Working mothers and early childhood outcomes: Lessons from the Canadian National Longitudinal study on children and youth

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Accepted 26 June 2007

Abstract

Background: More mothers are choosing to return to work during the first 2 years of their child's life with an uncertain impact on early developmental outcomes.

Aims: To determine the association between duration of maternity leave and motor and social development of toddlers.

Study design: Population-based, retrospective cohort study.

Subjects: The Canadian National Longitudinal Survey on Children and Youth (NLSCY) Cycle 3 provides data on the characteristics and life experience of Canadian children. For sampled households, the person most knowledgeable about the child completed a survey on demographics, parent characteristics and family environment. The analysis was limited to 6664 families with children up to 2 years.

Outcome measures: Logistic regression was used to assess the association between duration of maternity leave and impaired performance on the Motor and Social Development (MSD) scale adjusted for multiple covariates including maternal age, gender, breastfeeding and socioeconomic status.

Results: One month of maternity leave increased the odds of impaired performance on the MSD by 3% (OR 1.03, 95% CI 1.02, 1.04). This was also seen with categorized maternity leave duration. Being male (OR 1.53, 95% CI 1.35, 1.74) and having a younger mother (OR 1.48, 95% CI 0.98, 2.23) increased the risk of impaired performance on the MSD while being of higher SES reduced the risk (OR 0.96, 95% CI 0.93, 1.00).

Conclusions: There is an association between duration of maternity leave and impaired performance in motor and social development in children up to 2 years.

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KEYWORDS
Maternity leave;
Childhood development;
Prematurity
1. Introduction

From US data, it is reported that 56% of women will return to work within 1 year of the birth of a child and 72% will return in the first 2 years after the birth of a child [1]. With the majority of women working, there is an ongoing debate in the literature regarding potential consequences of maternal employment and timing of return to work on the development and behaviour of young children.

A number of studies have attempted to delineate the impact of maternal employment on cognition, school performance and behaviour for children born at term [2–15]. Reports from the US National Longitudinal Survey of Youth (NLSY) produced mixed conclusions. Some investigators conclude that maternal employment in the first year after birth is associated with an increase in negative behavioural and attachment issues [3–5], a significant negative impact on children’s cognitive ability [6,7] and school readiness [13]. In contrast, several studies did not find a difference in both behavioural and educational achievements [8–12,15] and still others that children who have employed mothers actually have an improvement in cognitive development [9,15].

In spite of the wealth of literature pertaining to the impact of maternal employment on childhood outcomes, two gaps in knowledge remain. The first is the influence of duration of maternity leave on early developmental outcomes. The few studies that have attempted to clarify the effect of duration on child outcomes [8,16–18] have produced mixed results and the varied methodological approaches make the findings difficult to interpret.

The second gap remaining is the impact of maternal employment on the development of children born preterm. Very few studies have examined the relationship of maternity leave and child outcomes by preterm status [17–20] with the exception of one cohort study [17,18]. Investigators found that preterm infants whose mothers worked showed a positive correlation between the number of hours worked per week and their motor outcomes at 3, 9 and 12 months of age [17,18]. Other investigators concluded that prematurity was not related to child cognitive and behavioural performance for children who were born preterm in single parent families [21].

Due to these gaps in knowledge, we investigated the relationship between duration of maternity leave and performance on the Motor and Social Development scale (MSD) [22] after adjustment for important covariates among Canadian children by utilizing a large, nationally representative sample from the Canadian National Longitudinal Survey on Child and Youth (NLSCY).

