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TEENAGE PREGNANCIES: CONSEQUENCES OF POVERTY, ETHNIC BACKGROUND, AND SOCIAL CONDITIONS

A longitudinal study of motherhood and induced abortion among 14 to 19 year old women born in 1981

RESEARCH DEPARTMENT OF CHILDREN AND FAMILIES

Teenage pregnancies: Consequences of poverty, ethnic background, and social conditions

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by

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Abstract

The study investigates the economic, ethnic and social background of teenagers before becoming teenage mothers or before having an induced abortion for the first time in order to study if results will be consistent with the hypotheses that poverty, social deprivation or ethnicity are causes of teen childbearing. A discrete-time proportional hazard model is applied to analyse the longitudinal observations of population-based registers covering 1981-2003 for girls born in 1981, and their parents. Results show a significant economic and social gradient for first-time teenage pregnancies. Teenagers who had experienced family separation or who were formerly in out-of-home care in particular had an increased risk of induced abortion or early childbearing. Thus teenage mothers were in every respect in a more disadvantaged position than pregnant teenagers who had an induced abortion. Although, induced abortions were at the same level for ethnic minorities as for ethnic Danes, this was not the case for teen motherhood, when controlling for social disadvantage and poverty.

JEL Classifications: C 23, C 25, J 13

Keywords: Early childbearing, risk factors, administrative registers, counter factual simulations

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1. Introduction

Throughout the last century two contrasting paradigms for understanding adolescent sexuality has dominated the research: The sexuality is inner driven (e.g. instinctual, hormones) or socially shaped and learned behaviour influenced by society's norms, values, and religion (Dyk et al. 1991).

It is within the latter paradigm we find indications why social deprivation and poverty in a society may be the most important causes of high rates of teen pregnancies found in some of the wealthiest countries such as UK, Canada, New Zealand, and the United States. We find the highest levels of births rates among teenagers and lowest rates of participation for 17 years olds in public and private education among the OECD countries with the greatest income inequality (Social Exclusion Unit 1999).

The present longitudinal study explore why some Danish teenagers got pregnant. What was their economic, social and psychosocial situation in the years prior to their pregnancy? Were women who had an induced abortion in a more disadvantaged position than women who became a teenage mother? What was the economic, ethnic and social background of those young women who had an induced abortion or became teenage mothers in the late 1990s?

2. Previous studies

Denmark and the other Scandinavian countries have the lowest rates of teenage births in Western Europe, but it is uncertain why rates had gone down, and how these trends can be sustained (Selman 1996; Wielandt et al. 1997; Donovan 1998; Knudsen et al. 2003). One explanation for the lower Danish figures may be unrestricted access to contraceptives (the Pill since the mid 60's), effective information, and abortion on demand since 1973 (Wielandt et al. 1997; Knudsen et al. 2003). Another explanation may be the huge expansion of education free of charge, and vocational training, especially women benefited from this development during the last twenty to thirty years.

Since 1973 abortion on demand has been legal and practised. About one out of four Danish women will have at least one induced abortion during her lifetime[1]. Particularly women in disadvantaged positions with regard to education, vocational training, employment and their own upbringing have an increased risk of induced abortion (Christiansen et al. 2003).

On one hand we therefore expect teenagers who choose abortion are in a more disadvantaged position than pregnant teenagers who chose to be a teenage mother. On the other hand research shows that the proportion ending in abortion is greater among teen pregnancies in more affluent areas, and results show that teenagers who chose abortion were likely to have been doing well in school before pregnancy (Smith 1993; Wellings et al. 1999). Research results thus seem inconclusive and contradictory.

Although, many unanswered questions give rise to speculations and moralizations, we still need to know how societal processes influence the teenagers' decisions. A moralization of the problem might hinder an understanding of teenage motherhood and therefore also obstruct effective help and support to pregnant teenagers.

