

Effects of area and family deprivation on risk factors for teenage pregnancy among 13-15-year-old girls

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Abstract

Information is needed about how the effects of socio-economic deprivation on teenage pregnancy are mediated by proximal risk factors in order to target area-wide and family interventions more effectively. Using a 2 x 2 factorial design, we tested the separate and interacting effects of area deprivation and family deprivation on six specific proximal risk factors for teenage pregnancy: early sexual activity, life expectations, knowledge and beliefs about contraceptives, attitude to abortion, beliefs about love, and use of local sexual health services. Data were collected from 201 13-15-year-old girls in deprived and non-deprived families living in deprived and more affluent areas of the UK. Area deprivation significantly increased early sexual activity, and both area and family deprivation significantly reduced life expectations. Significant interactions between area and family deprivation showed that the impact of living in a deprived area depends to some extent on family circumstances, with implications for targeting different types of intervention. Living in a deprived area increased early sexual activity much more markedly among girls in deprived families, so interventions to reduce early sexual activity could target individually deprived girls living in deprived areas. Living in a more affluent area increased life expectations, but only among girls in non-deprived families, so both area-wide and individually targeted interventions would be needed to raise life expectations among girls most at risk of teenage pregnancy.

Keywords: Teenage pregnancy; socio-economic deprivation; area effects; early sex; life expectations.

INTRODUCTION

Teenage pregnancy is associated with socio-economic deprivation in almost all developed countries including the US (Garlick *et al.*, 1993; Kirby *et al.*, 2001), UK (McCulloch, 2001), Spain (Nebot *et al.*, 2001), Finland (Vikat *et al.*, 2002), Canada, Sweden and France (Singh *et al.*, 2001). It has been targeted for preventative interventions because of associations with a range of unfavourable health and social outcomes (Keirnan, 1980; Moffitt, 2002; Olausson *et al.*, 2001).

With approximately 90,000 teenage conceptions per year, including 7,000 among girls under 16, the UK is second only to the US in teenage births worldwide (UNICEF, 2001) and has the highest teenage pregnancy rate in Europe (Social Exclusion Unit, 1999). There is also evidence that socio-economic inequalities in UK teenage pregnancy rates are increasing (McLeod, 2001). A UK teenage pregnancy unit was established in 1998, and substantial government funds were set aside to support its recommendations, which included aiming to halve the teenage conception rate between 1999 and 2010 (Social Exclusion Unit, 1999). Regional differences are an important feature of the UK teenage pregnancy problem, with significantly higher rates in northern regions than southern regions (Griffiths & Kirby, 2000; Wellings & Kane, 1999). One study reported a conception rate of 35-40 per 1,000 girls aged 11-19 in northern regions, compared with 25-29 per 1,000 in southern regions (Wilson *et al.*, 1992).

Any effects of socio-economic deprivation on teenage pregnancy rates must be mediated by the attitudes, beliefs and behaviours that are the proximal risk factors for teenage pregnancy. Those risk factors can provide specific behavioural objectives for interventions whose ultimate aim is to reduce teenage pregnancy rates. Previous research has identified six specific proximal risk factors for teenage pregnancy. First, early sexual activity and beliefs about early sex, which have been associated with teenage pregnancy in a number of studies (Burack, 1999; Morgan *et al.*, 1995). Second, low expectations about education and achievement in life, which were identified as a key factor by a major review of the literature on risks for teenage pregnancy (Social Exclusion Unit, 1999). One study, for example, showed that educational expectations were lower among adolescent girls who became pregnant than those who did not (Young *et al.*, 2001). Third, ignorance about contraception, which was identified as a key risk factor in the same major review (Social Exclusion Unit, 1999) and has been the focus of numerous sex education interventions (Bonell *et al.*, 2003; Mellanby *et al.*, 1995). Fourth, attitudes about the acceptability of abortion, which are important because the abortion rate is a key factor differentiating areas with high and low teenage pregnancy rates (Smith 1993). Fifth, beliefs about love and emotional attachments, which are important because of research showing that young women's beliefs about not using condoms when in loving relationships differentiated those who became teenage mothers from those who did not (Jewell *et al.*, 2001). Sixth, use of local services for contraception and sexual advice, which is important because of evidence that teenagers may be less reluctant to seek advice about contraception and sex than has sometimes been assumed (Churchill *et al.*, 2000).