2. Methods

2.1. Survey data and study sample

Our study utilized data from the cross-sectional component of the NLSCY Cycle 3 administered from October 1998 to June 1999. The primary objective of the NLSCY was to gather data on the characteristics and life experience of Canadian children and to inform the development of national social policies. For sampled households, the person most knowledgeable about the child (PMK) completed a computer-assisted face-to-face interview to collect data on general demographics, parent characteristics, and the family environment. The survey relied heavily on Computer-Assisted Personal Interviewing technology or CAPI. Interviews were primarily completed by telephone (although interviews conducted in person were done for a small percentage of the sample) by Statistics Canada (StatsCan) interviewers, the national statistical agency for Canada. Interviewers underwent both self-study modules and classroom orientation to the survey. CAPI means that a laptop computer is used to record responses to survey items rather than paper and pencil. This technique provides higher quality data since it reduces errors. For example, quality checks can be built into the interview process so that inconsistent responses can be cleaned up. Skip patterns are also programmed into CAPI to eliminate errors due to the interviewer having to follow complicated skip patterns for pencil and paper copies. Data were encrypted for confidentiality and sent to Regional StatsCan offices then to StatsCan headquarters. It was only then that the data were unencrypted on a computer with no external access.

Of the 31 194 households sampled in Cycle 3 (88% response rate), our analyses was limited to 6664 families with children aged 2 years or less—a sample for which there was complete data for all variables. With this number of families, we have sufficient power (alpha=0.05/beta=0.25) to detect a difference in the proportion of children scoring <-1 standard deviation (SD) below the mean on the MSD equal to 0.0729 (i.e., effect size of 0.0729). Baseline characteristics of the study sample were collected including age and gender of PMK, gender of the child, number of children living in the household, frequency of any prenatal problems during the pregnancy and preterm versus term birth.

2.2. Variable selection

The Motor and Social Development scale or MSD was the outcome of interest. The MSD was derived from validated and reliable measures of child development including the Bayley, Gesell and Denver methods [22] and has been used in the National Longitudinal Survey of Youth in the US and the National Child Development Survey in the UK. The MSD consists of a set of 15 questions that measure dimensions of the motor, social and cognitive development of children from birth to 3 years. Each question asks the parent whether the child can perform a specific task; these questions vary by age. The score was converted into a binary outcome.

The explanatory variable was duration of maternity leave. Duration of maternity leave based on PMK responses was coded as a continuous variable in months from zero upwards and as a categorical variable (maternity leave of less than 1 month, one to 11 months, 12 to 23, 24 months plus and not returned to work). For the working mothers, the type of work was classified as continuous, discontinuous but >50% full-time since she returned to work or discontinuous and <50% of full-time since returning to work.

Covariates were added to the model to adjust for their effects on the outcome. Covariates known to be associated with growth and development based on previous studies include gender [14], socioeconomic status (SES), breastfeeding [23], and number of children in the household [13]. Breastfeeding was documented by “did you ever breastfeed
the child?” and therefore, the “yes” answers include both partial and exclusive breastfeeding. Preterm birth was a categorical variable with two levels: preterm and term/post-term based on days of gestation. The cross-sectional measure of SES was derived from the educational level of the PMK and the partner/spouse of the PMK in years, the prestige of both the PMK’s and the PMK’s partner/spouse’s occupation (categorized as labourer, clerical, semi-professional and professional and the occupation code transformed to the logit distribution) and household income in thousands of dollars. Each of these five variables was standardized to have a mean of zero and a standard deviation of one. The SES variable was entered as a continuous variable into the model but was coded in the NLSCY as a categorical variable with nine levels from less than −1.7 to greater than 1.7. The detailed instructions for the construction of the SES variable by Statistics Canada is reported elsewhere (http://data.library.ubc.ca/datalib/survey/statscan/kids/cycle3/nlscyc3pr_cbk.pdf; page 223). An example of a derived score of 1.5 would be both the PMK and spouse have a university degree, are both employed professionals and have a household income of $80000. This coincides with a score of 8. In addition, preterm birth was included. This was a categorical variable with two levels: preterm and term/post-term based on days of gestation.

2.3. Statistical methods

Demographic characteristics were summarized for the whole sample and for children whose mothers worked versus not. Parametric and nonparametric tests were performed as appropriate and results showing significant differences were reported. Statistics were analyzed using SAS (Version 9.1. Cary, NC: The SAS Institute, 2005).