The increasing research in this field during the last two or three decades can help us to reduce some of this misjudgement. It is reported that the vast majority of pregnancies are unintended

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[1] Induced abortion according to The National Hospital Register.

and that the teen mothers are in a disadvantaged position with regard to education, employment, income, housing, and health (somatic as well as mental) (McAnarney et al. 1983; Maskey 1991; Peterson et al. 1992; Kiernan 1997; Christoffersen 1998; Social Exclusion Unit 1999; Clarke 1999; Hobcraft et al. 2001; Olausson et al. 2001; Vikat et al. 2002).

Recent studies point at family disadvantages as one of the most important precursors of teen pregnancies (Social Exclusion Unit 1999; Raley 1999). About one third of Danish children in care have a mother who was originally a teenage mother (Hestbæk 1997; Egelund et al. 2004). Intergenerational transfer of teenage childbearing is found in earlier studies showing an increased risk of daughter who tend to repeat the maternal pattern of early childbearing (Card 1981; Murphy et al. 2002; Christoffersen in print). Another intergeneration transfer which may increase the risk is own low education caused by low education among parents (Deding and Hussain 2005).

Loss of self-esteem or being in care is predictors of early childbearing (Quinton et al. 1985; Christoffersen 1996). Low academic achievement and lack of educational goals are associated with early sexual experience both among black and whites (Hayes 1987; Williams et al. 1987; Kiernan 1997; Hobcraft et al. 2001). Reviewing research in the decade 1970-80, Chilman (1980) found that powerlessness, alienation, a sense of personal incompetence and hopelessness in respect to striving for high educational and occupational goals characterize the situation of teenage mothers. This is especially true when racism combines with poverty to reduce one's life chances.

In newer and earlier research findings the association between teenage motherhood and adversity later in life (e.g. poorer physical and mental health, lack of qualifications, experience adult poverty, odds ratio of welfare dependency) remains substantial (Chilman 1980; Miller 1987; Maskey 1991; Knudsen 1994; Olausson et al. 2001; Hobcraft et al. 2001; Kiernan 2002). Although many studies confirm correlations between deprivation and teen childbearing, the direction between cause and effect is neither clear nor unquestionable. Therefore, it is crucial to examine the years before the first pregnancy (the first induced abortion or the first child).

3. Data

The present study investigates the likely precursors of teenage fertility and attempt to illuminate why some pregnant teenagers had an induced abortion and why some teenagers became a teenage mother. The present study therefore has selected the generation of teenagers' born in 1981 who were approximately fourteen to nineteen years old in 1995 to 2000.

Analyses have been carried out using the total national birth cohorts including 26,824 women[2], and their parents[3]. Out of these women 2,635 were pregnant at least ones as a teenager. The number of teenage mothers was N_m=1,038 and the number of first time induced abortions was N_a=1,860 among teenagers born in 1981.

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[2] The selected population is all women born in 1981 who were registered in the Population Statistics on the first of January 1994. This definition will exclude emigrated women born in Denmark in 1981 and include women immigrated before 1994.

[3] The children's personal identity number is the key, which links the children to their parents whether they are living together, married, or not. Information from registers has been collected for each calendar year, and information about the child and the parents is combined to one record for each child.

The total birth cohort of women born in 1981 is followed until their 20th birthday. Risk factors about their childhood and upbringing, which are collected prospectively on the basis of linked registers, include the following risk factors: Social background, family background, intergenerational transfer, educational qualifications of parents, parental employment and poverty, ethnic background, and health of teenager.

By taking risk factors prior to the event into account, this method is better than traditional cross section surveys or analyses of aggregated data to judge consequences of risk factors. Earlier interview based studies have difficulties in obtaining an adequate sample of teenage respondents, largely because parental permission is obligatory (Chilman 1980). The register-based total birth cohort is not corrupted by this bias, while on the other hand some information may only be obtained in personal interviews and thus not included in any register.

