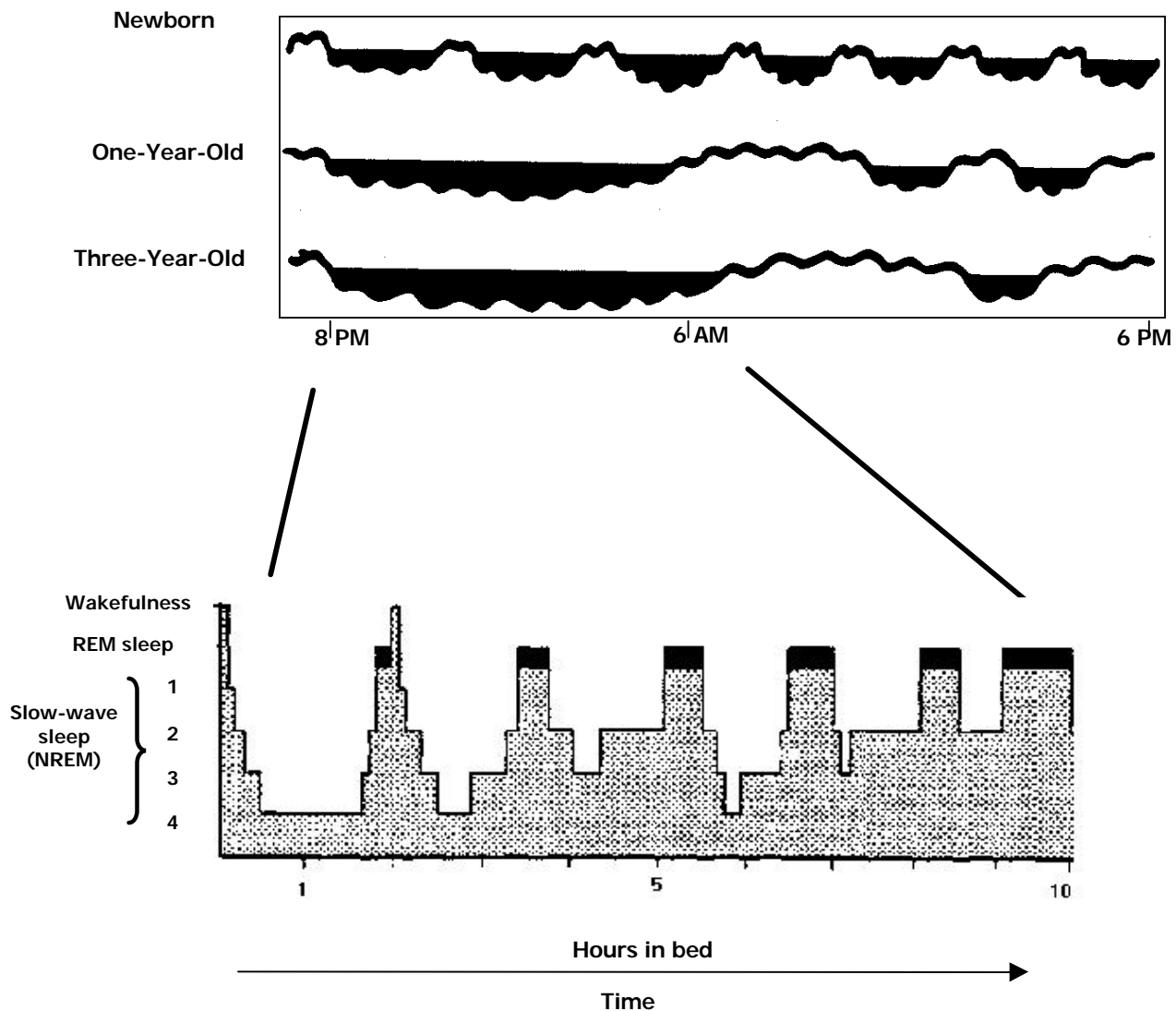
Before presenting the results of the analyses, a brief review of research on the normal development of sleep in young children and the factors likely influencing it seems appropriate.

1.1 Review of the Literature

1.1.1 *Sleep Characteristics and Problems in Young Children*

Sleep follows an accelerated developmental path in the first few years of life (see illustration in Figure 1.1).

Figure 1.1
Schematic representation of Sleep development in young children¹



1. Infants present short periods of sleep (black) and awake (white) during the day. During the first year of life, periods of sleep and awake lengthen. The internal structure of sleep also changes. The hypnogram at the bottom of the figure shows that the night is composed of sleep cycles. Falling asleep (stage 1) progresses to stages 2, 3 and 4, then stages 3, 2 and REM sleep, indicated by the black bars, all in 70 to 90 minutes. At the end of the first period of REM sleep, a new 90 minute cycle begins. According to the number of hours asleep, there are 4 to 7 sleep cycles. Slow-wave sleep normally predominates in the cycles at the beginning of the night and REM sleep predominates in the cycles at the end of the night.

Source : Compilation of studies by various researchers.

Infants present several short periods of sleep and wake in the course of the day. Over time, the sleep and wake periods progressively lengthen; night sleep consolidates (no waking) and awake periods are concentrated during daytime even when still punctuated by naps (often 2 up to the age of 2 years, followed by one up to the age of 4-5 years (Weissbluth, 1995)). In parallel, the internal composition of night sleep changes (bottom

illustration in Figure 1.1). The two states of immature sleep at birth, namely quiet sleep and active sleep, become more defined and progressively differentiate into five, clearly identifiable stages. Quiet sleep comprises four stages or slow-wave or NREM (non-REM) sleep, and active sleep assumes all the characteristics of adult REM sleep (Louis *et al.*, 1997). The proportion of REM sleep diminishes from 50% at birth to 25% at 2-3 years of age, giving way to longer

periods of NREM sleep, stages 1 to 4. These stages organize into cycles.¹ In the first years of life, all sleep cycles contain slow-wave sleep and REM sleep in similar proportions. This is followed by the predominance of slow-wave sleep in the cycles at the beginning of the night and the preponderance of REM sleep in the cycles at the end of the night, resulting in sleep structure that resembles that of adults.

Most children pass through these stages with no problem. However, sleep disorders affect between a quarter and a third of young children (Johnson, 1991; Pollock, 1994; Richman *et al.*, 1985). They mainly consist of sleep onset difficulties (including bedtime resistance) or frequent night wakings. These two problems can also be found in the same child. Indeed, depending on the study and the criteria used to define the problem, from 30% to 50% of children 1 to 2 years of age who frequently wake at night also present difficulties in sleep onset (falling asleep) or bedtime struggle (resistance to being put to bed) (Jenkins *et al.*, 1984; Johnson, 1991; Richman, 1981).

The QLSCD data show that most children were sleeping through the night at the age of 5 months (78%; Petit *et al.*, 2000). However, a steep rise in night wakings has often been observed in the second half of the first year (Anders, 1979; Bernal, 1973; Carey, 1974; Moore and Ucko, 1957). Anna Freud (1961, 1965) has associated this return to increased night waking in the child as an awareness of the environment on the one hand, and the pivotal role played by the mother in his/her social and emotional life on the other. Combined with the acquisition of new motor skills allowing the child to explore his environment, this awareness of the environment leads to a certain level of separation anxiety.

Some studies have shown, either by video recording (Gaylor *et al.*, 2001 ; Minde *et al.*, 1993), actigraphy² (Sadeh *et al.*, 1991) or polygraphy³ in the home (Louis *et al.*, 1997), that on average, all children wake approximately 3 times a night between 1 and 3 years

of age. During these years, the difference between “good sleepers” and “poor sleepers” lies in the ability or inability to fall back asleep alone without needing the parent. Gaylor *et al.* (2001) have developed a classification system for sleep disorders (dyssomnias) adapted for young children (see Table 1.1).

In general, children under 2 years of age present more problems of night waking than of sleep onset or resistance to being put to bed (Jenkins *et al.*, 1984). The latter types of problems become more frequent after the age of two (Beltramini and Hertzog, 1983; Johnson, 1991). The criteria for diagnosing a problem of night waking seems to vary from one study to another. Many use the criterion of three wakings and more or remaining awake for 20 minutes or more during the night. Based on a clinical study, Gaylor *et al.* (2001) suggest that a slightly different criterion be applied for children 1 to 2 years of age compared to those 2 and over and add a new one for the problem of night waking – putting the child to sleep in the parents' bed in response to a waking. It is usually considered normal to have one night per week interrupted by wakings. As demonstrated in Table 1.1, the real problem lies in its recurrence every night or many nights a week.

1. A cycle is composed of a period of slow-wave or NREM (non-REM) sleep and a period of REM sleep.

2. Actigraphy is a method of recording motor activity by an instrument worn on the wrist. It reveals periods of wake and sleep.

3. Polygraphy is conducted using electrodes attached to the scalp. It measures electrical activity in the brain, and helps identify the stages of sleep the subject is experiencing.

Table 1.1

Classification of dyssomnias in young children

Problem	Normal Perturbation (1 episode/wk)	Disturbance (2 to 4 episodes/wk)	Disorder (5 to 7 episodes/wk)
Night Wakings			
• 12 to 24 months	≥ 2 wakings ¹ /and/or the child is brought to the parents' bed		
• 24 to 36 months	≥ 1 waking/and/or the child is brought to the parents' bed		
Sleep onset			
• 12 to 24 months	> 30 min to fall asleep and/or parent must remain present and/or > 2 reunions ²		
• 24 to 36 months	> 20 min to fall asleep and/or parent must remain present and/or > 1 reunion		

1. A waking here means the child has called for the parent.

2. A reunion indicates the parents return to the child's room after he was put to bed before sleep onset, following the child requesting something, such as a glass of water, another story, a final hug, adjusting the door of the room, etc.

Source : Gaylor *et al.* (2001).

Sleep latency (the time from lights out to falling asleep) or bedtime struggle (resistance to being put to bed) with a duration longer than 30 minutes is generally considered problematic. Based on polygraphy done in the home, a longitudinal study of sleep by Louis *et al.* (1997) shows that mean sleep latency remains stable at approximately 15 minutes (plus or minus 10 minutes) from the age of 3 months to 2 years. After this age, there is, according to some researchers, an increase in sleep latency (Armstrong *et al.*, 1994; Scher *et al.*, 1995).

After night waking and falling asleep problems, parasomnias are considered the most common sleep disorders in children. Parasomnias, such as somnambulism (sleepwalking), night terrors, etc., "consist of clinical disorders that are not abnormalities of the processes responsible for sleep and awake states per se but, rather, are undesirable physical phenomena that occur predominantly during sleep" (American Sleep Disorders Association, 1997; see also Lapierre and Montplaisir, 1992 for a review of parasomnias). They are not due to a mental disorder but are often the result of the transition from an infant organization of sleep to an adult one. They may also be exacerbated by stress, anxiety, changes in schedules and daily routines (vacation) or excitation. Parasomnias can present with variable intensity in children, and often disappear at puberty (Lagerge *et al.*, 2000); however they can persist to adulthood. Salzarulo and Chevalier (1983) report that parasomnias are more frequent in children who had sleep problems in the first year of life.

Since parasomnias appear in normal, healthy children and often disappear in adolescence, they are usually considered to be a transitory phenomenon, though bothersome, rather than a medical condition. However, the clinical impact of parasomnias is in general underestimated. When they present, they can impede the continuity of sleep and/or affect its restorative properties. They therefore increase the risk of fatigue or diurnal somnolence. This emphasizes the importance of sleep study as the cornerstone of understanding the overall development of children. It has added importance in that very few epidemiological studies have focused on the prevalence of parasomnias in young children; the usual focus being children of school age (Klackenberg, 1982; Lagerge *et al.*, 2000; Liu *et al.*, 2000; Paavonen *et al.*, 2000; Stein *et al.*, 2001). Data gathered in the QLSCD will help fill this enormous gap.

1.1.2 Persistence of Sleep Problems

People often tell parents that the sleep problems of their young child will disappear with age, but research indicates the opposite, with the exception of most of the parasomnias. Indeed, one study shows that 44% of poor sleepers at the age of 6 months continued to regularly wake at the age of 1 year, and among these, 41% still did so at the age of 18 months (Jenkins *et al.*, 1984). Similarly, a population study has shown that poor sleepers at 5 months of age were twice as likely to remain poor sleepers at 20 months than good sleepers were to become poor ones (Wolke *et al.*, 1995). Another study shows that 41% of children who had a sleep problem at 8 months still had it at 3 years of age, versus 26% of good sleepers who became poor sleepers (Zuckerman *et al.*, 1987).

