Institut de la statistique Québec

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

## FROM BIRTH TO 29 MONTHS

## Intraindividual Change in Behaviour from 17 to 29 Months

COLLECTION Health and Wellness

Volume 2, Number 7

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# 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.

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This paper is also available in French. (Ce numéro est aussi disponible en version française sous le titre : « Changement intra-individuel du comportement entre 17 mois et 29 mois » dans *Étude longitudinal 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° 7).

**A Word of Caution, Symbols and Abbreviations can be found in Section "Review of the Methodology and Caution"**

# 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 interviewers[2] 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.

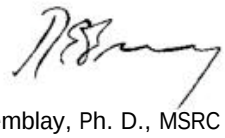
Researchers now have available more data than ever before about this stage of life. But this abundance of data has a perverse effect. If cross-sectional studies allow us to draw conclusions on the causes of problems observed, why shouldn't we go ahead and indulge in longitudinal data as well? When one 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.



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# Table of Contents

# List of Tables and Figures

## Tables

# 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.

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).

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 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.

## 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.

Given the nature of the data used for the study of behavioural development in young children, the *Direction Santé Québec* of the *ISQ* has left the statistical processing of the data and interpretation of the results entirely to the authors of this paper.

## 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 |

# Intraindividual Change in Behaviour From 17 to 29 Months of Age

# 1. Introduction

Problem behaviours characteristic of children attending mental health clinics, are quite common in the general population of pre-school aged children. For most children these behaviours are transient and reflect age-appropriate behaviours but for some, they persist over time and reflect the early signs of emerging problems when entering the school system. When present in school-aged children these behaviours may already have become a way of life. For example, aggressive school-aged children are at higher risk of alcohol and drug abuse, accidents, violent crimes, depression, suicide attempts, spouse abuse, and abusive parenting (Tremblay and LeMarquand, 2001). These observations have lead to an increased emphasis on the early prevention of problem behaviours (Conduct Problem Prevention Research Group, 1992; Webster-Stratton, 1983).

## 1.1 Current State of Knowledge

To what extent are problem behaviours stable during early childhood, i.e. will toddlers who manifest a particular problem behaviour at this point in time do so one year later? Since Alma Long (1941) attempted to collect information from parents on pre-school aged children's behaviours using questionnaire, there have been a number of epidemiological studies of problem behaviours in different countries. These studies targeted different types of problem behaviours, including opposition-defiance, physical aggression, inattention, unself-reliance, timidity, inhibition, anxiety and hyperactivity in children 2-4 years of age (Achenbach *et al.*, 1987; Baillargeon, *et al.,* 1999, in press; Cederblad, 1968; Crowther, *et al.*, 1981; Cullen and Boundy, 1966; Earls, 1980a, 1980b, 1982; Jenkins *et al.,* 1980; Jenkins *et al.*, 1984; Koot and Verhulst, 1991; Larson *et al.*, 1988; Luk *et al.*, 1991; Macfarlane *et al.*, 1954; McGee *et al.*, 1991; Richman *et al.*, 1982; Sanson, *et al.*, 1993; Tremblay *et al.*, 1996).

Yet, to our knowledge, there has been only one epidemiological study of problem behaviours in children before two years of age; namely, the University of California Control Study (Macfarlane *et al.*, 1954).[1] In this landmark study on a representative sample of children born in Berkeley (USA) in the late 1920s, Macfarlane and her colleagues were able to demonstrate that the inventory of easily observed behaviours in children as young as 21 months of age as reported by the mothers provided a rich source of data. They found that 29% of boys (n = 56) and 17% of girls (n = 60) aged 21 months were reported by their mother as displaying overactivity and restlessness. Similarly, 59% of boys and 43% of girls were reported as having temper tantrums including biting, kicking and striking; 18% as being oppositional; 21% of boys and 8% of girls as being emotionally dependent; 20% of boys and 27% of girls as demanding constant attention and 23% of boys and 25% of girls as being shy and timid. The authors of this study did not find gender differences in the prevalence of these problem behaviours at 21 months of age (except for excessive emotional dependence being more frequent among boys). In addition, they reported a higher prevalence of these problem behaviours among these children at 36 than at 21 months of age.

This study is not without limitations, however. Firstly, the data reported at 21 months of age did not take into account the problem behaviours' frequency of occurrence but only their presence versus absence. It may be that only a relatively small number of children manifest problem behaviours on a frequent basis whereas a much greater number of them do so only occasionally. Secondly, the relatively small sample used in this study may have greatly reduced its capability to detect gender differences. In addition, related to the first point mentioned above, it may be that boys are more likely than girls to manifest problem behaviours on a frequent basis, but they may be no more likely than girls to do so occasionally or vice versa. Another important limitation of this study is that it did not provide information about intra-individual change in problem behaviours over time. Indeed, some children may well increase or decrease

1. Of course, other studies have looked at behaviours in children before the age of two, but they have relied on non representative samples (ex.: Hay *et al.*, 2000; Hay *et al.*, 1999; Hay and Ross, 1982; Kagan *et al.*, 1998; Keenan and Shaw, 1994; Keenan *et al.*, 1998; and therefore, are not reviewed in this paper.

in the level at which they manifest problem behaviours during the toddlerhood period.

Overall, we know little about the prevalence of problem behaviours in children under two years of age and even less so about the continuity/ discontinuity with which toddlers manifest these problem behaviours during toddlerhood. One of the goal of the Québec Longitudinal Study of Child Development (QLSCD) was to fill this information gap by providing a better understanding of the natural history of different types of behaviours in the toddler years.

## 1.2 Objectives

The first goal of this study is to provide basic epidemiological information about children's behaviours; namely, opposition-defiance, inattention, hyperactivity, physical aggression toward peers, anxiety, unself-reliance, timidity-shyness and prosociality. More specifically, for each behaviour considered in this study, we want to know: (a) What is the prevalence of this behaviour when children are aged approximately 17- and 29-month-old?, and (b) Does it vary between boys and girls?

The second goal of this study is to look at intra-individual change in children's behaviours from 17 to 29 months of age. In order to do so, we will examine, for each behaviour considered in this study, (a) if the level at which a 17-month-old child manifest this behaviour related to his or her level at 29 months of age, and (b) if the majority of children who manifest this behaviour on a frequent basis at 17 months of age continue to do so one year later?

