Predictors of sexual intercourse and rapid-repeat pregnancy among teenage mothers: an Australian prospective longitudinal study

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ABSTRACT

Objectives: To examine the determinants of pregnancy within 2 years of a teenager giving birth for the first time (rapid-repeat pregnancy [RRP]) and resumption of sexual intercourse after the birth.

Design, setting and participants: Prospective cohort study between June 2004 and September 2006 at the sole tertiary obstetric hospital in Western Australia involving teenagers who gave birth for the first time. Data were collected using questionnaires at recruitment, 6 weeks and 3-monthly intervals for up to 2 years postpartum.

Main outcome measures: RRP and time to a return to sexual intercourse after giving birth.

Results: Of the 147 participants, 49 (33%) experienced an RRP. Sexual intercourse was independently significantly associated with using an oral contraceptive (odds ratio [OR], 2.83; 95% CI, 1.38–5.82); living with the birth father (OR, 8.43; 95% CI, 5.12–13.86); intending to become pregnant (OR, 3.20; 95% CI, 1.53–6.65); smoking marijuana (OR, 2.60; 95% CI, 1.38–4.79); and using alcohol (OR, 1.93; 95% CI, 1.17–3.20). Use of long-acting contraceptives was associated with reduced odds of RRP (OR, 0.27; 95% CI, 0.12–0.62), while teenagers who used an oral contraceptive had a similar risk of RRP compared with those using barrier methods or no contraception. Other factors predicting RRP were: being sexually active for more than 3 months (OR, 8.96; 95% CI, 1.97–40.74); intending to become pregnant (OR, 2.39; 95% CI, 1.62–4.93); and being an Indigenous Australian (OR, 2.38; 95% CI, 1.38–4.11).

Conclusion: There are two options available to health care providers for reducing the rate of RRP: to facilitate teenage mothers’ access to long-acting contraceptives; and to gain clear understanding of their intention with regard to repeat pregnancy and to provide appropriate support.

METHODS

Setting and participants

This study was conducted between June 2004 and September 2006 at King Edward Memorial Hospital (KEMH), the sole tertiary maternity hospital in Western Australia, with around 6000 births each year. KEMH has a dedicated adolescent antenatal clinic. Teenagers who attend the clinic are encouraged to attend at 6 weeks postpartum, when they receive free contraception and safe-sex counselling.

All nulliparous, English-speaking teenagers aged 18 years or younger who were booked to attend the adolescent antenatal clinic were eligible to participate, and provided their own consent. Exclusion criteria included intrauterine fetal demise or surrendering an infant to adoptive or social services.

Ethics approval for the study was given by the ethics committee at KEMH.

Study measures

Questionnaires were completed at recruitment (either before the birth or within 6 days after the birth), 6 weeks postpartum and then at 3-monthly intervals (alternating between a self-administered questionnaire completed during a home visit and a phone-call questionnaire) for a 2-year follow-up period. Participants were lost to follow-up if they could not be contacted between visits up to the next scheduled visit. Pregnancy was defined as a positive pregnancy test, termination, spontaneous miscarriage or live birth and was assessed at each follow-up after the birth.

Psychometric measures of health and social and emotional functioning previously found to be valid and reliable in teenage populations were used.12 Pregnancy planning, self-esteem, self-efficacy, mental health and family function were assessed using the London Measure of Unplanned Pregnancy,13 the Rosenberg Self-Esteem Scale,14 the Perceived Self-Efficacy Scale,15 the Depression Anxiety Stress Scales,16 and the McMaster Family Assessment Device.17 Social disadvantage was assessed using the Australian Bureau of Statistics Index of Relative Socioeconomic Disadvantage, with the lowest quintile representing the most disadvantaged group.18

At recruitment and each follow-up after the birth, teenagers’ living arrangements, social supports, relationship with the birth father and whether sexual intercourse had occurred were documented. Participants were also asked which contraceptive methods they had used, being grouped according to the contraceptives they had used most: long-acting contraceptives (etonalgestrel
implant or depot medroxyprogesterone aceta
te not requiring daily administration; oral
ccontraceptives requiring daily administra
tion; and barrier methods (which are coital
dependent) or no contraception. Those
using two forms of contraception were clas
cified according to the most effective form
(i.e., the long-acting contraceptive where
both it and condoms were used).
Participants were asked if they were
attending school and, if not attending, when
they had dropped out. Those who were one
school year or more behind in relation to
their age were classified as having an age-
inappropriate education. Participants were
also asked if they had used alcohol, cigarettes
or marijuana, and if they were employed.

