Effects on pregnancy outcome of changing partner between first two births: prospective population study

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Abstract

Objective To compare the effects on pregnancy outcomes of changing partner between the first two births with having the same partner for both births.
Design Prospective population study.
Setting Norway.
Participants 31 683 women who changed partner between their first two births and 456 458 women with the same partner for both births.
Results After adjustment for maternal age and education, interval between births, and decade of birth, the risk of adverse pregnancy outcomes for the second birth was higher for women who changed partner between the first two births compared with those who had the same partner for both births: preterm birth (<37 weeks; relative risk 2.0, 95% confidence interval 1.9 to 2.1), low birth weight (<2500 g; 2.5, 2.3 to 2.6), and infant mortality (1.8, 1.6 to 2.1). For the first birth, the risk of these adverse pregnancy outcomes was only slightly higher for mothers who subsequently had a second birth with another partner.
Conclusion Women who change partner between their first two births are at an increased risk of delivering a preterm, low birthweight baby with an increased risk of infant mortality compared with women who have the same partner for both births.

Introduction

A consequence of the increase in remarriages in Western societies is that a growing number of women are having children with different partners. The risk of adverse pregnancy outcomes may be higher in women who have changed partners between births than those who have the same partner. Women who have changed partners may have particular characteristics that increase risk, or they may adopt unfavourable behaviours with a new partner.

Pregnancy outcomes associated with change of partner have been ascribed to paternal influences such as antigens or genes.[1–5] This approach is useful for conditions that may recur from one pregnancy to another—for example, pre-eclampsia or congenital malformations—but in studies of spontaneous outcomes without reference to recurrence, the biological interpretation is less clear.[1–5] Factors associated with change of partner, such as characteristics or changes in lifestyle, should also be considered.[6] It is also possible that these effects could be modified by certain factors. For example, women with a high level of education are less likely to have adverse pregnancy outcomes, and childbearing with different partners is also less common in this group.[7–10] We compared infant mortality, preterm birth, and low birth weight between the first two births in women who changed partner between births with those who kept the same partner.

Methods

Data were derived from Norway's medical birth registry, which has records of around 1.8 million births between 1967 and 1998. Midwives and doctors notify the registry of each birth by using a standardised form.[1–5] Data registered include birth weight, birth length, and length of gestation estimated from the last menstrual period. Information on infant deaths was collected from vital statistics monitored by Statistics Norway.

The identity of both parents is also recorded, enabling identification of women who have children with different partners from those with the same partner. We restricted our study to women who had had at least two births. Overall, 488 141 women were included, and 31 683 of these had a different partner for a second birth.

Educational level is collected by Statistics Norway. For our study, level of maternal education was taken as completed years of education: low (≤10 years), medium (11-14 years), or high (≥14 years), according to revised national recommendations.[11]

Infant deaths were defined as deaths among liveborn infants during the first year of life. Preterm birth was defined as delivery before 37 weeks of gestation, estimated from the last menstrual period, and low birth weight was defined as birth weights less than 2500 g, regardless of length of gestation. The quality of the assessment of gestational age was assured by using a method described elsewhere.[12]

We compared pregnancy outcomes for the women who changed partner between the first two births with those who had the same partner. Deliveries were divided into three periods (1967-76, 1977-86, and 1987-98), maternal age at delivery was divided into five year categories (<20, 20-24, 25-29, etc), and interval between births was divided into two year categories. Stratification and logistic regression techniques were

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Table 1 Proportion of women who changed partner between first two pregnancies, Norway, 1967-98

Period of second birth	No of women*	No (%) with different partner
1967-76	128 692	3 941 (3.1)
1977-86	145 775	6 445 (4.4)
1987-98	213 674	21 297 (10.0)
1967-98	488 141	31 683 (6.5)

*Women with verified information on whether partner of second child was same or different from partner of first child.

Table 2 Proportion of women who had different partners for first two pregnancies, by maternal level of education, Norway, 1967-98

Level of education	No of women	No (%) with different partner
1967-76:		
Low	28 827	1 389 (4.8)
Medium	82 271	2 086 (2.5)
High	12 787	248 (1.9)
1977-86:		
Low	17 274	1 266 (7.3)
Medium	100 452	3 999 (4.0)
High	23 893	876 (3.7)
1987-98:		
Low	14 700	2 843 (19.3)
Medium	145 602	15 161 (10.4)
High	46 759	2 787 (6.0)

used to estimate odds ratios as estimates of relative risk and to adjust for possible confounding by maternal age, interval between births, decade of birth, and maternal level of education. We also analysed the association between change of partner and adverse pregnancy outcomes separately for each level of maternal education and tested whether change of partner had a different effect on pregnancy outcomes for different levels of maternal education.