The older a child gets, the higher the percentages seem to climb. Approximately 50% of children who signal their wakings at 1 year continue to do so two years later, resulting in a veritable sleep problem (Gaylor *et al.*, 2001). Another study shows that in children 15 to 48 months of age with sleep problems, 84% still had a problem three years later (Kataria *et al.*, 1987). According to Richman *et al.*, (1982), when children reach the age of 3 years, sleep problems tend to become chronic, at least during the course of childhood. In their study, two-thirds of poor sleepers at the age of 3 years still had a sleep problem 5 years later.

1.1.3 Factors Associated with "Poor" Sleep

As mentioned earlier, and according to Anna Freud (1961, 1965) the return to night wakings in the second half of the first year is in large part the result of anxiety separation experienced by the infant, who is both aware of his environment and of the fact that he is not inseparable from his mother. According to his individual characteristics and the type of interactions he has with his mother/parents, he learns to comfort himself and thereby reduce his anxiety, and begins to enjoy exploring his environment by himself. If the separation anxiety is poorly managed because the mother is either anxious, overprotective, depressed or herself has a history of insecure attachment, the child will face difficulties in learning to be autonomous with regards to sleep because he is not being encouraged to do so by the behaviours of his mother (Benoit *et al.*, 1992; Navalet, 1996; Paret, 1983; Scher and Blumberg, 1999). Indeed, the significant association between depression in the mother and sleep problems in children has been demonstrated many times over (Anders *et al.*, 1992; Armstrong *et al.*, 1998b; Lozoff *et al.*, 1985; Minde *et al.*, 1993; Richman, 1981; Van Tassel, 1985; Wolke *et al.*, 1995; Zuckerman *et al.*, 1987). This association may be attributable to a change in maternal behaviours such as overprotectiveness, or an increase in the rapidity in responding to the child, which impedes his learning to be autonomous (Paret, 1983).

Parenting behaviours to do with sleep, namely sleep onset and night wakings, are generally considered to be of prime importance in the establishment of a consolidated sleep (Anders, 1979; Benoit *et al.*, 1992; Hayes *et al.*, 1976; Johnson, 1991; Richman, 1981;

Van Tassel, 1985). In the first year of the QLSCD, these were revealed as the variable with the strongest association with sleeping through the night in 5-month-old babies (Petit *et al.*, 2000). Parental behaviours can also be influenced by the child's temperament. Hayes *et al.* (2001) have demonstrated a relationship between difficult temperament as perceived by the parents and the behaviour of having the child sleep in the parents' bed at least part of the night.

Many other studies have reported that a child's temperament plays an important role in the development of sleep problems (Blurton Jones *et al.*, 1978; Carey, 1974; Richman, 1981). Already by the age of 5 months, temperament is significantly associated with the behaviour of sleeping through the night (Petit *et al.*, 2000). According to Carey (1974), a particular aspect of temperament distinguishes good sleepers from poor – the child's sensory threshold. Two hypotheses are put forth to explain this. Amplified response to stimuli during the day renders the child more likely to wake at night (cumulative excitation), or the child may be more easily excited/irritated by internal and external stimuli, at night as well as during the day. The author adds that sleep problems likely result from the interaction between temperament and other factors, such as parent/child interactions and health, rather than temperament alone. Night wakings have indeed been shown to be associated with the health of the child (Minde *et al.*, 1993), particularly with recurrent minor afflictions (Hart *et al.*, 1984).

Most studies do not report any differences between boys and girls, although some show that boys have more problems of frequent wakings (Armstrong *et al.*, 1998b; Moore and Ucko, 1957). According to data from the first round of the QLSCD, male sex was the fifth factor in importance associated with not sleeping through the night at the age of 5 months (Petit *et al.*, 2000).

In an epidemiological study of children 8-9 years old (Paavonen *et al.*, 2000), the type of family, reconstituted and adoptive, was shown to be related to sleep problems. Marital status, rarely studied, does not seem to be associated with sleep problems in school-age children (Armstrong *et al.*, 1998a). Some studies have found that socio-economic status is

linked to the quality of sleep in children (Rona *et al.*, 1998; Van Tassel, 1985), whereas others have shown no association in this regard (Armstrong *et al.*, 1998a; Bernal, 1973; Paret, 1983; Richman, 1981; Zuckerman *et al.*, 1987). Epidemiological studies conducted on school-age children have shown that the immigrant status of the mother is associated with sleep problems (Pollock, 1994; Rona *et al.*, 1998). Bivariate analyses of data from the first round of QLSCD also revealed the role of this variable in terms of not sleeping through the night at the age of 5 months, but this factor did not appear in the multivariate analysis when certain other characteristics were entered in the model (Petit *et al.*, 2000). It can therefore be concluded that this factor exercises its influence through other variables such as parenting behaviours regarding sleep and in particular, co-sleeping in the parents' bed.

Studies of factors associated with poor sleep therefore present numerous results which are sometimes contradictory. Furthermore, except for certain epidemiological studies on populations of school-age children, very few studies have been conducted on large probabilistic samples (to prevent selection bias), or have simultaneously analyzed many variables in order to differentiate the direct and indirect influences they may have on sleep.

1.2 Objectives and Instruments

The analyses that follow have three objectives. First, describe the general characteristics of sleep at the ages of 5, 17 and 29 months in terms of the structure of sleep habits and the progressive appearance of parasomnias (undesirable phenomena superimposed on sleep), such as somnambulism (sleepwalking), somniloquy (sleeptalking), night terrors, nightmares, rhythmic movements (body rocking or head banging) and bruxism (teeth grinding).

The second objective is to verify whether sleep problems persist in very young children. Do sleep characteristics, such as time to fall asleep, number of wakings, number of consecutive hours of sleep, remain relatively stable? In other words, do poor sleepers at the age of 5 months tend to continue to be poor sleepers as they age (17 and 29 months), and by the same token, do good sleepers remain so at the ages of 17 and 29 months?

The third objective is to identify certain factors associated with poor sleep at 17 and 29 months, and verify whether these are the same ones observed at 5 months. Are parenting behaviours regarding sleep, sex and temperament of the child, co-sleeping in the parents' bed factors related to sleep at 17 and 29 months as they were at 5 months⁴ (Petit *et al.*, 2000)? Do certain characteristics such as socio-economic status, type of family, overall health of the child or depression in the mother play a role at 17 or 29 months? Are there other factors, such as the mother returning to work and using some form of child care, that affect sleep?

Data taken from the Self-Administered Questionnaire for the Mother (SAQM)⁵ helps answer some of these questions. This collection instrument, described in the first paper in this volume, is original and was specifically designed for the QLSCD. There seem to be no equivalents in similar surveys such as the National Longitudinal Study of Children and Youth (NLSCY - Canada). Like most other longitudinal surveys of young children, the NLSCY had only a few brief questions on sleep.

It should be emphasized that the sleep variables studied in the QLSCD are not the result of direct measurement such as objective observations in a laboratory. They are indirect, indeed subjective, and represent the opinion or perception of the mother. This is the case for the main question, "Does your child sleep undisturbed (straight) through the night?"

Data from other measurement instruments used in the 1998 round of the QLSCD were shown to be associated with whether or not the child was sleeping through the night at 17 and 29 months. Among these were characteristics known to play an important role in the development of young children and potentially linked to various aspects of sleep – sex, temperament and overall health status.

4. It should be emphasized that the feeding method, a strongly associated factor at 5 months, was not studied at 17 and 29 months, given the low prevalence of breastfeeding after the first year.

5. The questions on the child's sleep at 17 and 29 months of age are presented in the Annex.

Other variables studied reflect the environment of the child – socio-economic status of the household, type of family and parents' characteristics (mother's immigrant status, marital status and education, mother's employment status, mother's depression). Most of these variables were taken from the Interviewer Completed Computerized Questionnaire (ICCCQ) administered to the Person Most Knowledgeable of the child (PMK) in a face-to-face interview. Other variables, such as maternal overprotectiveness, mother's feeling of efficacy and mother's perception of impact on the child's life were taken from the Parenting Cognitions and Behaviours Scale⁶ in the SAQM.

It is important to remember that the variables found significant should be considered factors associated with the sleeping through the night (or not) rather than definitive causes of the behaviour, since in most cases, they were tested simultaneously.

6. The Parental Perceptions and Behaviours Regarding the Infant/Child Scale (PPBS) is a measurement scale based on the parents' evaluation of some of their cognitions and behavioural tendencies. The scale comprises 32 questions measuring six cognitive and behavioural dimensions: the perception of parental efficiency, perception of impact of parenting practices, tendency to coercion, tendency to overprotectiveness, parental affection and parent's perception of the general qualities of the child (Boivin *et al.*, 2000). In the analyses here, only data gathered from the mother were used.

2. Methodological Aspects

2.1 Target Population

The analyses presented in this paper are based on data collected in the first three rounds of the QLSCD, namely when the children were approximately 5, 17 and 29 months of age.⁷ Estimates of prevalence and longitudinal analyses were conducted on the group of children whose biological mother (or father's spouse/partner) was living in the household during the three rounds. Analyses of the factors associated with sleeping through the night at 17 and 29 months were based on the number of respondents obtained at each collection time (the sample size is therefore variable). The estimates presented here may be inferred to all children born in Québec in 1997-1998 who, at 29 months of age, had not permanently left the province.

2.2 Statistical Analyses

Four types of analyses were conducted on the weighted data:

1. Frequency analyses at each age were conducted to present the prevalence of sleep and parasomnia characteristics.
2. To examine the development of sleep (characteristics and parasomnias) between 5 and 17 months and between 17 and 29 months, the McNemar test for dichotomous variables and its extension, the test of marginal homogeneity, for variables of more than two categories (but with ordinal properties), were conducted. These tests establish whether there is a significant difference between positive changes and negative ones observed in the progress of variables over time. Given that these analyses do not compensate for the sample design, the threshold of significance for the tests was reduced to 0.01 to prevent interpreting deviations that were not present in the population.
3. To determine if parasomnias were more frequent in children who were not sleeping through the night compared to those who were, chi-square tests were conducted for each type of parasomnia analyzed at 17 and 29 months of age.
4. To identify the most determinant variables in the establishment of consolidated sleep at each age, and to separate direct associations from those explained by an intermediate variable, multivariate analyses by logistic regression were conducted. First, bivariate analyses were used to compare babies who were sleeping through the night to those who were not, as a function of variables linked to sleep characteristics, parental behaviours, child characteristics or living conditions. Nominal variables were evaluated using chi-square tests and continuous variables by Student tests. Secondly, only the significant variables were retained for the logistic regression analyses.

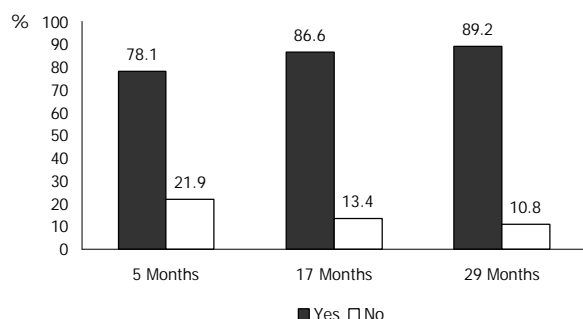
7. The characteristics of the target population are presented in Number 1 in this volume.

3. Results

3.1 Description and Evolution of Sleep Characteristics

Figures 3.1a to 3.7 illustrate sleep characteristics at 5, 17 and 29 months and the progress of these characteristics between 5 and 17 months and 17 and 29 months⁸. As indicated in these figures, on average for each characteristics, half and even up to three quarters of the children showed no change from one year to the next, thereby bearing witness to the general stability of the organization of sleep through the various time periods.

Figure 3.1a
Distribution of children by whether or not they were sleeping through the night around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000

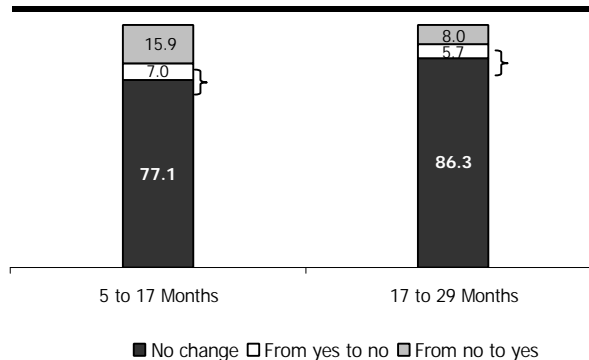


Source: Institut de la statistique du Québec, QLSCD 1998-2002.