Statistical analyses
It was estimated that a sample size of 160
teenagers was sufficient to attain 80% power
to detect odds ratios (ORs) of 3.0 in a twogroup comparison of exposure prevalence
between those with and without the out-
come, assuming an outcome prevalence of
33% and an exposure prevalence of 25% for
those without the outcome.19 This estima-
tion allowed for 10% loss to follow-up.19

Medians, interquartile ranges and ranges
were used to summarise continuous data,
and frequency distributions were used to
summarise categorical data. \( \chi^2 \) and Fisher
exact tests were used to assess univariate
associations of the categorical explanatory
variables with the outcome of RRP. Univari-
te logistic regression analysis was used to
identify significant candidate predictors
associated with sexual intercourse or RRP.
Multivariable logistic regression was used to
identify factors simultaneously associated
with sexual intercourse and RRP until 24
months postpartum, with the covariate
effects summarised using ORs and 95% con-
fidence intervals. Sexual intercourse and RRP
were both considered at 3-monthly follow-
up periods, and logistic regression modelling
was implemented using generalised estimat-
ing equations, with the individual teenagers
described according to the most effective form
of contraception they used.

RESULTS
Of the 560 teenagers who gave birth to their
first baby during the study period at KEMH,
289 (52%) were invited to participate; of
these, 189 (65%) agreed to participate.
Eight were ineligible because they did not
complete the recruitment questionnaire; 27

<table>
<thead>
<tr>
<th>Variable</th>
<th>All(\dagger)</th>
<th>RRP(\ddagger)</th>
<th>No RRP(\S)</th>
<th>(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years at initial conception, median (IQR)</td>
<td>17 (16–17) [12–18]</td>
<td>16 (16–17) [14–18]</td>
<td>17 (16–17) [12–18]</td>
<td>0.623</td>
</tr>
<tr>
<td>Indigenous Australian</td>
<td>26 (18%)</td>
<td>11 (22%)</td>
<td>15 (15%)</td>
<td>0.311</td>
</tr>
<tr>
<td>Low SES</td>
<td>52 (35%)</td>
<td>14 (29%)</td>
<td>38 (39%)</td>
<td>0.223</td>
</tr>
<tr>
<td>Age-inappropriate education</td>
<td>95 (65%)</td>
<td>32 (65%)</td>
<td>63 (64%)</td>
<td>0.973</td>
</tr>
<tr>
<td>Returned to school within 12 m</td>
<td>34 (27%)</td>
<td>10 (22%)</td>
<td>24 (31%)</td>
<td>0.276</td>
</tr>
<tr>
<td>Unemployed at 12 m</td>
<td>108 (87%)</td>
<td>44 (96%)</td>
<td>64 (82%)</td>
<td>0.029</td>
</tr>
<tr>
<td>Unemployed at 21 m</td>
<td>81 (67%)</td>
<td>33 (79%)</td>
<td>48 (60%)</td>
<td>0.057</td>
</tr>
<tr>
<td>Low self-esteem(</td>
<td>\dagger)</td>
<td>75 (51%)</td>
<td>17 (35%)</td>
<td>58 (59%)</td>
</tr>
<tr>
<td>Low self-efficacy**</td>
<td>97 (66%)</td>
<td>35 (71%)</td>
<td>62 (63%)</td>
<td>0.919</td>
</tr>
<tr>
<td>Depression††</td>
<td>38 (26%)</td>
<td>9 (18%)</td>
<td>29 (30%)</td>
<td>0.419</td>
</tr>
<tr>
<td>Anxiety††</td>
<td>56 (38%)</td>
<td>20 (41%)</td>
<td>36 (37%)</td>
<td>0.778</td>
</tr>
<tr>
<td>Stress††</td>
<td>46 (31%)</td>
<td>15 (31%)</td>
<td>31 (32%)</td>
<td>0.861</td>
</tr>
<tr>
<td>Abnormal family function‡‡</td>
<td>40 (27%)</td>
<td>14 (29%)</td>
<td>26 (27%)</td>
<td>0.850</td>
</tr>
<tr>
<td>Relationship with birth father</td>
<td>97 (66%)</td>
<td>35 (71%)</td>
<td>62 (63%)</td>
<td>0.461</td>
</tr>
<tr>
<td>Living with birth father</td>
<td>64 (44%)</td>
<td>19 (39%)</td>
<td>45 (46%)</td>
<td>0.911</td>
</tr>
<tr>
<td>Living with birth father at 12 m</td>
<td>47 (38%)</td>
<td>23 (50%)</td>
<td>24 (31%)</td>
<td>0.033</td>
</tr>
<tr>
<td>Never used contraception</td>
<td>19 (13%)</td>
<td>5 (10%)</td>
<td>14 (14%)</td>
<td>0.448</td>
</tr>
<tr>
<td>Not using contraception at first conception</td>
<td>71 (48%)</td>
<td>22 (45%)</td>
<td>49 (50%)</td>
<td>0.419</td>
</tr>
<tr>
<td>Did not intend to get pregnant§§</td>
<td>112 (76%)</td>
<td>33 (67%)</td>
<td>79 (81%)</td>
<td>0.094</td>
</tr>
<tr>
<td>Pregnancy intentions kept changing§§</td>
<td>23 (16%)</td>
<td>12 (24%)</td>
<td>11 (11%)</td>
<td>—</td>
</tr>
<tr>
<td>Intended to get pregnant§§</td>
<td>12 (8%)</td>
<td>5 (10%)</td>
<td>7 (7%)</td>
<td>—</td>
</tr>
<tr>
<td>No contraceptive switches within 24 m</td>
<td>44 (40%)</td>
<td>6 (14%)</td>
<td>38 (57%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Smoker before first pregnancy</td>
<td>91 (62%)</td>
<td>32 (65%)</td>
<td>59 (60%)</td>
<td>0.707</td>
</tr>
<tr>
<td>Smoked during first pregnancy</td>
<td>66 (45%)</td>
<td>23 (47%)</td>
<td>43 (44%)</td>
<td>0.806</td>
</tr>
<tr>
<td>Smoking at 3 m</td>
<td>68 (50%)</td>
<td>24 (50%)</td>
<td>44 (49%)</td>
<td>0.950</td>
</tr>
<tr>
<td>Smoking at 15 m</td>
<td>77 (66%)</td>
<td>26 (59%)</td>
<td>51 (70%)</td>
<td>0.234</td>
</tr>
<tr>
<td>Alcohol before first pregnancy</td>
<td>101 (69%)</td>
<td>38 (78%)</td>
<td>63 (64%)</td>
<td>0.131</td>
</tr>
<tr>
<td>Alcohol at 3 m</td>
<td>68 (50%)</td>
<td>21 (44%)</td>
<td>47 (53%)</td>
<td>0.349</td>
</tr>
<tr>
<td>Alcohol at 15 m</td>
<td>77 (66%)</td>
<td>26 (59%)</td>
<td>51 (70%)</td>
<td>0.234</td>
</tr>
<tr>
<td>Marijuana before first pregnancy</td>
<td>64 (44%)</td>
<td>20 (41%)</td>
<td>44 (45%)</td>
<td>0.362</td>
</tr>
<tr>
<td>Marijuana at 3 m</td>
<td>30 (22%)</td>
<td>11 (23%)</td>
<td>19 (21%)</td>
<td>0.832</td>
</tr>
<tr>
<td>Marijuana at 15 m</td>
<td>22 (19%)</td>
<td>8 (18%)</td>
<td>14 (19%)</td>
<td>0.894</td>
</tr>
</tbody>
</table>