# 2. Method

## 2.1 Instrument, Sample and Missing Values

The data used to study problem behaviours of children come from the BEH Section of the Interviewer Completed Computerized Questionnaire (ICCQ). This was administered at the QLSCD second and third round (1999 and 2000) when the children were aged about 17 and 29 months.

Table 2.1 presents the behaviours that are being considered in this study. Each behaviour was rated by the person most knowledgeable about the child (PMK), usually the mother, using a 3-point Likert scale: doesn't apply or never, occasional behaviour or sometimes and frequent behaviour or often, scored 1, 2 and 3, respectively.

Table 2.1
**Behaviours assessed in the QLSCD at 17 and 29 months of age, Québec, 1999 and 2000**

| Behaviours and questions | n | %[1] |
|---|---|---|
| **Opposition-defiance** | | |
| Is defiant? | 1,984 | 100.0 |
| Doesn't feel guilty after misbehaving? | 1,955 | 98.5 |
| Punishment doesn't change his/her behaviour? | 1,954 | 98.5 |
| **Inattention** | | |
| Is inattentive? | 1,976 | 99.6 |
| Is distractible, has trouble sticking to any activity? | 1,983 | 99.9 |
| **Hyperactivity** | | |
| Can't sit still, is restless, or hyperactive? | 1,984 | 100.0 |
| Fidgets? | 1,985 | 100.0 |
| Has difficulty awaiting turns in games or groups? | 1,907 | 96.1 |
| **Physical aggression toward peers** | | |
| Gets into many fights? | 1,985 | 100.0 |
| Physically attacks people? | 1,982 | 99.9 |
| Kicks other children? | 1,983 | 99.9 |
| Bites other children? | 1,985 | 100.0 |
| Hits other children? | 1,982 | 99.9 |
| **Anxiety** | | |
| Is too fearful or anxious? | 1,980 | 99.8 |
| Is nervous, high-strung or tense? | 1,983 | 99.9 |
| **Unself-reliance** | | |
| Clings to adult or is too dependent? | 1,983 | 99.9 |
| Gets too upset when separated from parents? | 1,957 | 98.6 |
| **Timidity/shyness** | | |
| Shy with children he/she doesn't know? | 1,979 | 99.7 |
| Takes a long time to get use to other children? | 1,978 | 99.7 |
| **Prosociality** | | |
| Will try to help someone who has been hurt? | 1,943 | 97.9 |
| Comforts a child who is crying or upset? | 1,928 | 97.1 |
| Helps other children who are feeling sick? | 1,837 | 92.6 |

1. Percentages of children without missing data appear.
Source: *Institut de la statistique du Québec*, *QLSCD 1998-2002*.

The analytical sample is made of 1,985 cases and includes all target children who participated in 1999 and 2000 survey rounds. For each behaviour we eliminated cases with missing values on any of the two time points. Not too many cases were eliminated for that reason, however, except for one prosocial behaviour where the partial non-response rate was attain 7% (see Table 2.1); hence, the results for this behaviour will be provided for information purposes only.

## 2.2 Statistical Method

The 17-month-old data on a particular behaviour was modelled using a "logit" model with the behaviour at 17 months of age as the dependent variable and gender as the independent variable. The 29-month-old data on a particular behaviour was modelled using a "logit" model with the behaviour at 29 months of age as the dependent variable and gender and the same behaviour at 17 months of age as the independent variables. Hence, the effect of the behaviour at 17 months and gender on the behaviour at 29 months of age were estimated while positing an effect of gender on the behaviour at 17 months of age. More details about the different logit models that were fitted to the 17- and 29-month-old data are provided in the Annex.

# 3. Result

## 3.1 Prevalence of Behaviours in Children at 17 and 29 Months of Age

What is the prevalence of different types of behaviours in children at 17 and 29 months of age? As expected, problem behaviours were quite common in the general population of toddlers. Many children manifested problem behaviours on an occasional basis while a much smaller but substantial number of children manifested them on a frequent basis. Table 3.1 presents the prevalence estimates for the different types of behaviours in children at 17 and 29 months of age. For instance, at 17 months of age, 42% of children were estimated to be defiant on an occasional basis; in addition, a smaller but substantial number of children were estimated to manifest this behaviour on a frequent basis; that is, about 10% of children were often defiant. Moreover, the results suggest that the prevalence of behaviours was either the same or higher at 29 months of age. In fact, at 29 months of age, 68% and 16% of children were estimated to manifest the defiant behaviour on an occasional and frequent basis, respectively.

When looking at all problem behaviours, there was a tendency for the prevalence to be higher at 29 months of age for the oppositional-defiant (2 out of 3 behaviours), inattentive (2 out of 2 behaviours), hyperactive (1 out of 3 behaviours), physically aggressive (3 out of 5 behaviours), timidity/shyness (1 out of 2 behaviours) and as expected from a socialisation perspective prosocial behaviours (3 out of 3 behaviours) (see Table 3.1). Interestingly, for prosocial behaviours, this increase in prevalence resulted in a majority of children manifesting 2 of the 3 behaviours on a frequent basis at 29 months of age (see Table 3.1). For instance, at 29 months of age, 38% and 53% of children were estimated to comfort a child who is crying or upset on an occasional and frequent basis, respectively.

Table 3.1
**Prevalence estimates for behaviours in children at 17 and 29 months of age, Québec, 1999 and 2000**

| | 17 months | | 29 months | | | |
|---|---|---|---|---|---|---|
| | % | s.e. | % | s.e. | % | s.e. |
| **Opposition-defiance** | | | | | | |
| Is defiant? | | | | | | |
| | Both sexes | | Boys | | Girls | |
| Never | 48.0 | .011 | 16.0 | .012 | 16.0 | .012 |
| Sometimes | 42.0 | .011 | 68.0 | .015 | 68.0 | .015 |
| Often | 10.0 | .007 | 16.0 | .012 | 16.0 | .012 |
| Doesn't feel guilty after misbehaving? | | | | | | |
| | Both sexes | | Boys | | Girls | |
| Never | 59.0 | .011 | 54.0 | .016 | 55.0 | .016 |
| Sometimes | 25.0 | .010 | 34.0 | .015 | 34.0 | .015 |
| Often | 16.0 | .008 | 12.0 | .010 | 11.0 | .010 |
| Punishment doesn't change his/her behaviour? | | | | | | |
| | Both sexes | | Boys | | Girls | |
| Never | 46.0 | .011 | 49.0 | .016 | 50.0 | .016 |
| Sometimes | 41.0 | .011 | 41.0 | .016 | 41.0 | .016 |
| Often | 13.0 | .008 | 10.0 | .009 | 9.0 | .009 |