Results

The proportion of women who changed partner between their first two births increased from 3.1% (3941/128 692) during 1967-76 to 10.0% (21 297/213 674) during 1987-98 (table 1). The level of maternal education also increased: 10.3% of women had a high level of education during 1967-76 compared with 22.6% during 1987-98. A change in partner between the first two births is common among women with a low level of education compared with those with a high level of education, and this difference has increased over time (table 2).

Infant mortality decreased from first to second birth in women who had the same partner for both births (8.3 to 6.7 per 1000 births) but not in those who changed partner (8.3 and 8.7 per 1000: table 3). After adjustment for maternal age, decade of birth, and maternal level of education, the risk of infant mortality for the first child was identical for women with the same partner and those who changed partner (relative risk 1.0, 95% confidence interval, 0.9 to 1.1). For the second child, however, the risk was higher (1.8, 1.6 to 2.1) for women who changed partner, after additional adjustment for time between births.

The risk of preterm birth between a first and second birth was reduced for women who had the same partner for both births (5.1% to 3.7%) and increased for women who changed partner (6.1% to 7.6%). After adjustment for maternal age, decade of birth, and maternal level of education, the risk was slightly higher for women who changed partner (1.18, 1.1 to 1.3), and for the second birth was higher than for women who had the same partner for both births (2.0, 1.9 to 2.1).

The risk of a low birthweight baby was reduced from the first to second birth for women who had the same partner for both births (4.4% to 2.8%) but increased for women who changed partner (5.5% to 6.8%). After adjustment for maternal age, decade of birth, and maternal level of education, the risk of having a first baby of low birth weight was slightly higher for women who had a second child with a different partner (1.27, 1.2 to 1.3). The risk was, however, higher for the second child (2.5, 2.3 to 2.6). This was not altered by additional adjustment for the interval between births.

For second births there was a consistent reduction in infant mortality related to increasing level of maternal education regardless of whether partners had changed. Preterm birth and low birth weight were, however, less common in women with a high level of education, but only if they had the same partner for both births (table 4). For women who changed partner, education did not seem to protect against preterm birth or low birth weight, and the risks did not differ between levels of education.

Table 3 Relative risk of infant mortality, preterm birth, and low birthweight babies in women who changed partner between births and those who had same partner, Norway, 1967-98

	First birth		Relative risk* (95% CI)	Second birth		Relative risk† (95% CI)
Pregnancy outcome	No of women	No (%) of events		No of women	No (%) of events	
Infant mortality:						
Same partner	452 250	3 790 (0.83)	1.0	453 747	3 051 (0.67)	1.0
Different partner	31 386	260 (0.83)	1.0 (0.9 to 1.1)	30 521	267 (0.87)	1.8 (1.6 to 2.1)
Preterm birth‡:						
Same partner	433 314	22 019 (5.1)	1.0	409 916	15 922 (3.7)	1.0
Different partner	29 028	1 761 (6.1)	1.18 (1.1 to 1.2)	28 634	2 183 (7.6)	2.0 (1.9 to 2.1)
Low birth weight§:						
Same partner	455 647	20 237 (4.4)	1.0	455 706	12 588 (2.8)	1.0
Different partner	31 616	1 751 (5.5)	1.27 (1.2 to 1.3)	31 589	2 155 (6.8)	2.5 (2.3 to 2.6)

*Adjusted for maternal age (<20, 20-24, 25-29, etc), period of birth (1967-76, 1977-86, 1987-98), and maternal level of education (≤10 years, 11-14 years, ≥14 years).
†Adjusted for maternal age, maternal level of education, interval between births (two year categories), and period of birth.
‡Delivery before 37 weeks of gestation, estimated from last menstrual period.
§Birth weight less than 2500 g, regardless of length of gestation.

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Table 4 Relative risk of infant mortality, preterm birth, and low birth weight for second babies in women who changed partner between births and those who had same partner, by level of maternal education, Norway, 1967-98

	Maternal level of education					
	Low (≤10 years)		Medium (11-14 years)		High (≥14 years)	
Pregnancy outcome	Proportion	Relative risk* (95% CI)	Proportion	Relative risk* (95% CI)	Proportion	Relative risk* (95% CI)
Infant mortality:						
Same partner	0.88	1.0	0.66	1.0	0.52	1.0
Different partner	1.16	2.0 (1.5 to 2.7)	0.82	1.8 (1.5 to 2.1)	0.65	1.6 (1.0 to 2.6)
Preterm birth†:						
Same partner	4.6	1.0	3.7	1.0	3.1	1.0
Different partner	7.8	1.8 (1.6 to 2.0)	7.4	2.0 (1.9 to 2.1)	7.7	2.6 (2.2 to 3.0)
Low birth weight†:						
Same partner	3.7	1.0	2.7	1.0	2.1	1.0
Different partner	7.1	2.0 (1.7 to 2.3)	6.6	2.5 (2.3 to 2.6)	7.0	3.8 (3.3 to 4.5)

*Adjusted for maternal age (<20, 20-24, 25-29, etc), interval between births (two year categories), and period of birth (1967-76, 1977-86, 1987-98).
†For definition see footnote to table 3.