SES = socioeconomic status. \( m \) = months postpartum.
* Percentages may not add up to 100% due to missing values for some variables. Proportions are
expressed as number (%) unless specified as medians, interquartile ranges (IQR) and ranges. Unless
stated otherwise, variables are based on numbers recorded at recruitment.
† Baseline population: \( n = 147 \) at 6 weeks, \( n = 137 \) at 3 m, \( n = 124 \) at 12 m, \( n = 117 \) at 15 m;
\( n = 110 \) at 21 m; and \( n = 109 \) at 24 m.
‡ Baseline population: \( n = 49 \) at 6 weeks, \( n = 48 \) at 3 m, \( n = 46 \) at 12 m, \( n = 44 \) at 15 m;
\( n = 42 \) at 21 m, and \( n = 42 \) at 24 m.
§ Baseline population: \( n = 98 \) at 6 weeks, \( n = 89 \) at 3 m, \( n = 78 \) at 12 m, \( n = 73 \) at 15 m;
\( n = 68 \) at 21 m, and \( n = 67 \) at 24 m.
¶ Measured using the Rosenberg Self-Esteem Scale. ** Measured using the Perceived Self Efficacy Index.
†† Measured using the Depression Anxiety and Stress Scales. ‡‡ Measured using the McMaster Family
Assessment Device. §§ Measure derived from London Measure of Unplanned Pregnancy.
declined postpartum follow-up; and a further seven were withdrawn for reasons including stillbirth, removal of their child by child protection services, and loss of contact. Of the remaining 147 (78%) who were followed up, 109 (74%) continued with the study until 24 months postpartum. Within 2 years of their first birth, 49 (33%; 95% CI, 26%–41%) became pregnant, two of these before 6 weeks postpartum.