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| | 17 months | | | | 29 months | | | |
|---|---|---|---|---|---|---|---|---|
| | % | s.e. | | | % | s.e. | % | s.e. |
| **Inattention** | | | | | | | | |
| Is inattentive? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 65.0 | .011 | | | 54.4 | .016 | 55.6 | .016 |
| Sometimes | 33.1 | .011 | | | 43.0 | .016 | 42.0 | .016 |
| Often | 1.9 | .003 | | | 2.6 | .005 * | 2.4 | .005 * |
| Is distractible, has trouble sticking to any activity? | | | | | | | | |
| | Boys | | Girls | | Boys | | Girls | |
| Never | 57.0 | .015 | 64.0 | .015 | 53.0 | .016 | 54.0 | .016 |
| Sometimes | 36.0 | .013 | 31.4 | .012 | 41.7 | .016 | 40.3 | .016 |
| Often | 7.0 | .007 | 4.6 | .005 | 5.3 | .007 | 4.7 | .007 |
| **Hyperactivity** | | | | | | | | |
| Can't sit still, is restless, or hyperactive? | | | | | | | | |
| | Boys | | Girls | | Boys | | Girls | |
| Never | 29.0 | .013 | 36.0 | .014 | 24.0 | .014 | 33.0 | .015 |
| Sometimes | 46.0 | .011 | 45.0 | .011 | 51.0 | .016 | 50.0 | .016 |
| Often | 25.0 | .013 | 19.0 | .011 | 25.0 | .014 | 17.0 | .012 |
| Fidgets? | | | | | | | | |
| | Boys | | Girls | | Boys | | Girls | |
| Never | 27.0 | .013 | 33.0 | .014 | 32.0 | .015 | 40.0 | .016 |
| Sometimes | 37.0 | .011 | 37.0 | .011 | 38.0 | .015 | 37.0 | .015 |
| Often | 36.0 | .014 | 30.0 | .014 | 30.0 | .015 | 23.0 | .013 |
| Has difficulty awaiting turns in games or groups? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 41.0 | .011 | | | 33.0 | .015 | 33.0 | .015 |
| Sometimes | 42.0 | .011 | | | 50.0 | .016 | 51.0 | .016 |
| Often | 17.0 | .009 | | | 17.0 | .012 | 16.0 | .012 |
| **Physical aggression toward peers** | | | | | | | | |
| Gets into many fights? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 83.6 | .008 | | | 71.0 | .014 | 71.8 | .014 |
| Sometimes | 14.2 | .008 | | | 25.3 | .014 | 25.0 | .014 |
| Often | 2.2 | .003 | | | 3.7 | .006 * | 3.2 | .006 * |
| Physically attacks people? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 81.4 | .009 | | | 76.0 | .015 | 76.6 | .014 |
| Sometimes | 17.0 | .008 | | | 22.5 | .013 | 22.0 | .013 |
| Often | 16.0 | .003 | | | 15.0 | .004 ** | 14.0 | .004 ** |
| Kicks other children? | | | | | | | | |
| | Boys | | Girls | | Boys | | Girls | |
| Never | 83.3 | .012 | 88.9 | .010 | 59.0 | .016 | 73.0 | .014 |
| Sometimes | 14.3 | .010 | 10.0 | .009 | 35.0 | .015 | 24.7 | .014 |
| Often | 2.4 | .004 * | 1.1 | .002 * | 6.0 | .007 | 2.3 | .005 * |

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| | 17 months | | | | 29 months | | | |
|---|---|---|---|---|---|---|---|---|
| | % | s.e. | | | % | s.e. | % | s.e. |
| Bites other children? | | | | | | | | |
| | Boys | | Girls | | Boys | | Girls | |
| Never | 71.0 | .014 | 76.5 | .013 | 67.3 | .015 | 77.0 | .013 |
| Sometimes | 24.1 | .012 | 20.4 | .011 | 29.4 | .014 | 21.5 | .013 |
| Often | 4.9 | .006 | 3.1 | .004 | 3.3 | .004 | 1.5 | .004 ** |
| Hits other children? | | | | | | | | |
| | Boys | | Girls | | Boys | | Girls | |
| Never | 90.6 | .009 | 95.2 | .007 | 76.4 | .013 | 85.4 | .011 |
| Sometimes | 8.5 | .009 | 4.5 | .006 | 22.0 | .013 | 14.1 | .011 |
| Often | 0.9 | .003 ** | 0.3 | .001 ** | 1.6 | .004 * | 0.5 | .002 ** |
| **Anxiety** | | | | | | | | |
| Is too fearful or anxious? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 80.1 | .009 | | | 77.6 | .013 | 77.6 | .013 |
| Sometimes | 18.0 | .009 | | | 20.0 | .013 | 20.0 | .013 |
| Often | 1.9 | .003 * | | | 2.4 | .005 * | 2.4 | .005 * |
| Is nervous, high-strung or tense? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 87.6 | .007 | | | 85.9 | .011 | 85.9 | .011 |
| Sometimes | 11.2 | .007 | | | 12.6 | .011 | 12.6 | .010 |
| Often | 1.2 | .003 * | | | 1.5 | .004 ** | 1.5 | .004 ** |
| **Unself-reliance** | | | | | | | | |
| Clings to adult or is too dependent? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 46.0 | .011 | | | 48.0 | .016 | 48.5 | .016 |
| Sometimes | 38.0 | .011 | | | 38.0 | .015 | 38.0 | .015 |
| Often | 16.0 | .008 | | | 14.0 | .011 | 13.5 | .011 |
| Gets too upset when separated from parents? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 57.0 | .011 | | | 62.0 | .016 | 64.0 | .016 |
| Sometimes | 31.0 | .011 | | | 28.0 | .014 | 28.0 | .014 |
| Often | 12.0 | .007 | | | 10.0 | .009 | 8.0 | .009 |
| **Timidity/shyness** | | | | | | | | |
| Shy with children he/she doesn't know? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 52.0 | .011 | | | 39.0 | .016 | 39.0 | .016 |
| Sometimes | 38.0 | .011 | | | 44.0 | .016 | 44.0 | .016 |
| Often | 10.0 | .007 | | | 17.0 | .012 | 17.0 | .012 |
| Takes a long time to get use to other children? | | | | | | | | |
| | Both sexes | | | | Boys | | Girls | |
| Never | 85.1 | .008 | | | 82.0 | .012 | 81.4 | .011 |
| Sometimes | 13.0 | .008 | | | 14.6 | .011 | 15.0 | .011 |
| Often | 1.9 | .003 | | | 3.4 | .006 | 3.6 | .006 |