This was particularly the case in the behaviour of sleeping through the night (or not), in which 77% and 86% of children 17 and 29 months of age, respectively, showed no change from the previous year (poor and good sleepers studied together). In children who changed groups, there were significantly more poor sleepers who became good ones compared to the reverse (16% v. 7% from 5 to 17 months, and 8% v. 6% from 17 to 29 months; see Figure 3.1b). The percentage of children who were sleeping through the night rose from 78% to 87% between 5 and 17 months, attaining 89% at 29 months. In contrast, the percentage of children who were not

sleeping through the night dropped from 22% to 11% between 5 and 29 months of age.

Figure 3.1b
Distribution of children by changes in sleeping patterns (through the night or not) between different ages (%), Québec, 1998, 1999 and 2000



} McNemar test significant ($p < 0.01$).

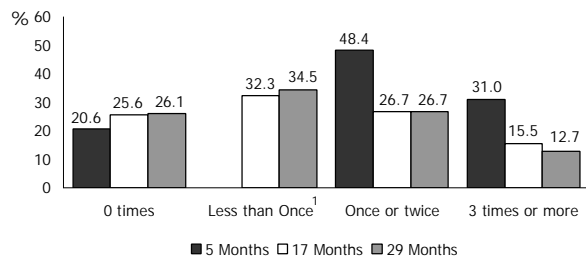
Source: Institut de la statistique du Québec, QLSCD 1998-2002.

It is not surprising to observe that there were significantly more children whose number of wakings decreased (all categories together) between 5 and 17 months than those whose number of wakings increased (Figure 3.2b). A similar trend was observed between 17 and 29 months ($p = 0.03$; Figure 3.2b).⁹ At 17 and 29 months, 16% and 13% of children respectively were waking up three or more times a night, compared to 31% at the age of 5 months (Figure 3.2a).

8. It is important to mention that are small differences between the percentages presented in figures "a" and those calculated from the proportions in figures "b" since the former were calculated for respondents present at each of the rounds taken separately, whereas the latter were calculated for respondents present at the two rounds under consideration. For example, for the behaviour of sleeping through the night at 17 and 29 months, we would calculate the following: 86.6% (yes at 17 months) + 8% (from no to yes) - 5.7% (from yes to no) = 88.9% (yes at 29 months) instead of 89.2% presented in Figure 3.1a.

9. It is, however, important to emphasize that to evaluate this change, children who were waking at least once a night at 17 and 29 months (data not available at 5 months) were grouped with those who were waking once or twice a night.

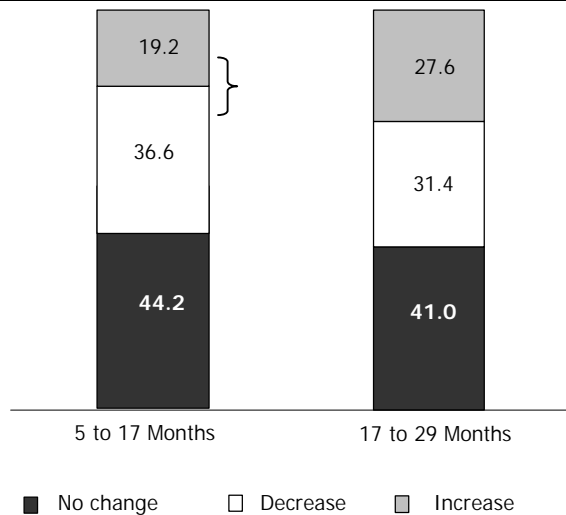
Figure 3.2a
Distribution of children by number of night wakings around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000



1. The response "Less than once a night" was not available at 5 months.

Source: Institut de la statistique du Québec, QLSCD 1998-2002.

Figure 3.2b
Distribution of children by changes in number of night wakings¹ between different ages (%), Québec, 1998, 1999 and 2000



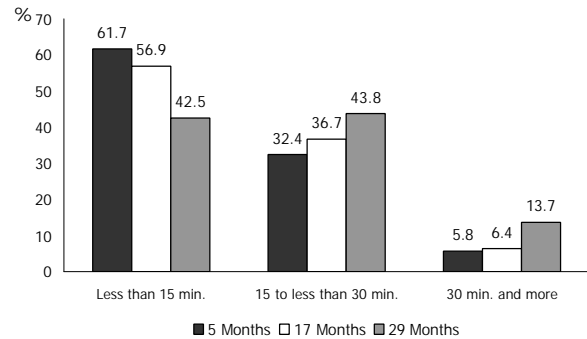
1. Tracking sleep between 5 and 17 months was done by twinning the response "Less than once a night" with the response "Once or twice a night".

} Marginal homogeneity test significant ($p < 0.0001$).

Source: Institut de la statistique du Québec, QLSCD 1998-2002.

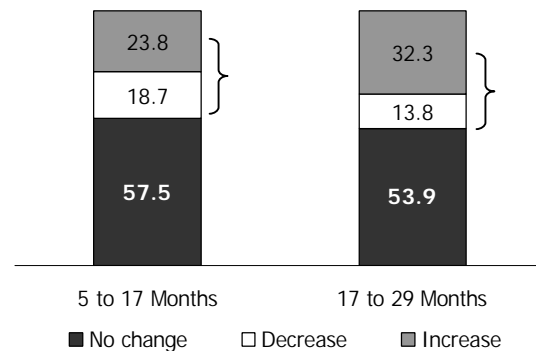
However, the time taken to fall asleep, seemed to increase with age, most markedly between the ages of 17 and 29 months. Approximately 14% of children at 29 months were taking 30 minutes and more to fall asleep, compared to approximately 6% at 5 months and 17 months (Figure 3.3a). Between the ages of 17 and 29 months, the time taken to fall asleep increased in 32% of children, whereas it decreased in only 14%. The difference between these proportions at 5 and 17 months was lower but still significant (Figure 3.3b).

Figure 3.3a
Distribution of children by time taken to fall asleep around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000



Source: Institut de la statistique du Québec, QLSCD 1998-2002.

Figure 3.3b
Distribution of children by changes in time taken to fall asleep between different ages (%), Québec, 1998, 1999 and 2000

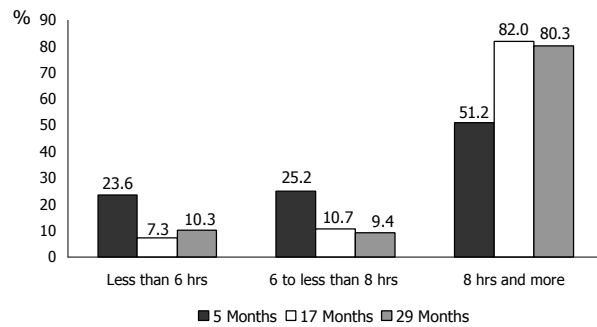


} Marginal homogeneity test significant ($p < 0.001$).

Source: Institut de la statistique du Québec, QLSCD 1998-2002.

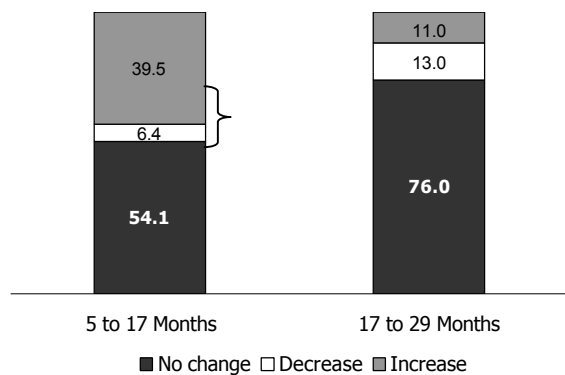
In spite of this increase in time taken to fall asleep, the number of consecutive hours of sleep significantly increased between 5 and 17 months rather than decreased (40% v. 6%), and remained stable between 17 and 29 months (non-significant difference; Figure 3.4b). Nearly 50% of children were sleeping at least 8 consecutive hours at 5 months, whereas approximately 80% were at 17 and 29 months (Figure 3.4a). At 29 months, the total sleep time attained a mean of 10 hours (standard deviation of 72 minutes) (data not shown).

Figure 3.4a
Distribution of children by number of hours of consecutive night sleep around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000



Source: Institut de la statistique du Québec, QLSCD 1998-2002.

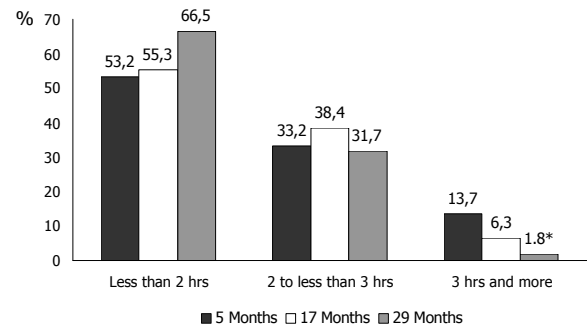
Figure 3.4b
Distribution of children by changes in number of hours of consecutive night sleep between different ages (%), Québec, 1998, 1999 and 2000



} Marginal homogeneity test significant ($p < 0.001$).
 Source: Institut de la statistique du Québec, QLSCD 1998-2002.

In parallel, the number of consecutive hours of sleep during the day progressively decreased between 5 and 29 months (Figure 3.5a). While 14% of infants 5 months of age were sleeping 3 consecutive hours and more during the day, 6% were doing so at 17 months and only 2% at 29 months (Figure 3.5a). The percentage of children whose duration of consecutive diurnal sleep decreased was significantly higher than those whose duration increased in the transition between 5 and 17 months (28% v. 22%), and even more so for that between 17 and 29 months (28% v. 13%; Figure 3.5b). At 29 months, 90% of children were having only one nap while 8% were no longer having one (data not shown).

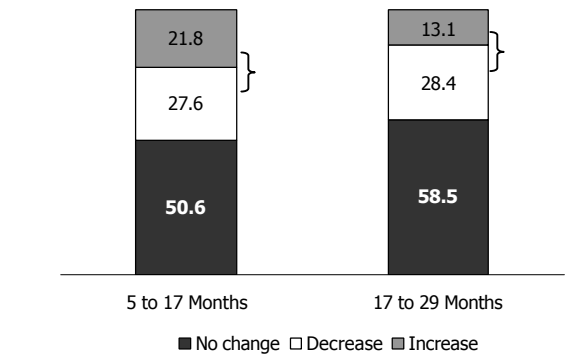
Figure 3.5a
Distribution of children by number of consecutive hours of day sleep around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000



* Coefficient of variation between 15% and 25%; interpret with caution.

Source: Institut de la statistique du Québec, QLSCD 1998-2002.

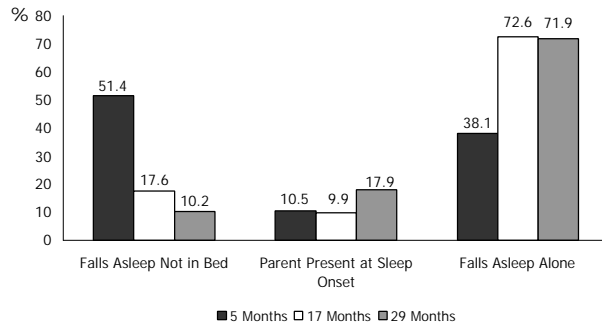
Figure 3.5b
Distribution of children by changes in number of consecutive hours of day sleep between different ages (%), Québec, 1998, 1999 and 2000



} Marginal homogeneity test significant ($p < 0.001$).
 Source: Institut de la statistique du Québec, QLSCD 1998-2002.

Similar to the sleep characteristics of the child, parental behaviours at bedtime (Figure 3.6) changed most between 5 and 17 months, but remained quite similar later on. There were much fewer children being put to bed already asleep at 17 and 29 months (18% and 10% respectively) than at 5 months (51%). This can be explained by the fact that at 5 months, the infant often falls asleep after his last feeding, whereas at 17 and 29 months, this behaviour is much less the norm. The percentage of children put to sleep in their own bed but with the parent present remained relatively stable between 5 and 17 months (approximately 10%), then increased at 29 months (18%). From the age of 17 months on, approximately 70% of children were falling asleep by themselves (alone).