The majority of teenagers (65%) had age-inappropriate education. However, almost a third (27%) returned to school for at least 3 months in the first 12 months postpartum. Teenagers who had an RRP were more likely to be unemployed at 12 months than those who did not (96% v 82%; \( P = 0.029 \)) (Box 1).

Teenagers who had an RRP were less likely to have low self-esteem than those who did not (35% v 59%; \( P = 0.002 \)) (Box 1).

At recruitment, most participants (66%) were in a relationship with the birth father, and 44% lived with the birth father. Teenagers who had an RRP were more likely to be living with the birth father at 12 months than those who did not (50% v 31%; \( P = 0.033 \)) (Box 1).

Participants reported frequent drug and alcohol use before their first pregnancy: 69% used alcohol, 44% used marijuana, and 62% smoked tobacco. During their first pregnancy, 45% continued to smoke tobacco. Rates of smoking tobacco and alcohol use were similar among those who had an RRP and those who did not, and increased with time postpartum (Box 1).

Most participants (76%) had not intended to conceive their first child, and 48% were not using contraception when they conceived. Teenagers who did not have an RRP were more likely to have continued using the same contraceptive method (no switches) than those who did (57% v 14%; \( P < 0.001 \)) (Box 1).

The proportion of teenagers intending to become pregnant fluctuated postpartum. Teenagers who had an RRP were more likely to intend to become pregnant than those who did not at 9 months (38% v 18%; \( P = 0.025 \)), 12 months (42% v 9%; \( P < 0.001 \)), 15 months (47% v 23%; \( P = 0.017 \)), and 21 months (46% v 22%; \( P = 0.019 \)) (data not shown).

Sexual intercourse and contraception

Within 24 months postpartum, 138 participants (94% of the initial 147 participants) had resumed sex. Of these, 41 (30%) did so without using contraception. Most (106; 77%) had resumed sex by 3 months postpartum, with 55 of these participants (52%) initially having no contraceptive cover (Box 2).

Simultaneous analysis of the factors associated with sexual intercourse (Box 3) highlighted that teenagers using an oral contraceptive were more likely to be sexually active than other teenagers (OR, 2.83; 95% CI, 1.38–5.82; \( P = 0.005 \)).

Relative to participants at 12–24 months postpartum, participants were less likely to be sexually active before 6 weeks postpartum (OR, 0.10; 95% CI, 0.05–0.21; \( P < 0.001 \)) and from 6 weeks up to 12 months postpartum (OR, 0.57; 95% CI, 0.38–0.85; \( P = 0.006 \)). Sexual intercourse was linked to: living with the birth father (OR, 8.43; 95% CI, 5.12–13.86; \( P < 0.001 \)); intending to become pregnant (OR, 3.20; 95% CI, 1.53–6.65; \( P = 0.002 \)); smoking marijuana (OR, 2.60; 95% CI, 1.38–4.79; \( P = 0.003 \)); and using alcohol (OR, 1.93; 95% CI, 1.17–3.20; \( P = 0.011 \)).

Predictors of RRP

Analysis of factors associated with RRP (Box 3) showed current use of long-acting contra-
Cigarette, alcohol and marijuana use are high in teenage mothers. Consistent with other studies, we found that alcohol and marijuana use dropped during pregnancy, but rates of cigarette smoking remained high. The use of cigarettes and alcohol postpartum increased with time. This is the first study to prospectively follow marijuana and alcohol use postpartum and to show a link between these activities and sexual intercourse. Clinicians should ask teenage mothers about alcohol and drug use as it may provide an opportunity for health promotion. However, as effective cessation strategies have not been established for this group, this is an important area for future health promotion research.

It has been shown that Indigenous Australian teenagers are more likely to experience teenage pregnancy than non-Indigenous Australian teenagers. Our study is the first to demonstrate that Indigenous teenagers are at increased risk of RRP compared with non-Indigenous teenagers. Providing Indigenous teenagers with culturally appropriate advice and accessible contraception will reduce their exposure to the increased social inequality associated with RRP.

There were limitations to the design of our study. After the birth, we answered all questions from the teenagers about contraception and provided referrals. These factors would have affected the findings. As teenagers could attend other KEMH antenatal clinics and also give birth at KEMH without attending for antenatal care, we were only able to approach 52% of teenagers giving birth to their first baby at KEMH.

Our data have shown that there are two options available for reducing the rate of RRP. The first is to provide teenage mothers with ready access to long-acting contraceptives and provide ongoing contraceptive support to encourage their long-term use. The second is for health care providers to gain a clear understanding of teenage mothers’ intention with regard to repeat pregnancy so appropriate advice and support can be given.

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18 Australian Bureau of Statistics. Information paper: an introduction to Socio-Economic Indexes for Areas (SEIFA), 2006. (ABS Cat No. 2039.0.)

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