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| | 17 months | | 29 months | | | |
|---|---|---|---|---|---|---|
| | % | s.e. | % | s.e. | % | s.e. |
| **Prosociality** | | | | | | |
| Will try to help someone who has been hurt? | | | | | | |
| | Both sexes | | Boys | | Girls | |
| Never | 58.0 | .010 | 16.0 | .012 | 15.5 | .011 |
| Sometimes | 24.0 | .009 | 37.0 | .015 | 36.2 | .016 |
| Often | 18.0 | 007 | 47.0 | .016 | 48.0 | .016 |
| Comforts a child (friend, brother or sister) who is crying or upset? | | | | | | |
| | Both sexes | | Boys | | Girls | |
| Never | 38.0 | .011 | 0.9 | .009 | 0.8 | .009 |
| Sometimes | 38.0 | .011 | 38.0 | .016 | 38.0 | .016 |
| Often | 24.0 | .008 | 53.0 | .016 | 54.0 | .016 |
| Helps other children (friend, brother or sister) who are feeling sick? | | | | | | |
| | Both sexes | | Boys | | Girls | |
| Never | 64.0 | .011 | 30.0 | .015 | 23.0 | .014 |
| Sometimes | 26.0 | .010 | 46.0 | .017 | 46.0 | .016 |
| Often | 10.0 | .007 | 24.0 | .014 | 31.0 | .015 |

* 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*.

## 3.2 Gender Differences in the Prevalence of Behaviours at 17 and 29 Months of Age

Does the prevalence of behaviours vary between boys and girls? Boys were more likely than girls to manifest inattentive (1 out of 2 behaviours), hyperactive (2 out of 3 behaviours) and physically aggressive (3 out of 5 behaviours) behaviours at 17 months of age. Table 3.2 presents the odds ratio estimates describing the association between the behaviours and gender at 17 and 29 months of age. Note that the association between behaviours and gender did not seem to vary as a function of the level at which a child manifested the behaviour in question. For instance, at 17 months of age, the odds of hitting often rather than sometimes were estimated to be higher for boys than girls (1.97). Similarly, the odds of manifesting this behaviour sometimes rather than never were higher for boys than girls (1.97). We observed the same gender differences at 29 months of age except for the inattentive behaviour where there were no statistically significant gender differences at 29 months after controlling for gender differences on this behaviour at 17 months of age (see Table 3.2). In addition, at 29 months of age, girls were more likely than boys to help other children who are feeling sick (see Table 3.2).

Table 3.2

**Odds ratio estimates describing the association between behaviours and gender at 17 and 29 months of age, Québec, 1999 and 2000**

| Behaviours and questions | 17 months | 29 months |
|---|---|---|
| | Odds ratio[1] | |
| **Opposition-defiance** | | |
| Is defiant? | Not signif. | Not signif. |
| Doesn't feel guilty after misbehaving? | Not signif. | Not signif. |
| Punishment doesn't change his/her behaviour? | Not signif. | Not signif. |
| **Inattention** | | |
| Is inattentive? | Not signif. | Not signif. |
| Is distractible, has trouble sticking to any activity? | 1.28 (.076) ** | Not signif. |
| **Hyperactivity** | | |
| Can't sit still, is restless, or hyperactive? | 1.27 (.062) ** | 1.31 (.07) ** |
| Fidgets? | 1.22 (.057) ** | 1.22 (.063) ** |
| Has difficulty awaiting turns in games or groups? | Not signif. | Not signif. |
| **Physical aggression toward peers** | | |
| Gets into many fights? | Not signif. | Not signif. |
| Physically attacks people? | Not signif. | Not signif. |
| Kicks other children? | 1.53 (.114) ** | 1.68 (.086) * |
| Bites other children? | 1.30 (.084) ** | 1.50 (.092) * |
| Hits other children? | 1.97 (.17) | 1.64 (.112) * |
| **Anxiety** | | |
| Is too fearful or anxious? | Not signif. | Not signif. |
| Is nervous, high-strung or tense? | Not signif. | Not signif. |
| **Unself-reliance** | | |
| Clings to adult or is too dependent? | Not signif. | Not signif. |
| Gets too upset when separated from parents? | Not signif. | Not signif. |
| **Timidity/shyness** | | |
| Shy with children he/she doesn't know? | Not signif. | Not signif. |
| Takes a long time to get use to other children? | Not signif. | Not signif. |
| **Prosociality** | | |
| Will try to help someone who has been hurt? | Not signif. | Not signif. |
| Comforts a child who is crying or upset? | Not signif. | Not signif. |
| Helps other children who are feeling sick? | Not signif. | .75 (.067) * |

1. The reference group is boy. Standard errors of the natural log odds appear in parentheses. Not signif. indicate that no statistically significant gender differences were found.

* 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*.

## 3.3 Continuity and Discontinuity of Behaviours from 17 to 29 Months of Age

Is there an association between the child's level at which he or she manifested a particular behaviour at 17-months of age and his or her level at 29 months of age beyond that expected by chance alone? Not surprisingly, for each behaviour considered in this study, there was a statistically significant association between the child's level at which he or she manifested a particular behaviour at 17 and 29 months of age. Table 3.3 presents the odds ratio estimates describing the association between the behaviours at 17 and 29 months of age. Note that this association did not seem to vary between boys and girls. Further, note that for all but 5 behaviours this association did not seem to vary as a function of the level at which a child manifested a particular behaviour at 17 and 29 months of age. For instance, the odds of having been nervous, high-strung or tense on a frequent rather than on an occasional basis at 29 months of age were estimated to be higher among children who had been rated often than among those who had been rated sometimes at 17 months of age (3.1). And, these odds were higher among children who had been rated sometimes than among those who had been rated never at 17 months of age (3.1). Similarly, the odds of having been nervous, high-strung or tense on an occasional basis rather than not at all at 29 months of age were higher among children who had been rated sometimes than among those who had been rated never at 17 months of age. And, these odds were higher among children who had been rated often than among those who had been rated sometimes at 17 months of age (3.1).