4. Risk factors (the independent variables)

Parents' background
   Alcohol abuse: According to hospital admissions the following diagnoses were expected to be associated with long-term alcohol abuse: Alcoholic psychosis, alcoholism, oesophageal varices, cirrhosis of liver (alcoholic), chronic pancreatitis (alcoholic), delirium, accidental poisoning by alcohol. Mental and behaviour disorder due to use of alcohol.
   Drug abuse: Addiction or poisoning by drugs according to hospital admissions. Mental and behavioural disorder due to use of drugs (e.g. opioids, cannabinoids, cocaine). Dependence on morphine was not included if chronic pain-giving diseases were observed too, e.g. rheumatoid arthritis and allied conditions, displacement of intervertebral disc, vertebrogenic pain syndrome, or cancer.
   Mental health problems: Psychiatric disorder according to hospital admissions.
   Domestic violence: Battered adults according to hospitals admissions or parents convicted of a violent crime. Parent exposed to assault, inflicted harms with undetermined intent. Victims of violence, which led to hospitalisation and professional assessment of the injury being wilfully inflicted by other persons.
   Violence conviction: The Criminal Statistic Register includes persons with violence convictions. This category comprises a wide range of criminal behaviour of various degrees of seriousness: manslaughter, grievous bodily harm, violence, coercion and threats. This category does not include accidental manslaughter in combination with traffic accidents, or rape, which belongs to the category of sexual offences.
   Suicidal behaviour: Parents' suicide attempts according to the National Patient Register and the Danish Psychiatric Nationwide Case Register or suicide according to the Causes of Death Register. Included is also intentional self-harm according to hospital admissions.
   Professional qualifications: Father/mother has vocational training or further education according to Education Statistics or the Educational Classification Module which is population based.
   Unemployment: The number of days parent is unemployed (more than 21 weeks) during a calendar year according to registers of Income Compensation Benefits, Labour Market Research, and Unemployment Statistics.
   Disability pension: One or both parents receiving disability pension according to registers of Income Compensation Benefits.
   Poverty: See below.

Family background
   Separation: Family separation includes information on all children who had experienced divorce, separation and the death of a parent before they were 18-years-old. The Danish Cen-

tral Population Register (CPR) includes information that connects all children to their parents whether they are married or not.

In care (out-of-home care or at-home care): The child is in care at home placement according to the children's acts section or the child is not living together with the parents but in an institution or in a foster home according to the population based register of social assistance to children in care.

Battered child syndrome: Adolescents being victims of violence, abuse or neglect, which led to hospitalisation and professional assessment of the injury being wilfully inflicted by other persons.

Intergenerational transfer of teenage motherhood: The girls' mother was a teenager herself when she gave birth to the girl in focus.

Teenage girl's background

Ethnic group: The ethnic minority group is defined as immigrants, or people born in Denmark whose parents are not born in Denmark, or persons with foreign citizenship.

Psychiatric disorder: Admitted to a psychiatric ward according to the Danish Psychiatric Nationwide Case Register.

Attempted suicide: Self-inflicted harm according to hospital admissions. The definition of suicide attempts include behaviour conforming to the following three conditions: (i) suicide attempts that had led to hospitalisation, (ii) assessment of the trauma being an act of self-mutilation according to the international statistical classification of injuries when discharged from hospital, (iii) the trauma had to be included in a specified list of traumas traditionally connected with suicide attempts: cutting in wrist (carpus), firearm wounds, hanging, self-poisoning with drugs, pesticide, cleaning fluids, alcohol or carbon monoxide.

Poverty

The poverty status of an individual is decided by the level of consumption possibilities which are approximated by equivalent disposable income defined as disposable income corrected for household composition and size. There is no standard way of proceeding with analysis of an equivalent income measure. In this study the income concept is equivalent annual household income after transfers and taxes[4].

5. Methods

The discrete-time Cox modelling of longitudinal data has demonstrated its usefulness when studying demographic event histories (Allison 1982; Hoem et al. 1992; Breslow 1992; Arjas et al. 1992; Christiansen et al. 2003; Christoffersen et al. 2003).

The available event history data contains information on events that fell within a calendar year during 1995 until 2000. Individuals' event history is broken up into a set of discrete time units (a calendar year) in which an event either did or did not occur[5]. The data is analysed

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[4] The square root of the number of family members is the applied equivalence scale, thus the elasticity of the equivalence scale with respect to household size is ½. A number of international comparisons of poverty and inequality apply scales in this range, see e.g. Buhmann et al. (1988), Förster (1995), Atkinson et al. (1995), and Hussain (2002). The poverty line is 40 per cent of the current year's equivalent income median. This is calculated on the basis of a representative 3 per cent sample of the whole population. Individuals with income less than the poverty line are defined as poor. In EU publications the 60 per cent of median poverty line is utilised, so applying the 40 per cent line means that we here look at severe poverty.