Much of the evidence about socio-economic deprivation and teenage pregnancy is based on area measures of deprivation. The rationale for using area measures is that area deprivation may consist of more than the agglomeration of deprived individuals or families and may have effects that are not accounted for by the levels of individual or family deprivation in those areas. Wilson, for example, argued that concentrated poverty, unemployment, and single parent households cause area-wide cultural changes, because of the absence of role models to 'help keep alive the perception that education is meaningful, that steady employment is a viable alternative to welfare, and that family stability is the norm not the exception' (Wilson, 1987, p 56). In one analysis of UK teenage pregnancy rates, however, the effects of area

deprivation were substantially attenuated when adjustment was made for measures of personal and household disadvantage, suggesting that 'personal deprivation rather than area deprivation dominate the explanation of teenage childbearing', and that area deprivation is important 'largely because residence in deprived areas is associated with personal disadvantage' (McCulloch, 2001, p. 20).

Epidemiological research with teenage conception or childbirth rates as the outcome measure is not well placed to examine the mechanisms involved in associations between deprivation and teenage pregnancy. McCulloch (2001, p. 22) concluded that 'Perhaps the most pressing need in future research on area effects is to identify the mechanisms by which area disadvantage (and other area characteristics) influence individual outcomes, including family formation events.' Focusing on proximal risk factors, such as those described above, is an important part of that effort to identify mechanisms.

Another important issue left unresolved by efforts to test for area effects on teenage pregnancy is the possibility of interactions between area and individual deprivation. It is possible, for example, that the effects of individual or family deprivation depend on whether they take place in the context of a deprived or more affluent area. Interactions like that, if they existed, would provide insights into the experience of deprivation and the mediation of socio-economic influences. Studies of interactions between individual and area deprivation should therefore examine proximal risk factors for teenage pregnancy. Recent theory about socio-economic influences on health emphasises relative rather than absolute deprivation and would predict interactions between individual family circumstances and wider levels of deprivation. 'It looks as if what matters about our physical circumstances is not what they are in themselves, but where they stand in the scale of things in our society' (Wilkinson, 1990, p. 405). Information about interactions between area and individual deprivation would also help to target interventions for maximum effect. For example, interventions targeting individually deprived girls may be more effective in either a more deprived or less deprived area, depending on the nature of the interaction. Also, area-wide interventions in deprived areas may be more effective when delivered to either deprived or non-deprived girls. However, studying interactions between area and individual deprivation requires balanced samples with substantial proportions of non-deprived individuals in deprived areas and vice versa. Those are unlikely to be obtained in fully representative epidemiological samples, where 'it is difficult to separate the effects of area environment from individual or household characteristics' (McCulloch, 2001, p. 22).

In the present study we examined proximal risk factors for teenage pregnancy among 13-15-year-old girls in two areas of England: a socio-economically deprived northern town and a more affluent southern town. We identified girls from relatively deprived and non-deprived families in each area in order to examine ways in which area and family deprivation affected proximal risk factors for teenage pregnancy. The aims of the study were to examine ways that area and family deprivation effects differed from one proximal risk factor to another, and to test for interactions between the effects of area and family deprivation.

METHODS

Design

The effects of area and family deprivation were examined in a 2 x 2 factorial design, with scores for six proximal risk factors, measured in a brief questionnaire, as the dependent variables. The data were collected at schools in two areas of England, UK. The more deprived area was Kingston upon Hull, a port city in the north east of England that was identified as among the most deprived local authority districts in England (Social Exclusion Unit, 1999), with teenage pregnancy rates consistently above the national average (Konje *et al.*, 1992). The more affluent area was Richmond upon Thames, a town in the south east of England that was identified as one of the most prosperous local authorities in the UK (Griffiths & Kirby, 2000).