Figure 3.6
Distribution of children by parental behaviour at bedtime around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000

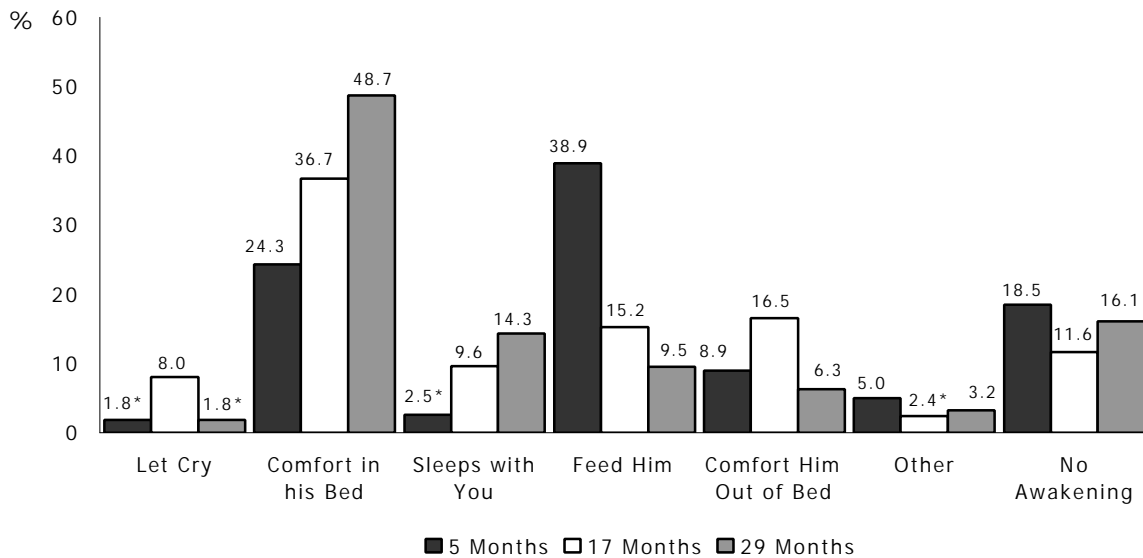


Source: Institut de la statistique du Québec, QLSCD 1998-2002.

Parental behaviours at night wakings progressively changed from 5 to 29 months (Figure 3.7). The percentage of parents who comforted the child in his bed rose from 24% to 37%, then to 49%, whereas that of feeding him decreased from 39% to 15% then to 10% (5, 17, and 29 months, respectively). In contrast, the behaviour of putting the child to sleep in the parents' bed in response to a waking increased progressively, from 2.5% at 5 months to 10% at 17, then 14% when the child was 29 months of age.

Approximately 7%, 8% and 13% of children who woke more than 3 times a night at 5, 17 and 29 months respectively, also had sleep onset problems when put to bed (i.e. taking more than 30 minutes to fall asleep) (data not shown).

Figure 3.7
Distribution of children by parental behaviour at night wakings around the age of 5, 17 and 29 months, Québec, 1998, 1999 and 2000



* Coefficient of variation between 15% and 25%; interpret with caution.

Source: Institut de la statistique du Québec, QLSCD 1998-2002.

Figure 3.8 presents a portrait of a typical day in the life of a young Québec child 29 months of age, as suggested by the QLSCD data.¹⁰ He/she is put to bed around 8:10 p.m., falls asleep in less than 30 minutes, and sleeps approximately 10 hours (standard deviation of 72 minutes), at least 8 of which are consecutive. He/she wakes up at least twice a night for a total awake time in the night of 19 minutes (standard deviation of 29 minutes). During the day, he/she has a nap lasting 1 hour and 56 minutes (standard deviation 36 minutes).

3.2 Prevalence and Trajectories of Parasomnias

The QLSCD data provide information on the prevalence of certain parasomnias at the ages of 5, 17 and 29 months. Questions on parasomnias were only asked at the ages in which they are possible or probable. For example, only the question on noisy breathing was posed at 5 months because it is obvious that an infant cannot sleepwalk, grind his teeth, recount bad dreams, etc. Prevalences were estimated as a function of at least the occasional occurrence (namely sometimes, often or always = yes) compared to absence (never = no) for each type of parasomnia. Figures 3.9a and 3.9b present the total prevalences, and those related to the behaviour of sleeping through the night, for children 17 and 29 months of age respectively.

At 17 and 29 months, approximately 40% (38-44%) of children presented noisy breathing during their sleep at least occasionally, similar to the percentage observed at 5 months (42%, datum not shown). At these ages, 3% to 5% of children “often” or “always” presented this problem (data not shown). Noisy breathing, without being a veritable parasomnia, can be a sign, if constant, of an obstructive respiratory problem related to sleep that can range from simple snoring without serious effect, to a syndrome of sleep apnea.¹¹

Nocturnal rhythmic movements,¹² a relatively common parasomnia in very young children, was reported as occurring at least occasionally in approximately 21% of 17-month-old children, decreasing to 7% in 29-month-old children. Bruxism (teeth grinding) was observed at least occasionally in approximately 8% and 11% of children at 17 months and 29 months respectively (Figures 3.9a and 3.9b), and frequently in 0.8% and 1.2% respectively (data not shown).

More frequently observed were night terrors (confused wakings), which occurred at least occasionally in 35% of children at 17 months, decreasing to 21% at 29 months. From 1 to 2% of children frequently experienced night terrors, which consist of sudden waking with a shrill yell, crying and perspiration (data not shown). The child appears to be in a state of panic, and does not respond to being comforted. Normally there is no dream content or memory of the incident the following day. Night terrors are therefore different from bad dreams, which are far more common. As the data show in Figure 3.9b, approximately 65% of children 29 months of age had bad dreams at least occasionally, and slightly more than 2% frequently (data not shown).

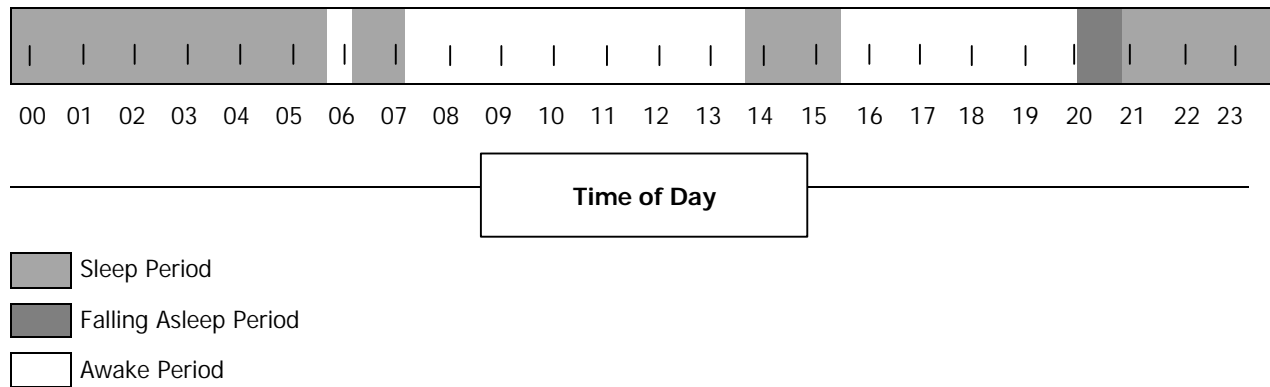
Somnambulism (sleepwalking) was still rare at 29 months (only 4% sometimes or often), whereas somniloquy (sleeptalking), and bad dreams were among the most common parasomnias, occurring sometimes or often in 47% of children at this age.

10. Data which helped produce this typical portrait for children 5 and 17 months of age are not available.

11. Sleep apnea is defined as pauses in breathing that last longer than 10 seconds and occur repeatedly throughout the night, leading to fatigue and inability to concentrate during the day.

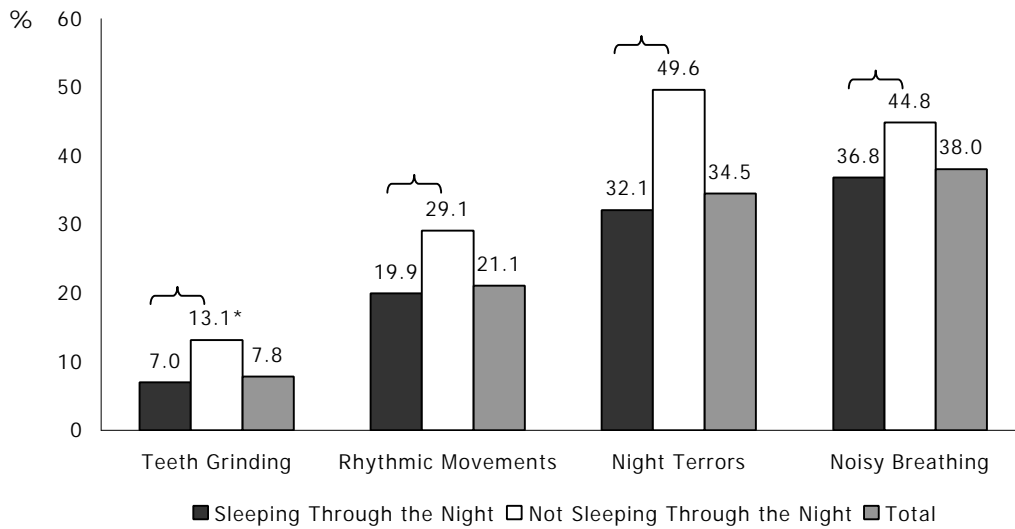
12. Night rhythms include rocking, swaying, rolling the body or head, or hitting the head against the bed or pillow in a repetitive fashion to fall asleep or while sleeping.

Figure 3.8
Typical day in the life of a 29-month-old child, Québec, 2000



Source: *Institut de la statistique du Québec, QLSCD 1998-2002.*

Figure 3.9a
Prevalence of various parasomnias at around 17 months and by whether the child was sleeping through the night or not, Québec, 1999

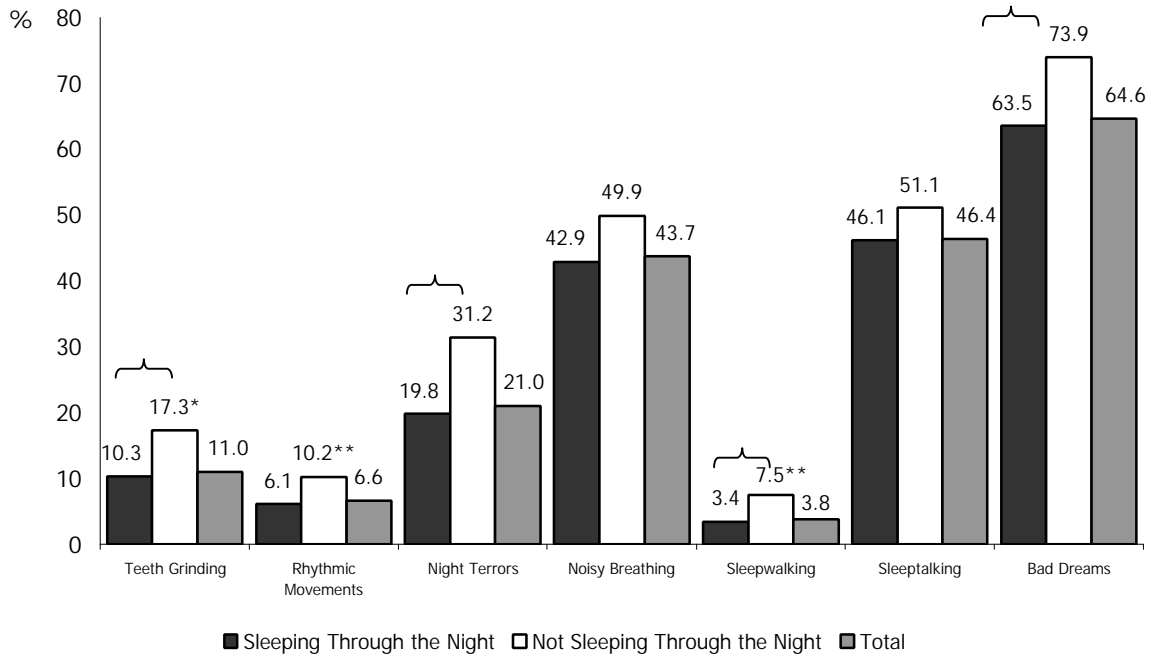


Chi-square test significant ($p < 0.01$), except for noisy breathing where $p < 0.05$.
 * Coefficient of variation between 15% and 25%; interpret with caution.

Source: *Institut de la statistique du Québec, QLSCD 1998-2002.*

Figure 3.9b

Prevalence of various parasomnias at around 29 months and by whether the child was sleeping through the night or not, Québec, 2000



Chi-square test significant ($p < 0.01$), except for bad dreams and sleepwalking where < 0.05 .
 * Coefficient of variation between 15% and 25%; interpret with caution.
 ** Coefficient of variation higher than 25%; imprecise estimate for information purposes only.
 Source: Institut de la statistique du Québec, QLSCD 1998-2002.