Spearman and Pearson correlation coefficients between covariates did not exceed 0.70 and all variables were entered into the multivariable models. Bivariate logistic regressions were performed and unadjusted OR generated for the explanatory variable and all covariates. A multivariable logistic regression was performed using the sample of families who had children 0 to 2 years of age with continuous maternity leave duration in months as the explanatory variable and MSD performance as the dependent variable. Maternity leave was also categorized and the model re-run with no return to work as the reference category. Adjusted and unadjusted odds ratios were generated for the variables under study and reported with 95% confidence intervals (95% CIs).

For all statistical analyses, the frequency weights provided by Statistics Canada were used to generate point estimates that adjusted for the differing probabilities that individuals were selected into the survey sample. To estimate the precision around the survey estimates, a model-based estimation of variance was used [24,25]. The probability weights were used in the regression analyses for estimation of the standard errors and coefficients of variation for the study sample. This method takes into account the unequal probability of selection in calculating variances, however, because this method does not take into account the stratification and clustering of the sample’s design, the variance estimates may be underestimated [26,27].

3. Results

Our sample consisted of 6664 families who had children 0 to 2 years of age. Almost 50% of mothers returned to work at
some point after the birth of the index child. Table 1 displays demographic characteristics for the overall study sample and for families whose mothers were not working and those who were working. With respect to the gender of children and gender of PMK as well as the prevalence of prenatal problems, the groups are similar. In general, the PMK/mothers who returned to work were older and had less children living in the household. Breastfeeding rates were significantly different between groups with a greater proportion of breastfed infants in the mothers that returned to work (chi square, \( p < 0.0001 \)). For mothers that returned to work, over 75% returned to continuous work while 11% reported working discontinuously but greater than 50% full-time and 11% reported working less than 50% full-time. Mean SES was significantly higher in the working mothers. The interpretation of these means translates into a standardized SES of \( -0.50 \) for the not working mothers (the PMK and the spouse have Grade 12 and the spouse is employed in a semi-skilled clerical position with a household income of approximately $30000) and for working mothers a standardized SES of 0.5 (the PMK has a university degree and the spouse has Grade 13, the PMK is employed as a semi-professional and the spouse is employed in a semi-skilled clerical position with a household income of approximately $65000).

Unadjusted and adjusted ORs are reported in Table 2. Maternity leave duration, as a continuous variable in months, increased the risk of impaired performance on the MSD scale (OR 1.03; 95% CI 1.02, 1.05). Indeed, confirmation of this relationship was found when maternity leave duration was entered as a categorical variable (see Table 2) with the exception of the category for the longest duration of leave. The greatest association was found in the 1 to 11 months of maternity leave with the effect reducing as maternity leave duration increased. For a maternity leave duration of 24 months plus, there was no significant association.

Covariates that were associated with impaired performance on the MSD included male gender (OR 1.53; 95% CI 1.35, 1.74). Variables that approached significance included having a younger mother (OR 1.48; 95% CI 0.98, 2.23). Protective effects were found with higher SES (OR 0.96; 95% CI 0.93, 1.00) and decreased number of children in the household (see Table 2). Preterm birth was not associated with impaired performance (OR 0.66; 95% CI 0.28, 1.58). Breastfeeding had no significant relationship with performance on the MSD (OR 0.94, 95% CI 0.80, 1.10).

### 4. Interpretation

Early childhood development establishes the foundation for later adult cognitive outcomes. We found that children 0 to 2 years of age whose mothers return to work had an increased risk of impairment on the Motor and Social Development scale compared to children whose mothers did not return to work. However, the risk of impaired performance on the MSD seemed to decrease as maternity leave increased with the highest risk seen in children whose mothers returned to work in the first year and tailing off for children whose mothers stayed at home for greater than