[5] When the discrete time unit is a calendar year, it is difficult to use continuous-time methods, since more than one individual experience an event in the same time interval. We will therefore apply a discrete-time model, which treats each individual's history as a set of independent observations. Earlier findings show that the maximum likelihood estimator can be obtained by treating all the time units for all individuals as though they were independent, when studying *first*-time events (Allison 1982).

separately for three types of events. An event is for example a teenage pregnancy, an induced abortion or teenage childbearing. Each individual is observed until time *t*, at which point an event occurs or the observation is censored either because it was outside the age limits, because of death, or the individual is lost for observation for other reasons. Consequently, individuals were excluded from the case group and controls after the first event. Pooling the non-censored years of all individuals, the person-years made up the controls. The controls (years at risk) were constructed by the total birth cohort of 26,824 women. Separate analysis is carried out for each event. The number of person-years varies depending on the event in focus.[6]

We assume that time takes only positive integer values (*t*=1,2,3,…) and we examine n independent individuals (*i*=1,2,3,…,*n*) while the observed explanatory variables x_{it} may take on different values at different discrete times. Only lagged values of explanatory variables are included.

P_{it} is the conditional probability that an event occurs at time *t*, given that it has not already occurred. α_t is a set of constants for each calendar year. This logistic regression function specifies how the hazard rate depends on time and the explanatory variables can be written in logit form (Allison 1982):

$$\log \frac{P_{it}}{1 - P_{it}} = \alpha_t + \beta x_{it}$$

Treatment of all teenagers as a coherent group may seem problematic, because the age group 15 to 16 is expected to experience a much different position compared to 18 to 19 year old women. Therefore a dummy variable for each calendar year under observation is created to estimate the parameters (alpha). Each age group will have their own initial level (α_t). Since all individuals are born in 1981, this constant includes information on age and therefore estimation take age into account. Thus, a kind of age-standardisation is incorporated into the model. Maximum likelihood estimators for the regression models are then calculated on the basis of pooling all the time units over all individuals.[7]

The controls are constituted by the person-years under risk of an event (e.g. teenage pregnancy, abortion or childbearing) in the chosen ages from fourteen to nineteen years.

The over all exposure to risk factors among children and adolescents is presented in table 2 to 4 in the column labelled "% of controls" (i. e. % of uncensored person-years).

Counter factual simulations applying estimated parameters are carried out in order to quantify how many of the total number of teenage mothers (1,038) or teenage abortions (1,860) are caused by a given risk factor. We use a slightly modified version of the methodology applied in Hussain (2002, chapter 3). First a base simulation is run where each teenager *i* in the sample keeps her actual characteristics x_i, and then the probability of the event (teenage motherhood or abortion) taking place $P(Y=1)$ is simu-

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[6] The numbers at risk were N_p=153,944, N_a=155,451, and N_m=158,838 person-years, when analyzing teen pregnancies, abortions, and teenage motherhood, respectively.

[7] The log-likelihood function *L* of the data may thus be written as

$$\log L = \sum_{i=1}^{N} \sum_{j=1}^{t_i} y_{it} \log\{ \frac{P_{ij}}{1 - P_{ij}} \} + \sum_{i=1}^{N} \sum_{j=1}^{t_i} \log(1 - P_{ij})$$

while y_{it} is a dummy variable equal to 1 if a person experiences an event at time *t*, otherwise zero (Allison 1982).

lated. The characteristics can be divided into the risk factor of interest d_i and other characteristics x_i^*, thus $x_i = [\,d_i^*\ d_i\,]$. The probability is defined as

$$P(Y_i = 1) = P_i = \frac{e^{\alpha + \beta^* X_i^* + \beta_d d_i}}{1 + e^{\alpha + \beta^* X_i^* + \beta_d d_i}}$$