Bivariate analyses showed that parasomnias were in general more frequent among children who were not sleeping through the night than in those who were. All parasomnias studied at 17 months, namely night terrors, rhythmic movements, bruxism and noisy breathing were more frequently reported for children who, according to their mother, were not sleeping through the night at this age (Figure 3.9a). Night terrors, bad dreams, bruxism and sleepwalking, but not rhythmic disorders, somniloquy and noisy breathing, were more frequently reported in children who were not sleeping through the night at 29 months than in those who were (see Figure 3.9b). It should again be emphasized that, similar to the notion of “sleeping through the night”, presenting a parasomnia is based on the perception of the mother.

The QLSCD data reveal that there was a certain persistence in the parasomnias. More than half (54%) of children whose breathing was noisy at 5 months still had this problem at 17 months, whereas only 27% who had not had this problem at 5 months had it a year later. As a result, nearly three-quarters (73%) of children who had never had noisy breathing

in their sleep at the age of 5 months, did not present this problem at 17 months. Of those who had the problem at 17 months, approximately two-thirds (68%) had it at 29 months, compared to only 29% of children who did not have it at 17 months. In general, noisy breathing disappeared in a greater proportion than it appeared between 5 and 17 months (disappearance 19% v. 16% new cases; McNemar = 6.73; $p < 0.01$; data not shown) but appeared in a greater proportion than it disappeared between 17 and 29 months (18% new cases v. 12% disappearance; McNemar = 18.15; $p < 0.0001$; data not shown). These changes may indicate two different causes of noisy breathing.

Amongst those who were grinding their teeth at 17 months, 42% were still doing it at 29 months, whereas only 9% of those who didn't do so at 17 months were doing it a year later. Therefore, 91% of children who were not grinding their teeth at 17 months still were not doing so at 29 months. Bruxism appeared in a greater proportion than it disappeared between 17 and 29 months (8% v. 4%; McNemar = 18.37; $p < 0.0001$; data not shown).

The same stability was observed for night terrors, since approximately 38% of children who had them at 17 months still had them at 29 months, whereas only 12% who did not have them at 17 months presented with them the following year. As a result, 88% of children who did not have night terrors at 17 months still did not have them at 29 months. In contrast to bruxism, night terrors disappeared in greater proportion than they appeared between 17 and 29 months (22% v. 8%; McNemar = 117.26; $p < 0.0001$; data not shown).

With regards to rhythmic disorders, 97% of children who had these at 17 months still did not have them at 29 months. In those who did at 17 months, 20% had them at 29 months, whereas this was the case in only 3% of those who did not have them in the previous year. As in night terrors, rhythmic disorders disappeared more than they appeared between 17 and 29 months (17% v. only 2% of new cases; McNemar = 191.07; $p < 0.0001$; data not shown).

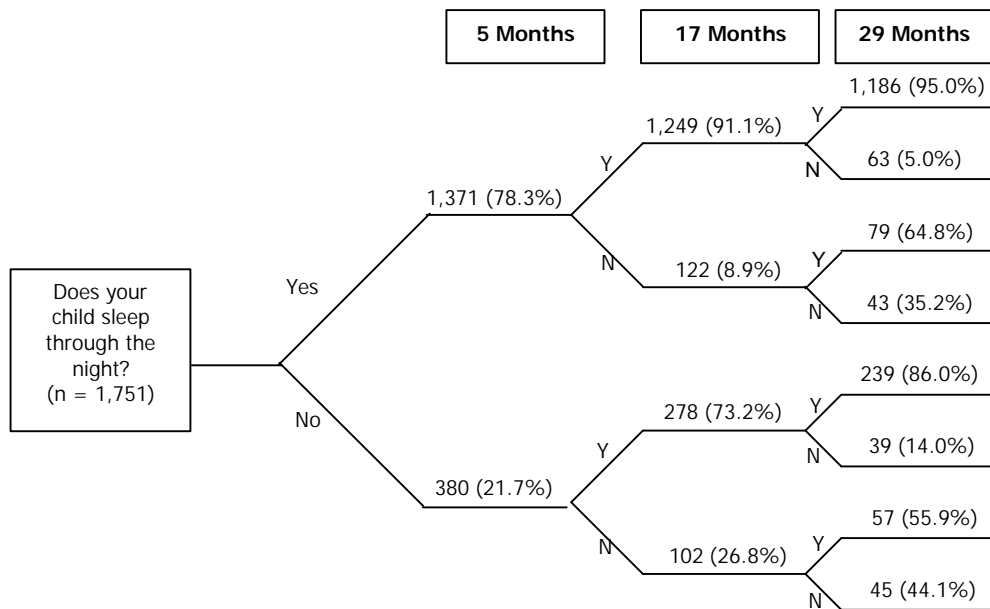
3.3 Trajectories of “Good” and “Poor” Sleepers from 5 to 29 Months

Figure 3.10 shows the trajectories of “good” and “poor” sleepers from the age of 5 months to 29 months. Of infants who were sleeping through the night at 5 months, 91% remained good sleepers at 17 months, while 73% of poor sleepers at 5 months became good sleepers the following year. Among good sleepers at 5 and 17 months, 95% were still good sleepers at 29 months. In all, 87% of good sleepers at 5 months remained good sleepers to the age of 29 months, and these comprised 68% of all the children studied (data not shown).

In contrast, among babies who were not sleeping through the night at 5 months, 27% remained poor sleepers at 17 months. In comparison, only 9% of good sleepers at 5 months became poor ones the following year. Of poor sleepers at 5 and 17 months, 44% remained so at 29 months. Only 12% of poor sleepers at 5 months remained poor sleepers to the age of 29 months (data not shown). It should be emphasized, however, that only 3% of all children were considered poor sleepers at the three ages (data not shown). Besides these groups, there were children who had a changing profile (no→yes→no or yes→no→yes).

Figure 3.10

Trajectory of “good” and “poor” sleepers by age, Québec, 1998, 1999 and 2000¹



1. The percentages represent the distribution of children in each path. However, the percentage of children who followed a given path from 5 to 29 months can be calculated by using the numbers indicated in the figure.

Source: Institut de la statistique du Québec, QLSCD 1998-2002.

3.4 Sleeping Through the Night at 17 and 29 Months – Certain Associated Factors

According to data from the 1998 round of the QLSCD, factors associated with the behaviour of sleeping through the night at 5 months were the following in order of importance: 1) parental behaviours at night wakings 2) perception of the baby's temperament 3) where the baby slept 4) breastfeeding or bottle-feeding, and 5) baby's sex (Petit *et al.*, 2000).

At 17 months, a number of variables were also observed to be associated with the behaviour of sleeping through the night (analyses not shown). Seventeen significant variables were entered into the logistic regression model: 1) parental behaviours at bedtime, 2) parental behaviours at night wakings, 3) immigrant status of the mother, 4) socio-economic status of the family, 5) marital status of the mother, 6) type of family, 7) main employment status of the mother, 8) recourse to child care, 9) where the child slept, 10) using a soother during the day or at night, 11) using an object to fall asleep, 12) mother's perception of the child's temperament, 13) overprotectiveness in the mother, 14) depression in the mother, 15) age of the mother, 16) safe

environment¹³ and 17) a measurement scale of mood changes in the child.

Likewise, twelve variables significantly associated with sleeping through the night at 29 months were entered in the logistic regression model: 1) parental behaviours at bedtime, 2) parental behaviours at night wakings, 3) immigrant status of the mother, 4) marital status of the mother, 5) socio-economic status of the family, 6) mother's educational level, 7) mother's health, 8) child's health, 9) using a soother, 10) mother's overprotectiveness, 11) mother's perception of efficacy and 12) mother's perception of impact on the child. It should be emphasized that certain significant variables at 17 months were not measured at 29 months, such as using an object to fall asleep, mother's perception of child's temperament and where the child sleeps.

13. The “safe environment” variable comes from the OFL (Observations of Family Life) questionnaire completed by the interviewer following each interview. It specifically asks whether the environment in which the child plays seems safe and not hazardous.

The factors with the strongest associations with sleeping through the night at 17 and 29 months of age are presented in Table 3.1 with their odds ratios and confidence intervals. Since the characteristic studied here (sleeping through the night) is not statistically considered a rare “event,” it is therefore appropriate to interpret the ratios as correlations - they only indicate that the probability of sleeping through the night may be increased or decreased by a given factor. Because partial non-response was higher than 5%, children whose mother was a non-European immigrant and those whose mother speaks a language other than French or English, may be under-represented in the analyses at 17 and 29 months, whereas those whose mother was 35 years of age or older risk being under-represented in the logistic regression at 29 months.

As indicated in Table 3.1, once all the characteristics were in the model, only four factors were associated with sleeping through the night at 17 or 29 months of age. Children who were put to bed awake and were left to fall asleep alone were clearly more likely to be sleeping through the night at 17 and 29 months (odds ratios of 4.18 and 2.92 respectively) than those who were essentially put to bed already asleep or those

whose parents remained at their side until they fell asleep. Letting the child cry or comforting him in his bed after a night waking (rather than not encouraging him to fall asleep by himself, feeding him, bringing him to co-sleep in the parent’s bed or comforting him out of his bed or other) was significantly associated with sleeping through the night at 17 and 29 months. Whatever the age, children’s whose parents acted this way were more likely to be sleeping through the night than other children.

As in 5-month-old infants, a temperament perceived as easy by the mother and the fact of sleeping alone in a room or with a brother or sister (rather than sleeping in the parents’ room) were also associated with sleeping through the night at 17 months (questions not asked at 29 months). A higher perception of efficacy in the mother and the child’s overall health (very good to excellent compared to good or fair) was also associated with sleeping through the night at 29 months. Taken together, these factors allowed 72% of children 17 months of age and 70% of children 29 months of age to be correctly categorized into “good” or “poor” sleepers.

Table 3.1

Main factors associated with sleeping through the night by age, Québec, 1999 and 2000

	Odds Ratio	Confidence Interval (95%)	
Variables – 17 months			
Behaviour of letting the child fall asleep alone	4.18	2.89	6.04
Behaviour of letting the child cry or comforting him in his bed at a night waking	2.16	1.53	3.06
Easy temperament of child ¹	1.17	1.04	1.31
Not sharing parents’ bedroom	1.78	1.14	2.77
Variables – 29 months			
Behaviour of letter child fall asleep alone	2.92	2.07	4.13
Behaviour of letting child cry or comforting him in his bed at a night waking	2.28	1.59	3.27
Mother’s perception of efficacy ¹	1.12	1.01	1.24
Child’s health	1.65	1.01	2.68

1. Continuous variable: an increase of one point on the measurement scale is associated with increased odds.
Source: *Institut de la statistique du Québec, QLSCD 1998-2002.*

4. Discussion

4.1 Prevalence and Persistence of Sleep Problems

The first three years of the QLSCD confirm the notion of the continuity of sleep organization in young children. The majority of children, according to the responses of their mothers, showed no change in their sleep characteristics such as sleeping through the night, time taken to fall asleep, and number of consecutive hours of day or night sleep. The sleep characteristic which had the highest rate of change was the number of wakings per night, particularly in the transition from 5 to 17 months. Many children who were not sleeping through the night in the first round of the QLSCD began to do so in the second, those not sleeping through the night decreasing from 22% at 5 months to 13% at 17 months, and finally to 11% at 29 months in the third round. Good sleepers in general (90% of cases) were still good sleepers a year later. In contrast, poor sleepers were three times more likely than good ones to still be poor sleepers a year later. Moreover, the data indicate that the persistence of sleep problems increases with age, as has been suggested in other studies (Kataria *et al.*, 1987; Richman *et al.*, 1982). According to the QLSCD data, a poor sleeper has a 65% to 73% greater chance of becoming a good sleeper a year later. However, if he had been a poor sleeper at 5 months and at 17 months, his chances of becoming a good sleeper at 29 months are 56%. This trend, if it continues, can have repercussions. As reported by Richman *et al.* (1982), sleep problems that persist to the age of 3 years can become chronic, at least during the childhood phase of life.

As mentioned earlier, the prevalence of sleep problems in children varies not only according with age and the population being studied, but also with the definition of "problem." Studies suggest that 20% to 42% of young children have sleep problems, often defined as frequent night wakings (Gaylor *et al.*, 2001; Kataria *et al.*, 1987; Richman, 1981). The QLSCD data reveal that 13% and 11% of children 17 and 29 months of age, respectively, were not sleeping through the night, and that, on average, similar percentages were waking three times or more during the night. These rates are below the means

reported in other studies conducted on the subject. The difference is probably due to the more restrictive definition adopted by the QLSCD, by which a problem should present every night rather than a few nights a week, the latter being the case in numerous other studies.