Table 3.3
**Odds ratio estimates describing the association between behaviours at 17 and 29 months of age, Québec, 1999 and 2000**

| Behaviours and questions | Odds ratio | |
|---|---|---|
| **Opposition-defiance** | | |
| Is defiant? | 1.98 | (.066) |
| Doesn't feel guilty after misbehaving? | 1.33 | (.043) |
| Punishment doesn't change his/her behaviour? | 1.51 | (.051) |
| **Inattention** | | |
| Is inattentive? | 2.25 | (.081) |
| Is distractible, has trouble sticking to any activity? | 2.03 | (.065) |
| **Hyperactivity** | | |
| Can't sit still, is restless, or hyperactive? | 2.34 | (.053) |
| Fidgets? | 2.03 | (.045) |
| Has difficulty awaiting turns in games or groups? | 1.65 | (.111) *[a] |
| | 1.08 | (.155) **[b] |
| | .95 | (.165) **[c] |
| | 3.06 | (.164) [d] |
| **Physical aggression toward peers** | | |
| Gets into many fights? | 3.01 | (.087) |
| Physically attacks people? | 3.02 | (.095) |
| Kicks other children? | 2.57 | (.090) |
| Bites other children? | 3.39 | (...) [a] |
| | 0.53 | (...) [bc] |
| | 1.45 | (...) [d] |
| Hits other children? | 3.10 | (.140) |

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| Behaviours and questions | Odds ratio | |
|---|---|---|
| **Anxiety** | | |
| Is too fearful or anxious? | 1.75 | (.088) * |
| Is nervous, high-strung or tense? | 3.1 | (.109) |
| Clings to adult or is too dependent? | 2.77 | (.108) [a] |
| | 0.67 | (.180) **[b] |
| | 0.89 | (.162) **[c] |
| | 2.58 | (.172) *[d] |
| Gets too upset when separated from parents? | 2.34 | (.054) |
| **Timidity / shyness** | | |
| Shy with children he/she doesn't know? | 2.68 | (.110) [a] |
| | 0.61 | (.149) **[b] |
| | 1.28 | (.207) **[c] |
| | 2.94 | (.186) *[d] |
| Takes a long time to get use to other children? | 2.31 | (.084) |
| **Prosociality** | | |
| Will try to help someone who has been hurt? | 1.95 | (.051) |
| Comforts a child who is crying more upset? | 2.03 | (.054) |
| Helps other children who are feeling sick? | 2.88 | (.157) [a] |
| | 0.56 | (.126) *[b] |
| | 1.58 | (.279) **[c] |
| | 2.14 | (.192) **[d] |

Note: The standard error of the log of the odds ratio estimates appear in parentheses.

a The odds of having manifested this behaviour on an occasional basis rather than not at all at 29 months of age were estimated to be x times higher among children who had been rated sometimes than among those who had been rated never at 17 months of age.

b The odds of having manifested this behaviour on a frequent rather than on an occasional basis at 29 months of age were estimated to be x times higher among children who had been rated sometimes than among those who had been rated never at 17 months of age.

c The odds of having manifested this behaviour on an occasional basis rather than not at all at 29 months of age were estimated to be x times higher among children who had been rated often than among those who had been sometimes at 17 months of age.

d The odds of having manifested this behaviour on a frequent rather than on an occasional basis at 29 months of age were estimated to be x times higher among children who had been rated often than among those who had been rated sometimes at 17 months of age.

* 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*.

Does the majority of children who had manifested a particular behaviour on a frequent basis at 17 months of age continued to do so one year later? The answer is no except for the three prosocial behaviours. Hence, for all the other behaviours considered in this study there was only a minority of children who had manifested a particular behaviour on a frequent basis at 17 months of age who continued to do so at 29 months of age. Table 3.4 presents estimates of the conditional probability of a randomly selected 29-month-old child having been rated never, sometimes or often on a particular behaviour given his or her rating at 17 months of age. For instance, 33% of children who clanged to adult or were too dependent on a frequent basis at 17 months of age were estimated to have continued to do so at 29 months of age. In fact, 39% and 28% of these children were estimated to have manifested this behaviour occasionally or even not at all, respectively, at 29 months of age (see Table 3.4). In contrast, there was a majority or very close to a majority of children who had manifested a particular prosocial behaviour on a frequent basis at 17 months of age who continued to do so at 29 months of age. For instance, 74% of children who help someone who has been hurt on a frequent basis at 17 months of age were estimated to have continued to do so at 29 months of age. In fact, 23% and 3.2% of these children were estimated to have manifested this behaviour occasionally or not at all, respectively, at 29 months of age (see Table 3.4).

Table 3.4

**Estimates of the conditional probability of a randomly selected 29-month-old child having been rated never, sometimes or often on a particular behaviour given his or her rating at 17 months of age, Québec, 1999 and 2000**

| | | Rating at 29 months of age | | | | | |
|---|---|---|---|---|---|---|---|
| | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. |
| | | **Opposition-defiance** | | | | | |
| **Rating at 17 months of age** | Is defiant? | | | | | | |
| | Never | 22.0 | .012 | 68.5 | .011 | 9.5 | .008 |
| | Sometimes | 11.0 | .008 | 70.0 | .011 | 19.0 | .01 |
| | Often | 5.1 | .007 | 61.5 | .018 | 33.4 | .023 |
| | Doesn't feel guilty after misbehaving? | | | | | | |
| | Never | 59.0 | .013 | 32.0 | .011 | 9.0 | .007 |
| | Sometimes | 51.0 | .013 | 36.0 | .012 | 13.0 | .008 |
| | Often | 41.0 | .02 | 40.0 | .013 | 19.0 | .017 |
| | Punishment doesn't change his/her behaviour? | | | | | | |
| | Never | 57.7 | .015 | 36.5 | .012 | 5.8 | .006 |
| | Sometimes | 46.0 | .012 | 44.0 | .012 | 10.0 | .008 |
| | Often | 33.0 | .021 | 49.0 | .014 | 18.0 | .016 |
| | | **Inattention** | | | | | |
| | Is inattentive? | | | | | | |
| | Never | 62.7 | .013 | 36.0 | .012 | 1.3 | .002* |
| | Sometimes | 41.7 | .017 | 54.0 | .016 | 4.3 | .006 |
| | Often | 22.0 | .027 | 66.0 | .019 | 12.0 | .020* |
| | Is distractible, has trouble sticking to any activity? | | | | | | |
| | Never | 62.5 | .013 | 35.0 | .012 | 2.5 | .003 |
| | Sometimes | 43.7 | .015 | 49.0 | .014 | 7.3 | .007 |
| | Often | 25.0 | .024 | 58.0 | .016 | 17.0 | .021 |