α is the estimated intercept term and β^* is a vector of estimated parameters representing effects of risk factors, except risk factor d_i, whose effect is represented by β_d. Then we run a counter factual simulation where the risk factor d_i is eliminated ($d_i = 0$). The probability of the event in the counter factual case is

$$P(Y_i^* = 1) = \frac{e^{\alpha + \beta^* X_i^*}}{1 + e^{\alpha + \beta^* X_i^*}}$$

The actual (n) and counter factual number (n^*) of events is thus

$$n = \sum_{i=1}^{N} P(Y_i = 1) \qquad\qquad n^* = \sum_{i=1}^{N} P(Y_i^* = 1)$$

where N ($= \{N_p, N_a, N_m\}$, see footnote 7) is the sample size. The reduction in the number of events if a risk factor is eliminated is then $n-n^*$.

6. Results

9.8 per cent of the women born in 1981 experienced teenage pregnancy, while 6.9 percent of the birth cohort had an induced abortion for the first time before the age of twenty, and 3.9 per cent of the women born in 1981 have had their first child while they were teenagers.

Firstly, a comparison between first time teenage mothers and first time induced abortions is conducted. Analysing all the mentioned risk factors independently shows that risk factors indicating social disadvantage during adolescence, e.g. parental substance abuse, mental illness, and domestic violence, were found about equally frequent among girls who later became teenage mothers, as among pregnant teenagers who chose induced abortion (table 1).

The health of pregnant teenagers who had an induced abortion was at the same level as teenagers giving birth to a child. On the other hand, the other background factors, e.g. family background, educational qualifications of parents, parental employment, poverty, and ethnic background differed significantly between the two groups. The teen mothers seem to be in a significantly more disadvantaged position compared to teenagers having an abortion.

Teenagers whose mother was a teen mother were more frequently among pregnant teenagers giving birth to a child than among pregnant teenagers having an induced abortion.

These differences and similarities between teenage motherhood and abortions give a clue about both homogeneous and heterogeneous structures between the two groups, and we may doubt if it is reasonable to analyse pregnancy among teenagers as if it is a homogenous group or instead if we should divide the analysis into two groups: teenage motherhood and teenage abortions.

Secondly, despite these doubts, we continue to analyse teenage pregnancies in order to see if the model fits the data. One by one the risk factors (except parental suicidal behaviour) show a highly significant association with first time teenage pregnancy. When all the risk factors are introduced to the stepwise regression model, some of them reveal lack of explanatory information in relation to the occurrence of teenage pregnancy[8]. Results from the final models

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[8] Risk factors (the regressors) are included forward, but each time a regressor is entered one or more regressors

are presented in table 2. Family background, parental employment, educational background and experiences of poverty elevated the risk of teenage pregnancies. Occurrence of psychiatric problems, attempted suicide, drug addiction or alcohol abuse likewise were precursors of later teen pregnancies, also when other risk factors were taken into account in the stepwise model. As expected, the risk factors seem to be interrelated and the odds-ratio (OR) is generally reduced when the other risk factors are introduced into the stepwise model. But unfortunately the Hosmer and Lemmeshow goodness-of-fit test does not support the final model's adequacy for these data (table 2).

Thirdly, we analyse teenage motherhood and teenage abortions separately and now the Hosmer and Lemmeshow goodness-of-fit test support the final model's adequacy for both sets of data (table 3 and 4).

Results show that each risk factor (except ethnic background) significantly elevates the risk of teenage abortion when the risk factors are analysed separately (table 3). But even when all the other risk factors were taken into account in the stepwise model, the ethnic factors turned out to significantly reduce the probability of induced abortion (table 3: ethnic majority OR=1.4). Compared with Danes we expect more induced abortions among the ethnic minorities when social and economic conditions, and family background etc. are taken into consideration.

Children who had experienced disadvantages during childhood have an elevated risk of teenage abortions, also when other disadvantages were taken into account in the stepwise multivariable analysis. Domestic violence or child-in-care significantly predicts teenage induced abortions. Likewise family separations, poverty and parental unemployment were precursors of teen abortions.