The socio-economic differences between the two areas are illustrated by a recent analysis that used multiple measures of socio-economic deprivation to compute an Index of Multiple Deprivation for 354 English local authority districts and 32,482 smaller areas. In a ranking of the 354 local authority districts, Kingston upon Hull was ranked the ninth most deprived and Richmond upon Thames the 301st. The city of Kingston upon Hull was also the 25th most deprived of the 32,482 smaller areas of England (Noble *et al.*, 2004). Those socio-economic differences are reflected in teenage conception rates, which for under-18-year-olds during the 1990s were 77.4 per 1,000 in Kingston upon Hull, compared with 21.9 per 1,000 in Richmond upon Thames (Griffiths & Kirby, 2000).

A mixed-sex comprehensive school was selected in each area that was close to the average for schools in the local education authority in terms of numbers of pupils, percent of pupils receiving free school meals, and grades achieved in the national public examinations taken by 16-year-olds in the UK. This meant that although the two schools differed, with more pupils, poorer examination grades, and more children receiving free school meals at the school in the deprived area, each school was representative of its area. Comprehensive schools provide publicly funded secondary education for 11-16-year-olds in their local communities. They do not select by ability and are the type of school attended by the majority of teenagers in the UK.

Girls in deprived families were defined as those who lived with just one parent or received free school meals. This measure of family deprivation was used recently for national UK secondary school league tables (Guardian Newspapers, 2004). Being in a single parent family has been shown to increase the individual risk of teenage pregnancy (Hogan *et al.*, 2000). Receiving free school meals is an indicator of low family income for which the qualification criteria were the same in both areas, and which was described as 'the best available indicator of the social backgrounds of students' (Guardian Newspapers, 2004).

Procedure

Ethical approval was obtained from the Psychology Research Ethics Committee, London Metropolitan University, and permission to collect the data was obtained from the Head Teacher at each school. The study was introduced to pupils in the context of classes in Personal and Social Education (PSE). A written invitation to participate explained that the survey was

anonymous, that participants should not write their names on the questionnaire, and that only the researchers would have access to the data. At each school the PSE teacher explained the study and distributed questionnaires during timetabled girls-only classroom sessions. To ensure privacy, each girl received a large sealable envelope in which to place the completed questionnaire before returning it to the teacher, who passed all the sealed envelopes to the researchers.

Participants

Questionnaires were distributed to 402 girls (246 in the more deprived area and 156 in the more affluent area) and returned by 288 (143 in the more deprived area and 145 in the more affluent area). There were 87 questionnaires excluded because of missing data (15 in the more deprived area and 72 in the more affluent area), so the sample comprised 201 girls (128 in the more deprived area and 73 in the more affluent area). There were 42 girls (33%) in deprived families in the more deprived area and 23 (32%) in the more affluent area. Participant details are given in table 1. The sample included 50 girls (25%) who had already had sex and 3 (1.5%) who had had abortions. There were significantly more girls from minority ethnic groups in the more affluent area ($\chi^2 = 21.6, p < .001$), and more girls who had already had sex in the more deprived area ($\chi^2 = 14.6, p < .001$) but no significant differences in age, single parent families or receipt of free school meals between areas.

Table 1. Participant details

	More deprived area (n=128)	More affluent area (n=73)	Total (n=201)
13 years old	10 (7.8%)	3 (4.1%)	13 (6.5%)
14 years old	48 (37.5%)	39 (53.4%)	87 (43.3%)
15 years old	70 (54.7%)	31 (42.5%)	101 (50.2%)
Minority ethnic origin	2 (1.6%)	15 (20.5%)	17 (8.5%)
Single parent family	36 (28.1%)	19 (26%)	55 (27.4%)
Free school meals	16 (12.5%)	9 (12.3%)	25 (12.4%)
Already had sex	43 (33.9%)	7 (9.6%)	50 (25%)
Had an abortion	1 (0.8%)	2 (2.7%)	3 (1.5%)

Risk factor measures

Responses to the 15 questionnaire items shown in the appendix were used to compute scores for six risk factors, as shown below. The questionnaire items were designed as brief self-report measures that represented as closely as possible the constructs identified by previous research that had examined risk factors for teenage pregnancy using a range of different methods, including non-questionnaire measures.

Early sexual activity: 0-2 scale with one point each for having had sexual intercourse and believing in sex before age 16.