Analyses of the data also revealed low prevalences of sleep onset problems at 5 and 17 months but a higher one at 29 months. In this regard, studies suggest that these problems normally begin after the age of 2 years (Beltramini and Hertzog, 1983; Johnson, 1991). It should however be emphasized that these rates could have been higher if the QLSCD definition had also included bedtime struggle (resistance to being put to bed). This can also explain the weak association between multiple night wakings and sleep onset problems. Contrary to what has been reported in most studies, a small percentage of children 17 and 29 months of age who presented multiple night wakings also presented sleep onset problems.

Since very few epidemiological studies have examined parasomnias in young children, it is difficult to compare the QLSCD data with prevalences reported elsewhere, with a few exceptions. For example, the prevalence of night rhythmic movements in this survey is much lower than that reported in a longitudinal study of approximately 200 children, where it was 45% at 18 months, 26% at 24 months and 12% at 36 months (Klackenberg, 1971). The prevalence of sleepwalking observed in the QLSCD is similar to that observed in other epidemiological studies of older children (8 to 13 years; Laberge *et al.*, 2000; Paavonen *et al.*, 2000).

The QLSCD data, revealing that parasomnias were more frequent in children who were not sleeping through the night than in those who were, confirms the results obtained by Salzarulo and Chevalier (1983) in a small group of children. There are two explanations for this higher frequency. First, certain types of parasomnia such as night terrors or bad dreams can directly disturb the continuity of sleep. However, this is perhaps less the case with other problems, such as bruxism and rhythmic movements,

which were indeed reported in a greater proportion among children in the QLSCD who were not sleeping through the night. However, some studies have indicated a link between the level of anxiety and the presence of certain parasomnias such as night terrors, bruxism, night rocking, somniloquy (Lalonde *et al.*, 2000) and somnambulism (Klackenberg, 1982). This second explanation would apply in the sense that poorly managed anxiety separation results in the child strongly feeling the need for parental presence in order to fall asleep or fall back asleep after a night waking.

4.2 Determinants of Good or Poor Sleep

Analysis of the factors associated with sleeping through the night revealed that parental behaviours *vis-à-vis* sleep, at bedtime and night wakings, remained the most important factor in establishing good or poor sleep. This result supports what has been previously demonstrated, namely that the behaviour of putting the child to bed already asleep or remaining present until he falls asleep are associated with signaling night wakings (Hayes *et al.*, 1996). Similarly, certain parental behaviours at night wakings, such as putting the child in the parents' bed or putting the child to sleep before putting him back to bed, may impede or at least delay the acquisition of autonomy. Behavioural methods of treating sleep disturbances that also redress parental behaviours during sleep periods markedly improve or completely resolve the situation in 90% of cases (Richman *et al.*, 1985).

The mother's perception of the child as having a difficult temperament remained a factor that was significantly associated with not sleeping through the night at 17 months (question not asked at 29 months). Carey (1974) suggests that sleep problems probably result from an interaction between temperament and other factors, such as parent/child interactions, rather than temperament alone. However, the QLSCD data suggest that the child's temperament could be an important factor independent of parental behaviours. This is supported by the fact that in a number of child temperament scales in the field of child development, there is often an item evaluating the capacity of the child to regulate, in general, his biological rhythms.

As at 5 months, co-sleeping with the parents (not measured at 29 months) remained, at 17 months, an important factor associated with the behaviour of not sleeping through the night. According to Lozoff *et al.* (1984), it is not co-sleeping with the parents that is in itself responsible for subsequent sleep problems, but rather inconsistency in sleep habits caused by the parents' ambivalence towards the practice. In cultures or families where sharing the parents' bed is chosen at the outset as the place to put the child to sleep, night wakings are not generally reported as a problem. Indeed, sharing the parents' bed is judged to be a problem only if it is reactive, namely the child being removed from his own bed and brought to that of the parents because he will not fall asleep by himself after waking at night. In these cases, not only is co-sleeping with the parents the source of multiple night wakings, it constitutes a problem in itself, and is treated as such in the new classification of dyssomnias in young children (Gaylor *et al.*, 2001).

The association between the mother's feeling of efficacy and sleeping through the night has been the object of very few studies. There may be two explanations for this. First, the fact that the child is a good sleeper may give the mother a feeling of being an effective parent. Secondly, this feeling may also be a personality trait, one that tends to engender confident and consistent behaviours rather than ambivalent and changeable ones. Indeed, changeable parenting behaviours have been associated with the child not sleeping through the night (Johnson, 1991). In this study, the parents of children who signaled their wakings were much more inclined to change, shorten or eliminate daytime naps and vary bedtimes at night than parents of children who were sleeping through the night. It has also been demonstrated that children in families who have a regular schedule enjoy better sleep than those who are in families whose structures are loose or non-existent (Billon-Descarpentries, 1997). The association between the mother's perception of impact on the child's life and sleeping through the night can be explained in similar fashion.

At 29 months in the QLSCD, the child's health became an important factor in sleeping through the night, whereas at 5 and 17 months there was no indication of this. The link between sleep problems in children

over one year of age and their health, particularly in terms of minor recurrent illnesses, has been reported in a number of studies (Hart *et al.*, 1984; Minde *et al.*, 1993), one of which was an epidemiological study of children 5 to 11 years of age (Rona *et al.*, 1998). Another longitudinal epidemiological survey showed that frequent night wakings in children 5 years of age was a predictor of chronic medical problems at 10 years of age (Pollock, 1994).

As at 5 months, parental overprotectiveness, using an object to fall asleep and immigrant status of the mother constituted factors associated with sleeping (or not) through the night at 17 and 29 months in the QLSCD. In the regression analysis, these factors did not appear, because they were undoubtedly strongly associated with parental behaviours at bedtime and night wakings. For example, the influence of the mother's immigrant status on sleeping through the night was explained, at least in part, by the fact that co-sleeping in the parents' bed and staying with the child until he falls asleep are much more frequent in other cultures than in North American Caucasian families (Lozoff *et al.*, 1996). In addition to cultural habits, difficult financial circumstances upon arrival (small apartment, etc.) probably contribute to intensifying this phenomenon for families who have recently immigrated. According to Rona *et al.* (1998), a greater propensity towards sleep problems in children of certain ethnic groups could be attributed to a time effect – the more recent the immigration, the higher the risk may be. Though in the QLSCD the mother's immigrant status directly refers to the immigration of the mother and not that of preceding generations, the duration of time that has passed since she immigrated was not taken into account in the analysis.

Among the factors associated with sleep at 5 months, the child's sex was the fifth factor in importance. No difference between the sexes was observed at 17 or 29 months. This is in line with the results of another study, which showed that between the ages of 4 and 15 months, boys presented more sleep disturbances than girls, but a year later, no difference between the sexes was observed (Moore and Ucko, 1957).

Socio-economic status, type of family, mother's marital, health and employment status, and recourse to child care, became influential but non-determinant

factors at 17 or 19 months. These are ages when the child certainly becomes more sensitive to social and environmental factors. Indeed, at the age of 5 months, these variables did not seem to be associated with the quality of sleep. Van Tassel (1985) also observed that socio-economic status became associated with the quality of sleep in children 16 and 29 months of age, whereas no relationship had been seen a year earlier in the same children.

As seen in other studies, depression in the mother was significantly associated with not sleeping through the night at 17 months (scale not available for 29 months) in the QLSCD ($p < 0.01$), but was not one of the most conclusive factors. It is generally believed that the influence of depression in the mother on a child's sleep occurs through a change in care behaviours and the rapidity of responding to the child (Paret, 1983). The QLSCD data seem to show this, since the depression factor did not emerge from the regression analysis independent of parental behaviours regarding sleep. Van Tassel (1985) underlines the strong correlation between depression in the mother, the child's temperament and the level of stress in the family. However, depression may be engendered by sleep problems in the child. Armstrong *et al.* (1998) have shown that after behavioural treatment of sleep problems in the child, the rate of clinical depression in the mothers in their sample decreased from 40% to 4%. This suggests that the vast majority of these mothers suffered from chronic sleep deprivation rather than true depression.

5. Conclusion

As a variety of other studies on the subject have shown, the results of the QLSCD data suggest that the behaviour of sleeping through the night (or not) is not only associated with a constellation of factors that change with the child's age, but also with the nature and persistence of sleep problems. However, it is clear that parental behaviours regarding sleep are a crucial ingredient in the secret recipe for a good sleep. This is why the most effective treatments consist of behavioural methods, in which the behaviours of both the child and the parent are examined in the overall context of the child's life, and are progressively changed to attain the desired goal.

Greater promulgation of information on parenting behaviours and other factors likely to impede the establishment of good sleep organization would be of great benefit. This is because the problem is, in most cases, easy to correct, and less than 25% of parents whose children have a sleep problem see a health professional to resolve it (Rona *et al.*, 1998).

There is a small percentage of children whose sleep problems maybe related to a central nervous system dysfunction causing general behavioural difficulties (Minde *et al.*, 1993; Richman, 1981). Neuro-developmental or perinatal problems may possibly be a cause (Bernal, 1973; Blurton-Jones *et al.*, 1978; Hoban, 2000; Minde *et al.*, 1993; Pollock, 1994). It has been reported that sleep problems are not only frequent but also serious and persistent in children suffering from neuro-developmental disorders (Wiggs, 2000). The QLSCD data show that the overall health status of the child as perceived by the mother was associated with sleeping through the night at 29 months. However, children with serious neuro-developmental or health problems having been excluded from the cohort, it is difficult to validate conclusions made elsewhere. It will therefore be important in future Québec studies to document this link between serious health conditions and sleep problems. One step in this direction could be to do a more detailed analysis of other data gathered on health in the QLSCD, such as perinatal complications and chronic health problems. Future studies should also attempt to clarify the concept of sleeping through the night as perceived by the mother, using objective

methods such as video or polysomnography. Furthermore, filling out a sleep diary for a few days (designated as typical) in the life of the child would help paint a more detailed portrait of sleep organization in children at various ages.

Since two more rounds are planned to complete Phase 1 of the QLSCD, the third volume in this series will be devoted to analyses of data gathered at five ages. It will be interesting to study the impact of sleep on various aspects of the health and development of children, such as height-weight, motor, cognitive, social, and in particular, the onset of behavioural problems such as hyperactivity.

Annex

**Questions on the sleeping habits of
children of about 17 and 29 months of age (SAQM)**

First name - Child/twin

SECTION 2 - ABOUT SLEEPING HABITS...

THE FOLLOWING QUESTIONS CONCERN YOUR CHILD/TWIN (OF ABOUT 17 MONTHS) AND REFER TO HIS/HER SLEEPING HABITS.

- 5- In your opinion, does your child/twin OF ABOUT 17 MONTHS sleep undisturbed (straight) through the night? [*Circle "1" for Yes or "2" for No*]

Yes 1
No 2

- 6- In general, how many hours in a row does your child/twin OF ABOUT 17 MONTHS sleep at NIGHT? [*Circle only one answer*]

Less than 4 hours 01	} + (<i>Go to Q.7</i>)
From 4 hours to less than 5 hours 02	
From 5 hours to less than 6 hours 03	
From 6 hours to less than 7 hours 04	
From 7 hours to less than 8 hours 05	
From 8 hours to less than 9 hours 06	
From 9 hours to less than 10 hours 07	
10 hours and more 08	

Source: Sleep Section of the Self-Administered Questionnaire for the Mother (SAQM), QLSCD, Round 1999.