Girls who had been admitted to a hospital because of psychiatric disorder, drug addiction or admissions according to alcohol abuse, also indicate an elevated risk of teen abortions, but only relatively few in the birth cohort had been exposed to these risk factors, consequently, only a small reduction is seen in incidence if the population had not been exposed to these risk factors (table 3: counterfactual reduction). The educational qualifications of the mothers seem to be a preventive factor. Thus, there are fewer teenage abortions when their mothers had at least some professional qualifications. The most important counterfactual reductions are gained from being in an ethnic minority group, family separations, poverty and parental unemployment.

There seem to be a two-way association between motherhood and abortion (table 3 and 4). Teenagers who experienced induced abortion had a significantly elevated likelihood of being a teenage mother the following year (table 4, OR=2.8, counterfactual reduction CFR=-4.0 per cent). This is true to a higher extent for the opposite direction. Teenage mothers have an increased risk of an induced abortion the following year (table 3, OR=3.4, CFR=-1.7).[9]

Domestic violence is more often seen in the years before teenage childbearing than among their contemporaries. Furthermore family separation precedes adolescent teenage motherhood significantly more often compared to their contemporaries who postpone childbearing. 5.4 per cent of the total birth cohort of women born in 1981 had been in care at-home or out-of home

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could be removed if they hereafter did not add any significant effect to the model. The process is stopped if the latest entered regressor also is the latest removed regressor in the subsequent backward elimination.

[9] Also mothers in their 20s or 30s have an increased risk of being unwanted pregnant in the months after having given birth to at child (Christiansen et al. 2003).

for a shorter or longer time during adolescence. Even though only a small fraction of the population is at risk, this factor is associated with later teenage motherhood. The counterfactual reduction is estimated to -10.3 per cent (table 4). Together with family separations these factors counts for about 40 per cent of the total number of teenage mothers, although it must be kept in mind that the counter factual reductions are not simple additive factors.

Parental educational qualifications significantly reduce the probability of teenage motherhood. Parental unemployment and poverty are also significant precursors of teenage motherhood, and to a remarkably higher degree than was seen for teenage abortions.

Being a member of an ethnic minority group also seems to play another role when it comes to early motherhood, also when other risk factors were accounted for in the stepwise model (table 4).

In addition, a teenager who had been admitted to a hospital for psychiatric reasons or because of alcohol abuse had an elevated risk of subsequent teenage pregnancy.

7. Discussion and conclusion

If we assume that the mentioned risk factors, who show a significant association with an elevated risk of teenage pregnancy, also indicate a causal relationship, our results reveal that a reduction in the incidence of teenage motherhood should be expected if children were not exposed to each of following disadvantages: 1) parental unemployment and poverty, 2) lack of educational qualification of parents, 3) family background (separation, abuse and neglect) causing children being in care; 4) intergenerational transfer (mothers' own early motherhood). The results show that daughters of teenage mothers are more likely to become teenage parents themselves even when other risk factors were taken into consideration.

The model offers a method to estimate the reduction in incidence if the population of teenagers had not been exposed to the mentioned risk factors. The number of teenage mothers would have been reduced from 1,038 to 260 if the population had not been exposed at all, compared with the current exposure pattern. This is approximately a reduction of 3/4 (table 4). And the number of induced abortions could be reduced with 2/3 (from 1,860 to 620), according to the estimations in the final applied model (table 3).

In conclusion, the study shows a significant social gradient for teenage motherhood. Teenagers coming from high-risk groups had an increased risk of becoming a teenage mother. Teenage mothers were at a higher social risk and in a more social disadvantaged position than pregnant teenagers who chose abortion.

Evidence based research shows that school-based sex-education linked to easy access to contraceptive services does not increase sexual activity but reduces pregnancy rates (Franklin et al. 1997; NHS 1997; Kirby 1997, p. 48; Cheesbrough et al. 1999, p. 30). One of the most effective approaches to prevent unintended teenage pregnancy seem to be comprehensive advisory and family planning service combined with measures to tackle the adverse socio-economic factors which are associated with teenage pregnancy (Peckham 1993).