Life expectations: 0-4 scale with one point for planning to go to university and one point each for believing that having a house, money, and career are important before having a baby.

Knowledge and beliefs about contraceptives: 0-4 scale with one point each for knowing about 5 or more contraceptive methods, being willing to use 3 or more contraceptive methods, believing that contraception is important before having sex, and agreeing with always using contraception.

Attitude to abortion: Single item Likert scale scored from 1 (strongly agree with abortion) to 5 (strongly disagree).

Beliefs about love: 0-3 scale with one point each for believing that being in love is important before having sex, before having a baby, and as a reason not to use contraception.

Use of local sexual health services: 0-6 scale with one point each for being aware of services, being satisfied with services, perceiving services as available, having attended services, being willing to attend, and being sure that confidentiality would be maintained.

RESULTS

The Statistical Package for Social Science (SPSS) version 12.0 for Windows was used to analyse the data. Descriptive statistics for risk factor scores are shown in table 2, and the correlations among risk factor scores in table 3. The largest correlation was 0.25, and only five of the 15 correlations were significant at $p < .05$, supporting the rationale for examining specific risk factors separately. The significant correlations showed that early sexual activity was associated negatively with life expectations and positively with use of services. Life expectations were associated positively with knowledge and beliefs about contraception and with beliefs about love. Knowledge and beliefs about contraception were associated positively with use of services.

Table 2. Descriptive statistics for risk factor scores

	Mean	SD	Range
Early sexual activity	0.9	0.7	0-2
Life expectations	2.7	1.2	0-4
Knowledge and beliefs about contraceptives	2.7	1.0	0-4
Attitude to abortion	3.5	1.2	1-5
Beliefs about love	1.4	0.9	0-3
Use of local health services	4.4	1.4	1-6

Table 3. Correlations among risk factor scores

1. Early sexual activity					
2. Life expectations	-.17*				
3. Knowledge/beliefs about contraceptives	.06	.17*			
4. Attitude to abortion	.13	-.09	-.01		
5. Beliefs about love	-.03	.18*	.04	.03	
6. Use of local sexual health services	.25**	-.10	.18*	-.08	-.07
	1	2	3	4	5

* $p \leq .05$; ** $p \leq .001$

Mean risk factor scores for girls in each group are shown in table 4. The effects of area and family deprivation were tested with 2 x 2 factorial analyses of variance, the results of which are shown in table 5. The multivariate effect sizes (partial Eta-squared) were .18 for area deprivation, .08 for family deprivation, and .06 for the interaction effect, indicating that area deprivation accounted for 18%, family deprivation 8%, and the interaction between them 6% of the total variance in risk factor scores. Girls in the more deprived area had significantly higher scores for early sexual activity and use of local sexual health services, and significantly lower scores for life expectations and knowledge and beliefs about contraceptives. Girls in deprived families had significantly lower scores for life expectations.

There were significant area-by-family interaction effects for both early sexual activity and life expectations. Fig 1a shows that living in the more deprived area increased early sexual activity much more markedly for girls in deprived families than those in non-deprived families. Put another way, being in a deprived family increased early sexual activity only in the more deprived area. Fig 1b shows that living in the more affluent area increased life expectations only among girls in non-deprived families, with no difference between areas among those in deprived families. Put another way, being in a non-deprived family increased life expectations much more markedly in the more affluent area.

Table 4. Mean (SD) risk factor scores

	More deprived area		More affluent area	
	Deprived family	Non-deprived family	Deprived family	Non-deprived family
Early sexual activity	1.32 (0.7)	0.86 (0.7)	0.57 (0.6)	0.66 (0.6)
Life expectations	2.41 (1.2)	2.58 (1.2)	2.43 (1.2)	3.32 (0.9)
Knowledge and beliefs about contraceptives	2.69 (1.0)	2.49 (1.0)	3.00 (1.0)	2.90 (1.1)
Attitude to abortion	3.44 (1.3)	3.61 (1.3)	3.26 (1.3)	3.37(1.0)
Beliefs about love	1.36 (1.1)	1.30 (0.9)	1.48 (0.8)	1.52 (0.8)
Use of local sexual health services	4.74 (1.4)	4.52 (1.3)	3.70 (1.3)	4.16 (1.3)