First name - Child/twin

6a- Since what age has your child/twin OF ABOUT 17 MONTHS been sleeping at least 6 hours straight during the NIGHT ? *[Circle only one answer]*

- He/she does not sleep 6 hours straight 01
- Since birth to less than 2 weeks 02
- From the age of 2 weeks to less than 3 months 03
- From the age of 3 months to less than 6 months 04
- From the age of 6 months to less than 9 months 05
- From the age of 9 months to less than 1 year 06
- From the age of 1 year to less than 15 months 07
- From the age of 15 months up until now 08

7- In general, how long does it take your child/twin OF ABOUT 17 MONTHS to go to sleep at NIGHT? *[Circle only one answer]*

- Less than 15 minutes 1
- From 15 minutes to less than 30 minutes 2
- From 30 minutes to less than 45 minutes 3
- From 45 minutes to less than 60 minutes 4
- 60 minutes or more 5

8- When putting your child/twin OF ABOUT 17 MONTHS down for the NIGHT, how often does he/she have difficulty falling asleep? *[Circle only one answer, namely 1 or 2 or 3 or 4]*

- Never 1
- Sometimes 2
- Often 3
- Always 4

First name - Child/twin

9- In general, how many hours in a row does your child/twin OF ABOUT 17 MONTHS sleep during the DAY? [*Circle only one answer*]

- Less than 1 hour 1
 - From 1 hour to less than 2 hours 2
 - From 2 hours to less than 3 hours 3
 - From 3 hours to less than 4 hours 4
 - 4 hours and more 5
-

10- When you put your child/twin OF ABOUT 17 MONTHS to bed for the NIGHT, most often you... [*Circle only one answer, namely 1 or 2 or 3*]

- ... lull him/her to sleep before putting him/her down 1
 - ... put him/her to bed awake and stay with him/her until he/she falls asleep 2
 - ... put him/her to bed awake and let him/her fall asleep on his/her own 3
-

11- In general, where does your child/twin OF ABOUT 17 MONTHS sleep? [*Circle all applicable answers*]

- Alone in a bedroom 1
- In his/her parent's bedroom 2
- Shares his/her bedroom but NOT his/her bed with a brother or sister 3
- Shares his/her bedroom AND bed with a brother or sister 4

FOR TWINS ONLY :

- Shares his/her bedroom BUT not his/her bed with his/her twin brother/sister 5
 - Shares his/her bedroom AND bed with his/her twin brother/sister 6
-

First name - Child/twin

12- Does your child/twin OF ABOUT 17 MONTHS have one or more object(s) in particular that help/s him/her to fall asleep when he/she is in bed? [*Circle all applicable answers*]

- None 1
- Soother (pacifier) 2
- Bottle 4
- Any other object (teddy bear, blanket, mobile, etc.) 8

13- When your child/twin OF ABOUT 17 MONTHS is healthy, what do you *currently* do when he/she wakes up at NIGHT? [*Circle only one answer*]

- You let him/her cry 1
- You comfort him/her but leave him/her **in** his/her bed 2
- You bring him/her into your bed 3
- You give him/her something to eat or drink 4
- You take him/her **out** of bed to comfort him/her 5
- You do something else 6
- Your child/twin OF ABOUT 17 MONTHS does not wake up at **night** 7

14- On average over the past month, how many times per NIGHT has your child/twin OF ABOUT 17 MONTHS woken up? [*Circle only one answer*]

- Does not wake up 1
- Less than once a night 2
- 1-2 times 3
- 3-4 times 4
- 5 times and more 5

First name - Child/twin

15- Does your child/twin OF ABOUT 17 MONTHS breathe *noisily* during his/her sleep? [*Circle only one answer, namely 1 or 2 or 3 or 4*]

- Never 1
 - Sometimes 2
 - Often 3
 - Always 4
-

16- Does your child/twin OF ABOUT 17 MONTHS have night terrors (wakes up suddenly, crying, sometimes drenched in sweat and confused)? [*Circle only one answer, namely 1 or 2 or 3 or 4*]

- Never 1
 - Sometimes 2
 - Often 3
 - Always 4
-

17- Does your child/twin OF ABOUT 17 MONTHS rock himself/herself to sleep or during sleep? [*Circle only one answer, namely 1 or 2 or 3 or 4*]

- Never 1
 - Sometimes 2
 - Often 3
 - Always 4
-

18- Does your child/twin OF ABOUT 17 MONTHS bang his/her head against his/her bed or pillow in a repetitive fashion either while falling sleep or during sleep? [*Circle only one answer, namely 1 or 2 or 3 or 4*]

- Never 1
 - Sometimes 2
 - Often 3
 - Always 4
-

First name - Child/twin

19- Does your child/twin OF ABOUT 17 MONTHS grind his/her teeth during the night? *[Circle only one answer, namely 1 or 2 or 3 or 4]*

- Never 1
Sometimes 2
Often 3
Always 4

20- During the day or night, whether awake or asleep, does your child/twin OF ABOUT 17 MONTHS currently use a pacifier? *[Circle "1" for yes or "2" for no]*

- Yes 1
No 2 + *(Go to Q.21)*

First name - Child



Section 1

About sleeping habits...

The following questions are about your child of ABOUT 29 MONTHS and refer to his/her sleeping habits.

2a. In general, at what time do you put your child (of ABOUT 29 MONTHS) to bed for the NIGHT?

_____ hours _____ minutes

2b. In general, at what time does your child wake up in the MORNING?

_____ hours _____ minutes

2c. In your opinion, does your child sleep undistracted through the NIGHT? **[Circle "1" for Yes or "2" for No]**

Yes 1
No 2

3. In general, how long does it take your child to go to sleep at NIGHT? **[Circle only one answer]**

Less than 15 minutes 1
From 15 minutes to less than 30 minutes 2
From 30 minutes to less than 45 minutes 3
From 45 minutes to less than 60 minutes 4
60 minutes and more 5

Source: Sleep Section of the Self-Administered Questionnaire for the Mother (SAQM), QLSCD, Round 2000



First name - Child

4. In general, how many hours IN A ROW does your child sleep at NIGHT? **[Circle one answer only]**

- Less than 4 hours 01
- From 4 hours to less than 5 hours 02
- From 5 hours to less than 6 hours 03
- From 6 hours to less than 7 hours 04
- From 7 hours to less than 8 hours 05
- From 8 hours to less than 9 hours 06
- From 9 hours to less than 10 hours 07
- 10 hours and more 08

4a. Indicate how long in total he/she sleeps during the NIGHT (on average):

[Do not count the hours that your child is awake]

_____ hours _____ minutes

5. On average over the past month, how many times per NIGHT has your child (of ABOUT 29 MONTHS) woken up?

[Circle only one answer]

- Does not wake up 1
- Less than once a night 2
- 1-2 times 3
- 3-4 times 4
- 5 times or more 5

5a. Indicate how long in total he/she is awake during the NIGHT (on average):

_____ hours _____ minutes

6. When you put your child, to bed for the NIGHT, most often you... **[Circle only one answer, namely 1 or 2 or 3]**

- ... lull him/her to sleep before putting him/her down 1
- ... put him/her to bed awake and stay with him/her until he/she falls asleep 2
- ... put him/her to bed awake and let him/her fall asleep on his/her own 3



First name - Child

10. Does your child talk in his/her sleep? **[Circle only one answer]**

- Never 1
- Sometimes 2
- Often 3
- Always 4

11. Does your child breathe **noisily** during his/her sleep? **[Circle only one answer]**

- Never 1
- Sometimes 2
- Often 3
- Always 4

12. Does your child (of ABOUT 29 MONTHS) have nightmares? **[Circle only one answer]**

- Never 1
- Sometimes 2
- Often 3
- Always 4

13. Does your child have night terrors (wakes up suddenly, crying, sometimes drenched in sweat and confused)?
[Circle only one answer]

- Never 1
- Sometimes 2
- Often 3
- Always 4

14. Does your child rock himself/herself or bang his/her head against his/her bed or pillow or the wall in a repetitive fashion either while falling asleep or during sleep? **[Circle only one answer]**

- Never 1
- Sometimes 2
- Often 3
- Always 4

First name - Child



15. Does your child grind his/her teeth during the NIGHT? **[Circle only one answer]**

- Never 1
- Sometimes 2
- Often 3
- Always 4

16. Does your child pee in his/her bed or wet his/her diaper at NIGHT? **[Circle only one answer]**

- Never 1
- Sometimes 2
- Often 3
- Always 4

17. At the present time, does your child (of ABOUT 29 MONTHS) have any of the following sucking habits (during the day, at night, when awake or asleep)? **[Circle only one answer, "1" for Yes or "2" for No to each habit]**

- | | Yes | No |
|---|------------|-----------|
| a) Sucks a pacifier | 1 | 2 |
| b) Sucks his/her thumb or one or more fingers | 1 | 2 |
| c) Sucks another object
(specify) _____ | 1 | 2 |

References

- American Sleep Disorders Association (1997). *International classification of sleep disorders, revisited: diagnostic and coding manual*, Rochester, American Sleep Disorders Association.
- ANDERS, T. F. (1979). "Night-waking in infants during the first year of life", *Pediatrics*, Vol. 63, p. 860-864.
- ANDERS, T. F., L. HALPERN and J. HUA (1992). "Sleeping through the night: A developmental perspective", *Pediatrics*, Vol. 90, p. 554-560.
- ARMSTRONG, K. L., R. A. QUINN and M. R. DADDS (1994). "The sleep patterns of normal children", *The Medical Journal of Australia*, Vol. 161, p. 202-206.
- ARMSTRONG, K. L., H. O'DONNELL, R. McCALLUM and M. R. DADDS (1998a). "Childhood sleep problems: Association with prenatal factors and maternal distress/depression", *Journal of Paediatrics and Child Health*, Vol. 34, p. 263-266.
- ARMSTRONG, K. L., A. R. VAN HAERINGEN, M. R. DADDS and R. CASH (1998b). "Sleep deprivation or postnatal depression in later infancy: Separating the chicken from the egg", *Journal of Pediatrics and Child Health*, Vol. 34, p. 260-262.
- BELTRAMINI, A. U., and M. E. HERTZIG (1983). "Sleep and bedtime behavior in preschool-aged children", *Pediatrics*, Vol. 71, No. 2, p. 153-158.
- BENOIT, D., C. H. ZEANAH, C. BOUCHER and K. K. MINDE (1992). "Sleep disorders in early childhood: Association with insecure maternal attachment", *Journal of American Academy on Child and Adolescent Psychiatry*, Vol. 31, p. 86-93.
- BERNAL, J. (1973). "Night waking in infants during the first fourteen months", *Developmental Medicine in Child Neurology*, Vol. 15, p. 760-769.
- BILLON-DESCARPENTRIES, J. (1997). "Influence des pratiques éducatives parentales sur le sommeil et les performances attentionnelles de l'enfant", *Archives de pédiatrie*, Vol. 4, p. 181-185.
- BLURTON-JONES, N., M. ROSETTI-FERREIRA, M. FARQUAR-BROWN and I. MCDONALD (1978). "The association between perinatal factors and later night waking", *Developmental Medicine in Child Neurology*, Vol. 20, p. 427-434.
- BOIVIN, M., D. PERUSSE, V. SAYSET, N. TREMBLAY and R. E. TREMBLAY (2000). "Parenting and Family Relations" in Québec Longitudinal Study of Child Development (QLSCD 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 10, 62 p.
- CAREY, W. (1974). "Night waking and temperament in infancy", *Journal of Pediatrics*, Vol. 84, p. 756-758.
- CHAVIN, W., and S. TINSON (1980). "Children with sleep difficulties", *Health Visitor*, Vol. 53, p. 477-480.
- DAHL, R. E. (1998). "The development and disorders of sleep", *Advances in Pediatrics*, Vol. 45, p. 73-90.
- FERBER, R. (1995). "Introduction: Pediatric sleep disorders medicine" in R. FERBER and M. KRYGER (eds). *Principles and practice of sleep medicine in the child*, Philadelphia, W. B. Saunders Company, p. 1-5.
- FREUD, A. (1961). *Answering pediatricians' questions. Writings of Anna Freud -5*, New York, International University Press.
- FREUD, A. (1965). *Normality and pathology in childhood*, New York, International University Press.
- GAYLOR, E. E., B. L. GOOLIN-JONES and T. F. ANDERS (2001). "Classification of Young Children's Sleep Problems: A Pilot Study", *Journal of American Academy on Child and Adolescent Psychiatry*, Vol. 40, p. 61-67.
- HART, H., M. BAX and S. JENKINS (1984). "Health and behaviour in preschool children", *Child: Care, Health and Development*, Vol. 10, p. 1-16.
- HAYES, M. J., G. P. PARKER, B. SALLINEN and A. A. DAVARE (2001). "Bedsharing, temperament, and sleep disturbance in early childhood", *Sleep*, Vol. 24, p. 657-662.
- HAYES, M. J., S. M. ROBERTS and R. STOWE (1996). "Early childhood co-sleeping: Parent-child and parent-infant nighttime interactions", *Infant Mental Health Journal*, Vol. 17, p. 348-357.
- HOBAN, T. F. (2000). "Sleeplessness in children with neurodevelopmental disorders: Epidemiology and management", *CNS Drugs*, Vol. 14, p. 11-22.
- JENKINS, S., C. OWEN, M. BAX and H. HART (1984). "Continuities of common behavior problems in preschool children", *Journal of Child Psychology and Psychiatry*, Vol. 25, p. 75-89.