Results indicate that teen pregnancy could be seen as a symptom of social disadvantage and consequently targeting social deprivation will give the full advance of the major improvements in sex education and contraceptive provision.

The results from the present study indicate a social gradient for teenage pregnancies. Teenagers who had been suffering from abuse and neglect during childhood are at risk of starting a family at a very early stage in life. Compared with other young people, young mothers were more likely to have had a mother who had been a teenage parent herself. Likewise, their parents had low socio-economic status and more frequently experienced financial hardship. At the same time, young mothers are more likely to have experienced emotional difficulties while growing up and they are less likely to have performed well in school (Kiernan 1995; 1997).

These studies combined with the present study leave us with a hypothesis for further investigation: can we reduce early motherhood by motivating disadvantaged teenage girls to pursue education and training (e.g. Selman et al 2001; Hosie 2003).

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Table 1. Risk factors the previous years before having an induced abortion or being a teenage mother. Only first time events.
Women born in 1981, followed from 1981 to 2003. Denmark. Aged 14 to 19 year old.

Risk factors included	Level of signifi-cance	first time teenage abortions n=1,860		first time teenage mothers n=1,038	
		% among cases	No	% among cases	No
Social background:					
Parental substance abuse	Ns	10.8	200	11.7	121
Parental mental illness	Ns	19.3	359	21.4	222
Domestic violence	*	10.5	195	13.4	139
Parental suicidal behaviour	Ns	0.4	8	0.3	3
Battered child syndrome	Ns	2.6	48	2.9	30
Family background:					
Child in care (out-of-home or at-home)	***	17.3	321	25.2	261
Family separation	***	64.4	1197	71.1	738
Intergenerational transfer:					
Mother teenager	***	8.7	161	13.6	141
Educational qualifications of parents:					
Mother has professional qualification	***	18.7	348	6.7	70
Father has professional qualification	***	14.6	272	5.3	55
Parental employment and poverty:					
Parental unemployment > 21 weeks	***	72.5	1349	85.5	887
Poverty (<40% of median income)	***	38.7	720	55.3	574
Parental disability pension	***	18.0	335	27.8	289
Ethic background:					
Ethic majority	***	93.7	1743	86.8	901
Health of teenager:					
Pregnancy previous year	***	2.5	46	6.6	68
Psychiatric disorder	*	6.1	114	8.3	86
Attempted suicide	Ns	0.6	11	1.1	11
Drug addicted	Ns	0.7	13	1.1	11
Alcohol abuse	*	4.2	78	6.2	64

Note: Fishers' exact Test was applied. 'Ns' stands for: 'Not significant'. * 0.05-level; ** 0.01-level; *** 0.0001-level.

Table 2. Risk factors previous years before first time pregnancy among teenagers. Unadjusted Odds Ratio for each factor separately and the final logistic regression model.
Women born in 1981, followed from 1981 to 2003. Denmark. Age group 14 to 19 years old.

Risk factors included	Type	% among controls: years at risk N=153,944	% among cases	No of teenage-pregnan-cies n=2,635	Un-adjusted single factor OR	Stepwise final model OR
Social background:						
Parental substance abuse	III	6.1	10.7	282	1.8***	Ns
Parental mental illness	III	11.5	19.5	515	1.9***	Ns
Domestic violence	III	4.7	11.1	293	2.5***	1.3***
Parental suicidal behaviour	II	0.1	0.3	8	2.1 *	Ns
Battered child syndrome	II	0.9	2.4	62	2.7***	Ns
Family background:						
Child in care (out-of-home or at-home)	II	5.0	18.6	491	4.3***	1.8***
Family separation	II	38.8	64.9	1710	2.9***	1.8***
Intergenerational transfer:						
Mother teenager	II	3.6	10.0	264	3.0***	1.7***
Educational qualifications of parents:						
Mother has professional qualification	II	25.4	15.1	397	0.5***	0.7***
Father has professional qualification	II	21.3	11.8	312	0.5***	0.7***
Parental employment and poverty:						
Parental unemployment > 21 weeks	II	55.0	75.9	2000	2.6***	1.5***
Poverty (<40% of median income)	II	20.5	42.9	1130	2.9***	1.5***
Parental disability pension	II	10.8	20.5	540	2.1***	1.1 *
Ethnic background:						
Ethnic majority	I	93.8	91.1	2401	0.7***	Ns
Health of teenager:						
Psychiatric disorder	II	2.1	6.5	171	3.3***	1.4***
Attempted suicide	II	0.1	0.7	19	8.8***	1.9 *
Drug addicted	II	0.1	0.7	19	8.4***	2.0 **
Alcohol abuse	II	1.3	4.6	121	3.8***	2.0***