| | | Rating at 29 months of age | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Boys | | | | | | Girls | | | | | |
| | | Never | | Sometimes | | Often | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. | % | s.e. | % | s.e. | % | s.e. |
| | | **Hyperactivity** | | | | | | | | | | | |
| **Rating at 17 months of age** | Can't sit still, is restless hyperactive? | | | | | | | | | | | | |
| | Never | 43.0 | .019 | 48.0 | .014 | 9.0 | .009 | 51.0 | .019 | 43.0 | .015 | 6.0 | .007 |
| | Sometimes | 21.0 | .012 | 56.0 | .012 | 23.0 | .012 | 27.0 | .014 | 55.0 | .012 | 18.0 | .012 |
| | Often | 8.0 | .008 | 46.0 | .015 | 46.0 | .020 | 11.0 | .012 | 51.0 | .014 | 38.0 | .021 |
| | Fidgets? | | | | | | | | | | | | |
| | Never | 55.0 | .020 | 34.0 | .013 | 11.0 | .011 | 61.0 | .018 | 31.0 | .013 | 8.0 | .009 |
| | Sometimes | 33.0 | .015 | 41.0 | .012 | 26.0 | .014 | 39.0 | .015 | 40.0 | .012 | 21.0 | .012 |
| | Often | 15.0 | .012 | 38.0 | .012 | 48.0 | .019 | 19.0 | .015 | 40.0 | .012 | 41.0 | .020 |

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| | | Rating at 29 months of age | | | | | |
|---|---|---|---|---|---|---|---|
| | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. |
| | **Hyperactivity** | | | | | | |
| Rating at 17 months of age | Has difficulty awaiting turn in games or groups? | | | | | | |
| | Never | 40.5 | .018 | 47.0 | .018 | 12.5 | .012 |
| | Sometimes | 29.6 | .016 | 56.4 | .018 | 14.0 | .012 |
| | Often | 22.0 | .023 | 44.0 | .027 | 34.0 | .026 |
| | **Physical aggression toward peers** | | | | | | |
| | Gets into many fights? | | | | | | |
| | Never | 76.6 | .010 | 21.8 | .009 | 1.6 | .003 * |
| | Sometimes | 48.8 | .022 | 41.7 | .019 | 9.5 | .012 |
| | Often | 19.0 | .032 * | 48.0 | .023 | 33.0 | .042 |
| | Physically attacks people? | | | | | | |
| | Never | 81.4 | .009 | 18.0 | .009 | 0.6 | .001 * |
| | Sometimes | 57.9 | .022 | 38.0 | .020 | 4.1 | .008 * |
| | Often | 27.3 | .038 | 55.0 | .027 | 17.7 | .037 * |

| | | Rating at 29 months of age | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Boys | | | | | | Girls | | | |
| | | Never | | Sometimes | | Often | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. | % | s.e. | % | s.e. | % | s.e. |
| | **Physical aggression toward peers** | | | | | | | | | | | | |
| Rating at 17 months of age | Kicks other children? | | | | | | | | | | | | |
| | Never | 64.0 | .015 | 32.3 | .014 | 3.7 | .005 | 76.0 | .013 | 22.5 | .012 | 1.5 | .003 * |
| | Sometimes | 38.0 | .025 | 48.0 | .019 | 14.0 | .017 | 53.0 | .028 | 40.0 | .021 | 7.0 | .011 * |
| | Often | 15.0 | .029 * | 49.0 | .025 | 36.0 | .047 | 26.0 | .043 * | 51.0 | .019 | 23.0 | .040 * |
| | Bites other children? | | | | | | | | | | | | |
| | Never | 76.4 | .014 | 22.0 | .013 | 1.6 | .003 | 83.2 | .012 | 16.0 | .011 | 0.8 | .002 * |
| | Sometimes | 48.0 | .025 | 45.9 | .023 | 6.0 | .009 | 58.4 | .025 | 38.0 | .022 | 3.6 | .006 * |
| | Often | 32.0 | .037 | 57.0 | .024 | 11.0 | .029 | 42.0 | .043 | 51.3 | .029 | 6.7 | .021 ** |
| | Hits other children? | | | | | | | | | | | | |
| | Never | 79.3 | .013 | 19.8 | .012 ** | 0.9 | .002 | 86.4 | .011 | 13.2 | .010 | 0.4 | .001 ** |
| | Sometimes | 53.0 | .037 | 41.0 | .031 * | 6.0 | .014 | 66.0 | .037 | 31.0 | .032 | 3.0 | .008 ** |
| | Often | 22.0 | .058 ** | 54.0 | .033 ** | 24.0 | .064 | 35.0 | .075 * | 51.0 | .040 | 14.0 | .048 ** |

| | | Rating at 29 months of age | | | | | |
|---|---|---|---|---|---|---|---|
| | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. |
| | **Anxiety** | | | | | | |
| Rating at 17 months of age | Is too fearful or anxious? | | | | | | |
| | Never | 80.3 | .010 | 18.0 | .009 | 1.7 | .003 |
| | Sometimes | 68.4 | .019 | 27.0 | .016 | 4.6 | .007 |
| | Often | 52.7 | .047 | 36.5 | .028 | 10.7 | .025 |
| | Is nervous, high-strung or tense? | | | | | | |
| | Never | 88.7 | .007 | 10.6 | .007 | 0.7 | .002 * |
| | Sometimes | 69.2 | .023 | 25.6 | .020 | 5.2 | .010 * |
| | Often | 34.9 | .057 * | 39.9 | .029 | 25.3 | .052 * |
| | **Unself-reliance** | | | | | | |
| | Clings to adult or is too dependent? | | | | | | |
| | Never | 64.3 | .016 | 29.0 | .015 | 6.4 | .008 |
| | Sometimes | 37.5 | .018 | 47.2 | .018 | 15.3 | .013 |
| | Often | 28.0 | .026 | 39.0 | .028 | 33.0 | .028 |