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unadjusted OR</th>
<th>95% CI</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternity leave duration (months)</td>
<td>1.03</td>
<td>1.01, 1.04</td>
<td>1.03</td>
<td>1.02, 1.05</td>
</tr>
<tr>
<td>Gender of child (reference = female)</td>
<td>1.53</td>
<td>1.35, 1.74</td>
<td>1.53</td>
<td>1.35, 1.74</td>
</tr>
<tr>
<td>Breastfeeding (reference = breastfed)</td>
<td>0.97</td>
<td>0.83, 1.13</td>
<td>0.94</td>
<td>0.80, 1.10</td>
</tr>
<tr>
<td>Number of children in the household (reference = 3 children)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1.33</td>
<td>1.11, 1.23</td>
<td>1.18</td>
<td>0.98, 1.43</td>
</tr>
<tr>
<td>2</td>
<td>1.23</td>
<td>1.02, 1.48</td>
<td>1.17</td>
<td>0.97, 1.41</td>
</tr>
<tr>
<td>Maternal age (reference= 40+)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–24</td>
<td>1.57</td>
<td>1.06, 2.34</td>
<td>1.48</td>
<td>0.98, 2.23</td>
</tr>
<tr>
<td>25–29</td>
<td>1.16</td>
<td>0.79, 1.72</td>
<td>1.13</td>
<td>0.76, 1.68</td>
</tr>
<tr>
<td>30–34</td>
<td>1.19</td>
<td>0.81, 1.75</td>
<td>1.18</td>
<td>0.80, 1.75</td>
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<td>35–39</td>
<td>0.98</td>
<td>0.65, 1.48</td>
<td>0.99</td>
<td>0.65, 1.49</td>
</tr>
<tr>
<td>SES</td>
<td>0.95</td>
<td>0.92, 0.98</td>
<td>0.96</td>
<td>0.93, 1.00</td>
</tr>
<tr>
<td>Preterm versus term (reference = preterm)</td>
<td>0.61</td>
<td>0.26, 1.45</td>
<td>0.66</td>
<td>0.28, 1.58</td>
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<tr>
<td>Maternity leave duration (reference = did not return to work)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Less than 1 month</td>
<td>N/A</td>
<td>1.47</td>
<td>1.47</td>
<td>0.88, 2.47</td>
</tr>
<tr>
<td>One to 11 months</td>
<td>N/A</td>
<td>2.05</td>
<td>1.11, 3.77</td>
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<tr>
<td>Twelve to 23 months</td>
<td>N/A</td>
<td>1.34</td>
<td>1.16, 1.54</td>
<td></td>
</tr>
<tr>
<td>Twenty-four months plus</td>
<td>N/A</td>
<td>1.44</td>
<td>1.08, 1.93</td>
<td></td>
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<tr>
<td>Gender of child (reference = female)</td>
<td>N/A</td>
<td>1.53</td>
<td>1.35, 1.74</td>
<td></td>
</tr>
<tr>
<td>Breastfeeding (reference = breastfed)</td>
<td>N/A</td>
<td>0.93</td>
<td>0.80, 1.09</td>
<td></td>
</tr>
<tr>
<td>Number of children in the household</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>N/A</td>
<td>1.19</td>
<td>1.19</td>
<td>0.98, 1.43</td>
</tr>
<tr>
<td>2</td>
<td>N/A</td>
<td>1.17</td>
<td>0.97, 1.42</td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>N/A</td>
<td>0.95</td>
<td>0.92, 0.99</td>
<td></td>
</tr>
<tr>
<td>Preterm versus term (reference = preterm)</td>
<td>N/A</td>
<td>0.67</td>
<td>0.67</td>
<td>0.28, 1.60</td>
</tr>
</tbody>
</table>

a Bivariate analyses not performed.

b Unadjusted OR unchanged from model with duration of maternity leave as a continuous variable.
of the home by decreasing time spent in other activities [30] and that they have better quality of interaction with their child when they are at home [31]. Andrade found a positive association between cognition and stimulation in the home environment mediated by increased maternal education and employment [15]. Other authors found that mothers who expressed more commitment to work and less anxiety about using non-family childcare and who returned to work earlier were more likely to have secure infants [14].

There is one enormous gap in the literature that remains. There are very few reports of fathers’ influences on childhood development. Working fathers may directly and indirectly influence their child’s development. Direct influences are through a different type of play and interaction with their children and indirect influences include financial support leading to improved housing and SES, as well as positive interactions with the mother [32]. As the structure of families evolves and more fathers choose to stay at home with their infants, research will be needed to clarify the changing impact of fathers’ on their children’s early development.

References