- JOHNSON, C. M. (1991). "Infant and toddler sleep: A telephone survey of parents in one community", *Journal of Developmental and Behavioral Pediatrics*, Vol. 12, p. 108-114.
- KATARIA, S., M. S. SWANSON and G. E. TREVATHAN (1987). "Persistence of sleep disturbances in preschool children", *Journal of Pediatrics*, Vol. 110, p. 642-646.
- KLACKENBERG, G. (1971). "Rhythmic movements in infancy and early childhood", *Acta Paediatrica Scandinavica*, Vol. 224, p. 74-83.
- KLACKENBERG, G. (1982). "Somnambulism in childhood-prevalence, course and behavioral correlations", *Acta Paediatrica Scandinavica*, Vol. 71, p. 495-499.
- LABERGE, L., R. E. TREMBLAY, F. VITARO and J. MONTPLAISIR (2000). "Development of parasomnias from childhood to early adolescence", *Pediatrics*, Vol. 106, p. 67-74.
- LAPIERRE, O., and J. MONTPLAISIR (1992). "Les parasomnies", *L'Encéphale*, Vol. 18, p. 353-360.
- LIU, X., Z. SUN, M. UCHIYAMA, K. SHIBUI and K. KIM (2000). "Prevalence and correlates of sleep problems in chinese schoolchildren", *Sleep*, Vol. 23, No. 8, p. 1053-1062.
- LOUIS, J., C. CANNARD, H. BASTUJI and M. J. CHALLAMEL (1997). "Sleep ontogenesis revisited: A longitudinal 24-hour home polygraphic study on 15 normal infants during the first two years of life", *Sleep*, Vol. 20, p. 323-333.
- LOZOFF, B., G. L. ASKEW and A. WOLF (1996). "Cosleeping and early childhood sleep problems: Effects of ethnicity and socio-economic status", *Journal of Developmental and Behavioral Pediatrics*, Vol. 17, p. 9-15.
- LOZOFF, B., A. W. WOLF and N. S. DAVIS (1984). "Cosleeping in urban families with young children in the United States", *Pediatrics*, Vol. 74, p. 171-182.
- LOZOFF, B., A. W. WOLF and N. S. DAVIS (1985). "Sleep problems seen in pediatric practice", *Pediatrics*, Vol. 75, p. 477-483.
- MINDE, K. K., K. POPIEL, N. LEOS, S. FALKNER, K. PARKER and M. HANDLEY-DERRY (1993). "The evaluation and treatment of sleep disturbances in young children", *Journal of Child Psychology and Psychiatry*, Vol. 34, p. 521-233.
- MINISTÈRE DE LA SANTÉ ET DES SERVICES SOCIAUX (1998). *Priorités nationales de santé publique 1997-2202*, Québec, MSSS.
- MOORE, T., and L. UCKO (1957). "Night waking in early infancy, part 1", *Archives of Disease in Childhood*, Vol. 32, p. 333-342.
- NAVELET, Y. (1996). "Insomnia in the child and adolescent", *Sleep*, Vol. 19, p. S23-S28.
- PAAVONEN, E. J., E. T. ARONEN, I. MOILANEN, J. PIHA, E. RÄSÄNEN, T. TAMMINEN and F. ALMQVIST (2000). "Sleep problems of school-aged children: a complementary view", *Acta Paediatrica*, Vol. 89, p. 223-228.
- PARET, I. (1983). "Night waking and its relation to mother-infant interaction in nine-month-old infants" in J. D. CALL, E. GALENSON and R. L. TYSON (eds). *Frontiers of infant psychiatry*, New York, Basic Books Inc., p. 171-177.
- PETIT, D., C. SIMARD, J. PAQUET and J. MONTPLAISIR (2000). "Sleep" in Québec Longitudinal Study of Child Development (QLSCD 1998-2002), Québec, Institut de la statistique du Québec, Vol. 1, No. 4, 46 p.
- POLLOCK, J. I (1994). "Night-waking at five years of age: Predictors and prognosis", *Journal of Child Psychology and Psychiatry*, Vol. 35, p. 699-708.
- RICHMAN, N. (1981). "A community survey of characteristics of one- to two-year-olds with sleep disruptions", *American Academy of Child Psychiatry*, Vol. 20, p. 281-291.
- RICHMAN, N., J. DOUGLAS, H. HUNT, R. LANSDOWN and R. LEVERE (1985). "Behavioural methods in the treatment of sleep disorders - A pilot study", *Journal of Child Psychology and Psychiatry*, Vol. 26, No. 4, p. 581-590.
- RICHMAN, N., J. STEVENSON and P. GRAHAM (1982). *Preschool to school: A behavioral study*, London, Academic Press.
- RONA, R. J., L. LI, M. C. GULLIFORD and S. CHINN (1998). "Disturbed sleep: Effects of sociocultural factors and illness", *Archives of Disease in Childhood*, Vol. 78, p. 20-25.
- SADEH, A., and T. F. ANDERS (1993). "Infant sleep problems: Origins, assessment, intervention", *Infant Mental Health Journal*, Vol. 14, p. 17-34.

SADEH, A., P. LAVIE, A. SCHER, E. TIROSH and R. EPSTEIN (1991). "Actigraphic home-monitoring sleep-disturbed and control infants and young children: a new method for pediatric assessment of sleep-wake patterns", *Pediatrics*, Vol. 87, p. 494-499.

SALZARULO, P., and A. CHEVALIER (1983). "Sleep problems in children and their relationship with early disturbances of the waking-sleeping rhythms", *Sleep*, Vol. 6, p. 47-51.

SCHER, A., and O. BLUMBERG (1999). "Night waking among 1-year olds: A study of maternal separation anxiety", *Child: Care, Health and Development*, Vol. 25, p. 323-334.

SCHER, A. E., E. TIROSH, M. JAFFE, L. RUBIN, A. SADEH and P. LAVIE (1995). "Sleep patterns of infants and young children in Israel", *International Journal of Behavioral Development*, Vol. 18, p. 701-711.

STEIN, M. A., J. MENDELSON, W. H. OBERMEYER, J. AMROMIN and R. M. BENCA (2001). "Sleep and behavior problems in school-aged children", *Pediatrics*, Vol. 107, p. 1-9.

THOMAS, A., and S. CHESS (1984). "Genesis and evolution of behavioral disorders: From infancy to early adult life", *American Journal of Psychiatry*, Vol. 141, p. 1-9.

VAN TASSEL, E.B. (1985). "The relative influence of child and environmental characteristics on sleep disturbances in the first and second years of life", *Developmental and Behavioral Pediatrics*, Vol. 6, p. 81-86.

WEISSBLUTH, M. (1995). "Naps in children: 6 months-7 years", *Sleep*, Vol. 18, p. 82-87.

WIGGS, L. (2000). "Sleep problems in children with developmental disorders", *Journal of the Royal Society of Medicine*, Vol. 94, p. 177-179.

WOLKE, D., R. MEYER, B. OHRT and K. RIEGEL (1995). "The incidence of sleeping problems in preterm and fullterm infants discharged from neonatal special care units: An epidemiological longitudinal study", *Journal of Child Psychology and Psychiatry*, Vol. 36, p. 203-223.

ZUCKERMAN, B., J. STEVENSON and V. BAILEY (1987). "Sleep problems in early childhood: Continuities, predictive factors, and behavioral correlates", *Pediatrics*, Vol. 80, p. 664-671.

Glossary

<i>Direction de la méthodologie et des enquêtes spéciales, ISQ</i>	Methodology and Special Surveys Division, ISQ
<i>Direction des normes et de l'information, ISQ</i>	Standards and Information Division, ISQ
<i>Direction Santé Québec, ISQ</i>	Health Québec Division, ISQ
<i>Institut de la statistique du Québec</i>	Québec Institute of Statistics
<i>ministère de la Santé et des Services sociaux du Québec (MSSS)</i>	Ministry of Health and Social Services of Québec
<i>Personne qui connaît le mieux l'enfant (PCM)</i>	Person Most Knowledgeable (PMK)

List of Papers in Volume 2 of this Series

This paper is one of a series comprising Volume 2 of : JETTÉ, M., H. DESROSIERS, R. E. TREMBLAY, G NEILL, J. THIBAUT et L. GINGRAS (2002). *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2.

Numbers available:

JETTÉ, M. (2002). "Survey Description and Methodology, Part I – Logistics and Longitudinal Data Collections" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 1.

PLANTE, N., R. COURTEMANCHE and L. DESGROSEILLIERS (2002). "Survey Description and Methodology, Part II – Statistical Methodology – Longitudinal Aspects of the First Three Rounds 1998 to 2000" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) - From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 1.

DESROSIERS, H., G. NEILL, L. GINGRAS and N. VACHON (2002). "Growing Up in a Changing Environment" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 2.

Vol. 2 , No. 3 (To be published in Spring 2003).

PETIT, D., É. TOUCHETTE, J. PAQUET and J. MONTPLAISIR (2002). "Sleep: Development and Associated Factors" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 4.

DUBOIS, L., and M. GIRARD (2002). "Trends in Dietary Behaviours and Practices" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 5.

VEILLEUX, G., M. GÉNÉREUX and J. DUROCHER (2002). "Parental Behaviours Related to Children's Dental Health" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 6.

BAILLARGEON, R. H., R. E. TREMBLAY, M. ZOCOLILLO, D. PÉRUSSE, M. BOIVIN, C. JAPPEL and H.-X. WU (2002). « Intraindividual Change in Behaviour from 17 to 29 Months » in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 7.

BROUSSEAU, J., R. H. BAILLARGEON and H.-X. WU (2002). "Cognitive Development in Children Aged 17 to 29 Months" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 8.

BOIVIN, M., I. MORIN-OUELLET, N. LEBLANC, G. DIONNE, É. FRÉNETTE, D. PÉRUSSE and R. E. TREMBLAY (2002). "Evolution of Parental Perceptions and Behaviours" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 9.

Vol. 2 , No. 10 (To be published in Spring 2003).

BÉGIN, C., S. SABOURIN, M. BOIVIN, É. FRÉNETTE and H. PARADIS (2002). "The Couple, Part I – Couple Distress and Factors Associated with Evaluating the Spousal Relationship" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) – From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 11.

MARCIL-GRATTON, N., C. LE BOURDAIS and É. LAPIERRE-ADAMCYK (2002). "The Couple, Part II – Parental Separation in Early Childhood: A Preliminary Investigation" in *Québec Longitudinal Study of Child Development (QLSCD 1998-2002) - From Birth to 29 Months*, Québec, Institut de la statistique du Québec, Vol. 2, No. 11.

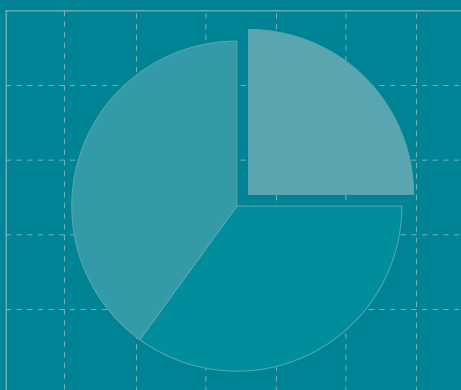
Vol. 2 , No. 12 (To be published in Spring 2003).

Vol. 2 , No. 13 (To be published in Spring 2003).

"The mission of the Institut is to provide reliable and objective statistical information on the situation of Québec as regards all aspects of Québec society for which such information is pertinent. The Institut shall be the central authority for the production and dissemination of statistical information for the government departments and bodies, except information produced for administrative purposes. The Institut shall be responsible for the carrying out of statistical surveys of general interest."

Act respecting the Institut de la statistique du Québec (S.Q. 1998, c. 44), passed by the National Assembly of Québec on 19 June 1998.

Sleep problems in young children are a major concern of parents and one of the most common reasons for consulting a doctor in clinical pediatrics. The consequences of poor sleep are many, and can affect all aspects of child development. This paper focuses on the evolution of sleep characteristics in Québec children at the ages of 5, 17 and 29 months, and on the prevalence and development of various parasomnias, such as sleepwalking, night terrors, etc. at these ages. The trajectories of good and poor sleepers, certain characteristics of the child and family, living conditions and parental practices associated with sleeping through the night at 17 and 29 months are also presented. Data from future rounds of the QLSCD will help gain a better understanding of the relationship between sleep and various aspects of child development (height/weight, motor, cognitive and social).



**Institut
de la statistique**

Québec



ISBN : 2-551-21556-0

\$ 7,95
Website : www.stat.gouv.qc.ca
Printed in Québec, Canada