*Continued on the next page...*

| | | Rating at 29 months of age | | | | | |
|---|---|---|---|---|---|---|---|
| | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. |
| | | **Unself-reliance (cont'd)** | | | | | |
| **Rating at 17 months of age** | Gets too upset when separated for parents? | | | | | | |
| | Never | 76.0 | .012 | 21.0 | .010 | 3.0 | .004 |
| | Sometimes | 52.0 | .014 | 35.0 | .013 | 12.0 | .008 |
| | Often | 27.0 | .021 | 41.0 | .015 | 32.0 | .023 |
| | | **Timidity/shyness** | | | | | |
| | Shy with children he/she doesn't know? | | | | | | |
| | Never | 52.0 | .016 | 39.0 | .015 | 9.0 | .009 |
| | Sometimes | 26.0 | .016 | 53.0 | .018 | 21.0 | .015 |
| | Often | 23.0 | .029 | 36.0 | .034 | 41.0 | .035 |
| | Takes a long time to get use to other children? | | | | | | |
| | Never | 15.0 | .012 | 48.0 | .014 | 37.0 | .016 |
| | Sometimes | 5.8 | .005 | 37.0 | .011 | 57.0 | .012 |
| | Often | 1.8 | .003 | 23.6 | .014 | 74.6 | .016 |
| | | **Prosociality** | | | | | |
| | Will try to help someone who has been hurt? | | | | | | |
| | Never | 22.0 | .012 | 42.0 | .013 | 36.0 | .013 |
| | Sometimes | 9.0 | .007 | 34.0 | .011 | 57.0 | .014 |
| | Often | 3.2 | .005 * | 22.6 | .014 | 74.2 | .018 |
| | Comforts a child friend, brother or sister who is crying or upset? | | | | | | |
| | Never | 15.0 | .012 | 48.0 | .014 | 37.0 | .016 |
| | Sometimes | 5.8 | .005 | 37.0 | .011 | 57.0 | .012 |
| | Often | 1.8 | .003 * | 23.6 | .014 | 74.6 | .016 |

| | | Rating at 29 months of age | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Boys** | | | | | | **Girls** | | | |
| | | Never | | Sometimes | | Often | | Never | | Sometimes | | Often | |
| | | % | s.e. | % | s.e. | % | s.e. | % | s.e. | % | s.e. | % | s.e. |
| | | **Prosociality** | | | | | | | | | | | |
| **Rating at 17 months of age** | Helps other children friend, brother or sister who are feeling sick? | | | | | | | | | | | | |
| | Never | 38.0 | .017 | 45.0 | .015 | 17.0 | .013 | 30.0 | .016 | 47.0 | .015 | 23.0 | .015 |
| | Sometimes | 15.0 | .018 | 52.0 | .023 | 33.0 | .023 | 11.0 | .014 | 48.0 | .023 | 41.0 | .025 |
| | Often | 16.0 | .031 * | 35.0 | .036 | 49.0 | .039 | 11.0 | .022 * | 31.0 | .034 | 58.0 | .038 |

* 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*.

Were boys who had manifested behaviours on a frequent basis at 17 months of age more likely than girls to continue to do so one year later? The answer is yes except for one prosocial behaviour. For all the other behaviours with gender differences at 29 months of age boys who had manifested them on a frequent basis at 17 months of age tended to be more likely than girls to continue to do so one year later. For instance, 46% of boys who were unable to sit still, were restless or hyperactive on a frequent basis at 17 months of age were estimated to have continued to do so at 29 months of age; in comparison, 38% of girls who were unable to sit still, were restless or hyperactive on a frequent basis at 17 months of age were estimated to have continued to do so at 29 months of age (see Table 3.4). In contrast, boys who help other children who are feeling sick on a frequent basis at 17 months of age tended to be less likely than girls to continue to do so one year later (see Table 3.4).

Were boys who had not manifested behaviours on a frequent basis at 17 months of age more likely than girls to manifest these behaviours on a frequent basis one year later? The answer is yes except for one prosocial behaviour. For all the other behaviours for which there were gender differences at 29 months of age boys who had not manifested these behaviours on a frequent basis at 17 months of age tended to be more likely than girls to manifest them on a frequent basis one year later. For instance, 11% of boys who did not fidget at 17 months of age were estimated to be doing so on a frequent basis at 29 months of age; in comparison, 8% of girls who did not fidget at 17 months of age were estimated to be doing so on a frequent basis at 29 months of age (see Table 3.4). In contrast, boys who did not help other children who are feeling sick on a frequent basis at 17 months of age tended to be less likely than girls to manifest this behaviour on a frequent basis one year later (see Table 3.4).

# 4. Conclusion

The QLSCD is the first large scale national survey of problem behaviours which started before the end of the second year after birth. Results indicate that a substantial number of children are showing problem behaviours before their second birthday. The behaviours include physical aggression, opposition, hyperactivity, inattention, and anxiety. These problems constitute the major areas of mental problems experienced by school age children (ex.: Achenbach and Edelbrock, 1981; Offord *et al.*, 1987; Rutter *et al.,* 1970; Tremblay *et al.*, 1992). Our results show clearly that these problems do not suddenly appear during the school years. Tremblay *et al.* (1999) have infact shown that some of these problems appear at the end of the first year after birth. Thus, the problems are there long before school starts, and prevention must be initiated at least during infancy, and preferably during pregnancy.

Our behavioural assessment included both problem behaviours and prosocial behaviours. The results concerning the latter clearly show that as children grow up they increase the frequency of prosocial behaviour. This substantial increase in prosocial behaviour within a year, from 17 to 29 months of age, highlights the fact that the socialisation of humans during early childhood involves learning to reduce disruptive behaviours and increase prosocial behaviours. Children who maintain high levels of disruptive behaviours and do not learn to use prosocial behaviours are at high risk of being rejected by their siblings, their peers and their caregivers. This rejection often initiates a life long pattern of aggression and rejection (Tremblay, 2000).