The risk of infant mortality did not differ between levels of education in women who changed partner (table 4). The effect on preterm birth was stronger for women with a high level of education (2.6, 2.2 to 3.0) than for those with a medium or low level of education (2.0, 1.9 to 2.1 and 1.8, 1.6 to 2.0, respectively; $P < 0.001$ for interaction).

The risk of a second child of low birth weight associated with change of partner was modified by maternal level of education: relative risks 3.8 (3.3 to 4.5) for high level of education, 2.5 (2.3 to 2.6) for medium level of education, and 2.0 (1.7 to 2.3) for low level of education (table 4).

Discussion

Changing partner between the first two births increases the risk of infant mortality, preterm birth, and low birth weight for the second birth compared with having the same partner. Our observation period covered more than 30 years, and shows that childbearing with different partners is increasingly more common. Women who change partner tend to have longer intervals between births and to be slightly older during childbearing, both of which may affect pregnancy outcomes.[5] To avoid confounding we therefore adjusted for differences in maternal age and interval between births. Similarly, we adjusted for level of maternal education, because a high level of education has been negatively associated with adverse outcomes in pregnancy.[7 8]

It is possible that adverse pregnancy outcomes occur more often among women who have changed partner between their first two births than among those who have the same partner. Women who change partner may be a selected group with characteristics that increase risk or they may change their lifestyle or behaviour in ways that are unfavourable on pregnancy outcomes.[6]

The "selection hypothesis" implies that women who change partner have a higher prevalence of risk taking behaviour, such as heavier smoking and alcohol consumption and poorer nutrition, and that this continues in pregnancy.[6 13 14] We explored this possibility in the most recent data from Norway's medical birth registry. Among 68 427 women with at least two births, smoking was nearly three times (odds ratio 2.9, 95% confidence interval 2.7 to 3.0) as likely among those who had a different partner for the second birth than those who had the same partner.

These women would be expected to also have a higher frequency of adverse pregnancy outcomes for their first birth, but the risk was only slightly higher than for women who had the same partner. This may weaken the selection hypothesis. However, another possibility is that risk of adverse pregnancy outcomes increases with duration of smoking, so that maternal smoking will do increasingly more harm with increasing parity. Women who quit smoking while pregnant may nonetheless have a higher risk of adverse outcomes than women who have never smoked.

Changes in lifestyle or social circumstances may accompany change of partner, and these changes could be important. Women may change behaviour from one pregnancy to the next, but it remains to be shown that women who change partner between births are more likely to adopt a less healthy lifestyle than those who have the same partner.

Many studies of pregnancy outcomes related to change of partner have focused on recurrence of conditions between births.[1–5] Effects have therefore been attributed to change of paternal antigens or genes. We

What is already known on this topic

Childbearing with different partners has increased in Western societies

Little is known about the effects of this on pregnancy outcomes

What this study adds

Women who change partner between their first two births are at a higher risk of having a preterm, low birthweight baby with an increased risk of infant mortality

Changes in lifestyle or social circumstances may accompany change in partner and therefore affect pregnancy outcomes

Women with high levels of education seem particularly vulnerable to the effects of changing partner

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did not consider recurrence of conditions from one pregnancy to the next but examined spontaneous pregnancy outcomes. It seems less clear that change of partner could reflect genetic changes or different paternal antigens in this situation. It is more likely that change of paternal genes or antigens would result in heterogeneous outcomes rather than unfavourable pregnancy outcomes.

In general, high educational level is associated with a reduced risk of adverse pregnancy outcomes, as is having the same partner for both births.[7 8] For women who changed partner, however, education had no protective effect, since the absolute risk of adverse outcomes was similar between women with different levels of education. In relative terms, the strongest effects related to change of partner between the first two births were observed in women who had a high level of education. In these women, change of partner was associated with a higher relative risk of a preterm, low birthweight baby than in women with medium or low levels of education. Women with high levels of education seem particularly vulnerable to the effects of changing partner.

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