Table 5. F ratios from analyses of variance to test effects of area and family deprivation on risk factor scores

	Area deprivation	Family deprivation	Area x family deprivation
Early sexual activity	21.3***	3.1	7.1**
Life expectations	4.6*	8.7**	3.9*
Knowledge and beliefs about contraceptives	5.2 *	0.9	0.1
Attitude to abortion	1.2	0.5	0.0
Beliefs about love	1.4	0.0	0.1
Use of local sexual health services	11.1***	0.4	2.6

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Fig. 1. Mean early sexual activity and life expectations scores for girls in deprived and non-deprived families in more deprived and more affluent areas



DISCUSSION

Area deprivation had larger effects than family deprivation, in terms of effect size and numbers of risk factors with significant main effects. The size of the effects, and the fact that there were no significant effects on attitudes to abortion and beliefs about love, show that deprivation is by no means the only influence on risk factors for teenage pregnancy. That is not surprising given the range of other influences that have been observed. Longitudinal studies, for example, have shown that developmental factors such as early puberty and conduct problems also play important roles in risk of teenage pregnancy (Woodward *et al.*, 2001). Given the scale of the teenage pregnancy problem in certain countries, however, the results suggest that substantial benefits could be obtained by interventions to reduce the impact of socio-economic factors on early sexual activity, life expectations, and knowledge and beliefs about contraception, which were all affected by area and/or family deprivation.

There were not, however, separate clusters of risk factors associated with each type of deprivation, for family deprivation had a significant main effect on just one risk factor, which was also affected by area deprivation. Instead, the most interesting aspects of the results were the interactions between area and family deprivation. Those go to the heart of the experience of deprivation and show that the effects of individual family circumstances depend on the broader social context in which they occur (or that the effects of area-wide factors depend on more immediate family circumstances).

For early sexual activity, the effects of family deprivation were much greater in the deprived area, perhaps because the more affluent area protected against the effects of family deprivation by providing social norms in the way Wilson suggested (Wilson, 1987; 1991). That interpretation is consistent with other research and theory about the effects of peer groups and social influences on adolescent sexual behaviour (Rodgers & Rowe, 1993). For life expectations, the effects of family deprivation (or rather, the benefits of family non-deprivation) were greater in the more affluent area, suggesting that higher life expectations require favourable family circumstances *and* a favourable social context. Both interactions show that family and area circumstances act in combination, with early sexual activity at its highest level in the presence of both area and family deprivation, and life expectations at their highest when both family and area circumstances were more favourable.

The sample raised two issues. First, the proportions of girls in deprived families were similar between areas, which means that girls in deprived families in the more deprived area were probably under-represented, because of absence from school at the time of the study, or non-participation, or both. That produced a balanced design, allowing tests of the interactions between area and family deprivation, but raised the question of whether the sample was representative in terms of risk factors for teenage pregnancy. In fact, the under-representation of girls in deprived families in the deprived area was probably a simple effect of deprivation, and there is no reason to suspect systematic differences between girls in deprived families who participated and those who did not. Absence from school has previously been associated with deprivation (Gleeson, 1994), and in the present study non-participation appeared to be associated with deprivation, for girls tended to be excluded from the study for different reasons

in the two areas. In the more deprived area, there were more girls who did not participate (i.e. did not return questionnaires), and in the more affluent area there were more girls who participated but returned questionnaires with missing data.

Second, the fact that there were more girls from ethnic minority groups in the more affluent area raises the question of whether culture could have affected the findings. One retrospective analysis of UK birth rate data found higher rates of teenage motherhood among Caribbean, Pakistani and Bangladeshi women compared with white women, but concluded that 'There are strong indications that teenage births occur in different circumstances, depending on the mother's ethnic group' (Berthoud, 2001, p. 16). Much less is known about how ethnicity and culture influence specific risk factors for teenage pregnancy. In the present study, all but two of the girls from ethnic minority groups were in the more affluent area, and in that area there were no significant differences in risk factor scores between girls of minority ethnic origin and those of 'white British' ethnicity (T values ranged from 0.14 to 1.21, with $p > 0.05$ in every case).