Our results also showed that by 17 months of age boys were already more likely than girls to manifest problems with physical aggression, hyperactivity and inattention. The differences between boys and girls in disruptive behaviours have often been shown in school age children. Our results highlight the fact that these sex differences are present by the 17$^{th}$ month after birth. Many have suggested that such differences are the product of recent cultural changes in attitudes towards boys and girls (ex.: *Conseil Supérieur de l'Éducation du Québec*, 1999; Pollack, 1998). If this is true, then these causal factors are in place during the first two years after birth. However, whether the cause is cultural attitudes, or biological processes, or both, if we want to reduce the differences between males and females in disruptive behaviours we need to target a large part of our interventions at parents of infants, and still better at expecting parents.

Finally, our results show that there is some stability and some change in behaviour within a one year period, i.e. between 17 and 29 months of age. It is too early to tell to what extent behaviour at 17 months of age predicts the long term trajectory of any given behaviour. Because the Québec Longitudinal Study of Child Development is a long term longitudinal study we will eventually be able to answer that question. For the moment, what we can see is that there is much flexibility in patterns of behaviour. This is an indication that appropriate environments should be able to help children learn to regulate their problem behaviours. However, it is also an indication that children without problem behaviours in infancy can develop problems during toddlerhood if they do not grow up in environments which support socialization. Yearly assessments of child behaviour and environment will enable us to study the factors which explain both continuity and discontinuity in the development of problem behaviours.

# Annex

**Modelling the 17-month-old Data**

The 17-month-old data on a particular behaviour was modelled using a logit model with the behaviour in question as the dependent variable and gender as the independent variable (for more details on logit model see Fienberg, 1980). Three different logit models were fitted to the 17-month-old data.

1. A saturated logit model. This model postulates that there is an unspecified association between the behaviour in question and gender beyond that expected by chance alone. In other words, there are no restrictions imposed on the two odds ratios describing the association between the behaviour in question and gender (i.e., the odds of being rated sometimes rather than never and the odds of being rated often rather than sometimes).
2. A uniform association model. This model postulates that there is a uniform association between the behaviour in question and gender beyond that expected by chance alone (for more details about the uniform association model see Clogg and Shihadeh, 1994). In other words, a single odds ratio is used to describe the association between the behaviour in question and gender.
3. A null association model. This model postulates that there is no association between the behaviour in question and gender beyond that expected by chance alone.

The null association model was chosen if, and only if, it did not represent a significant increment in likelihood-ratio chi-square ($L^2$) over the uniform association and the saturated logit models and was associated with the lowest Bayesian Information Criterion (BIC: [$L^2$ - (degrees of freedom) (log N)]) value. If the null association model was not chosen then the uniform association model was chosen if, and only if, it did not represent a significant increment in $L^2$ over the saturated logit model and presented the lowest BIC value. If the uniform association was not chosen then the saturated logit model was chosen. Of course, the chosen logit model had to fit the data using an $\alpha$ level of 0.01 to take into account the design effect in the estimation of the standard error of estimates. Moreover, the chosen model did not have standardised residuals greater than 2.58 in absolute value.

**Modelling the 29-month-old Data**

The 29-month-old data on a particular behaviour was modelled using a logit model with the behaviour in question at 29 months of age as the dependent variable and gender and the same behaviour at 17 months of age as the independent variables. Many different logit models were fitted to the 29-month-old data, among others: (a) a uniform association model that describes the association between the behaviour in question at 29 months of age and gender using one rather than two odds ratios (i.e., the odds of manifesting the behaviour on a frequent rather than on an occasional basis and the odds of manifesting the behaviour on an occasional basis rather than not at all are equal to a constant); (b) a uniform association model that describes the association between the behaviour in question at 17 and 29 months of age using one rather than four odds ratios; and (c) a symmetric association model that describes the association between the behaviour in question at 17 and 29 months of age using three rather than four odds ratios (for more details about the symmetric association model see Clogg and Shihadeh, 1994). More details can be obtained by contacting the first author. Suffice to say that a strategy similar to the one described above was used to select the final logit model.

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# Glossary

| | |
|---|---|
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| *Direction des normes et de l'information, ISQ* | Standards and Information Division, ISQ |
| *Direction Santé Québec, ISQ* | Health Québec Division, ISQ |
| *Institut de la statistique du Québec* | Québec Institute of Statistics |
| *ministère de la Famille et de l'Enfance (MFE)* | Ministry of Family and Child Welfare |
| *ministère de la Santé et des Services sociaux du Québec (MSSS)* | Ministry of Health and Social Services of Québec |
| *Personne qui connaît le mieux l'enfant* (PCM) | Person Most Knowledgeable (PMK) |

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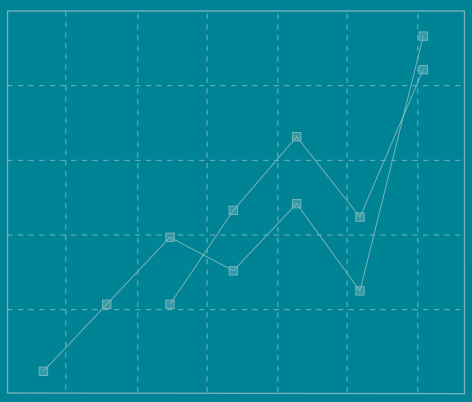
Certain behavioural problems characteristic of children said to be "having difficulty" are relatively widespread in the general population of children of pre-school age. These behaviours are transitory for most children, and are associated with certain ages. However, for some, they constitute the first signs of problems that will appear later when they enter the school system. This paper documents a number of these behaviours – opposition-defiance, inattention, hyperactivity, physical aggression toward peers, unself-reliance, timidity-shyness and prosociality. First, the prevalence of each of these behaviours in children 17 and 29 months of age is described, as is their variation by sex. Second, individual changes in these behaviours are examined at both ages, to determine whether, for each behaviour, 1) the degree it presented at 17 months is related to the degree it presented at 29 months, and 2) the majority of children who *frequently* presented it at 17 months continued to do so at 29 months, namely a year later.



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