The measurement of risk factors involved heterogeneous items including attitudes, behaviours, knowledge, beliefs and intentions. The risk factor scores were intended as assessments of risk across domains identified by previous research that had used a range of different methods and were not intended as psychometric indices of homogenous constructs such as knowledge or attitudes. It is not surprising therefore that the internal consistency of risk factor scores was generally low, with Cronbach's Alpha coefficients ranging from 0.25 (early sexual activity) to 0.53 (life expectations). This is the first questionnaire measure to our knowledge of a broad range of proximal risk factors for teenage pregnancy, and there is scope for further research to refine the measurement of those factors. This could include developing separate and more homogeneous measures of the relevant attitudes, beliefs, knowledge and behaviours that map more directly on to established psychological constructs and permit conventional assessments of validity and reliability.

The findings highlight the importance of the psychological processes underlying the behaviours giving rise to teenage pregnancy and show that proximal risk factors for teenage pregnancy are not all influenced in the same way by the same aspects of deprivation. The implications for targeting interventions differ from one risk factor to another, so the behavioural objectives and the targeting strategy of an intervention should be considered together. This is important because the relative merits of area-wide and individual/family interventions are beginning to be considered by policy and programmes that aim to reduce the impact of deprivation on teenage pregnancy. Based on the present findings, reducing the impact of family deprivation on early sexual activity would be expected to have greatest impact in more deprived areas, so interventions to reduce early sexual activity could target individually deprived girls in deprived areas. Higher life expectations, however, appeared to depend on both favourable area and family circumstances, so area-wide interventions in deprived areas would be expected to have most impact among girls in non-deprived families, and interventions for deprived families would be expected to have most impact in more affluent areas. That does not mean there is no need to improve life expectations among individually deprived girls in

deprived areas, only that this would require area-wide as well as individually targeted interventions. The broader strategy for reducing teenage pregnancy, therefore, will need to address a number of specific risk factors and incorporate both area-wide and individual/family interventions.

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Appendix: questionnaire items used to derive risk factor scores

Have you had sex? No [] Yes []

What age do you think people should be before having sex?

11 [] 12 [] 13 [] 14 [] 15 [] 16 [] older than 16 []

Do you plan to go to university? No [] Yes []

Which of these are important to you before you have sex?

Wanting the experience [] Being old enough []
 Wanting to try sex [] Being in a long-term relationship []
 Being drunk [] Having contraception []
 Being high [] All your friends have had sex []
 Being in love [] Something else [] please say what

Which of these are important to you before you have a baby?

Having a boyfriend [] Having a house []
 Being in a long-term relationship [] Having money []
 Being in love [] Having a job/career []
 Being married [] Having support from friends and family []

Which of these have you heard of, and which would you use?

	Heard of	Would use
Condom	[]	[]
Female condom	[]	[]
Contraceptive pill	[]	[]
Morning after pill	[]	[]
Depot (injected) contraceptive	[]	[]
Other contraceptives	[]	[] please say what

People should always use contraception when having sex

Strongly agree [] Agree [] Neither [] Disagree [] Strongly disagree []

When would you have sex without contraception?

Never [] When sober [] In a long term relationship []
 Always [] When in love [] On a one night stand []
 When drunk [] When trust the boy [] Something else [] please say what.....

How do you feel about abortion?

Strongly agree [] Agree [] Neither [] Disagree [] Strongly disagree []

How aware are you of sexual health and advice services?

Very aware [] Aware [] Neither [] Unaware [] Very unaware []

How satisfied are you with the sexual health and advice services on offer to you?

Very satisfied [] Satisfied [] Neither [] Unsatisfied [] Very unsatisfied []

How available are sexual health and advice services to you?

Very available [] Available [] Neither [] Unavailable [] Very unavailable []

Have you attended any sexual health or advice services? No [] Yes []

Would you attend any sexual health or advice services? No [] Yes []

How sure are you that confidentiality about sexual health issues would be maintained by health professionals?

Very sure [] Sure [] Neither [] Unsure [] Very unsure []