Note: pregnancies cover induced abortions and given birth to a child, but not spontaneous abortions. 'Ns' stands for: 'Not significant'. * 0.05-level; ** 0.01-level; *** 0.0001-level. Type I: exposed to risk factor the previous year. Type II: exposed to risk factor at least one of the previous years. Type III: risk factor observed for at least one of the years under investigation.

Hosmer and Lemmeshow goodness-of-fit test (chi-square: 22.4 DF: 8; Pr>ChiSq.: 0.004). This result does not support the final model's adequacy for these data.

Table 3. Risk factors previous years before first time induced abortion among teenagers. Unadjusted Odds Ratio for each factor separately and the final stepwise logistic regression model. *Women born in 1981, followed from 1981 to 2003. Denmark. Age group 14 to 19 years old.*

Risk factors included	Type	% among controls: years at risk N=155,451	% among cases	No of teenagers with an induced abortion n=1,860	Un-adjusted single factor OR	Step-wise Final model OR	% Counter factual reduction
Social background:							
Parental substance abuse	III	6.2	10.8	200	1.8***	Ns	
Parental mental illness	III	11.6	19.3	359	1.8***	Ns	
Domestic violence	III	4.8	10.5	195	2.3***	1.3 **	-2.3
Parental suicidal behaviour	II	0.1	0.4	8	3.0 **	Ns	
Battered child syndrome	II	0.9	2.6	48	2.9***	1.4 *	-0.7
Family background:							
Child in care (out-of-home or at-home)	II	5.2	17.3	321	3.8***	1.7***	-6.8
Family separation	II	39.1	64.4	1197	2.8***	2.0***	-31.1
Intergenerational transfer:							
Mother teenager	II	3.7	8.7	161	2.4***	1.4***	-2.9
Educational qualifications of parents:							
Mother has professional qualification	II	25.3	18.7	348	0.7***	0.8 **	3.4
Father has professional qualification	II	21.1	14.6	272	0.6***	Ns	
Parental employment and poverty:							
Parental unemployment > 21 weeks	II	55.3	72.5	1349	2.1***	1.4***	-19.4
Poverty (<40% of median income)	II	20.9	38.7	720	2.4***	1.3***	-9.1
Parental disability pension	II	11.0	18.0	335	1.8***	Ns	
Ethnic background:							
Ethnic majority	I	93.7	93.7	1743	Ns	1.4 **	-26.6
Health of teenager:							
Previous year given birth to a child	I	0.3	2.5	46	8.8***	3.4***	-1.7
Psychiatric disorder	II	2.1	6.1	114	3.0***	1.5 **	-1.8
Attempted suicide	II	0.1	0.6	11	6.4***	Ns	
Drug addicted	II	0.1	0.7	13	7.4***	2.1 *	-0.3
Alcohol abuse	II	1.3	4.2	78	3.3***	1.9***	-1.9

Note: 'Ns' stands for: 'Not significant'. * 0.05-level; ** 0.01-level; *** 0.0001-level.

Type I: exposed to risk factor the previous year. Type II: exposed to risk factor at least one of the previous years.

Type III: risk factor observed for at least one of the years under investigation.

Counter factual reduction is seen as the reduction in incidence that would be achieved if the population had not been exposed by the current risk factor, compared with the current/actual exposure pattern. The total reduction is 66.7 per cent or 1,240 fewer abortions if all the included risk factors were eliminated, and the advantageous factor "educated mother" is unchanged.

Hosmer and Lemmeshow goodness-of-fit test (chi-square: 5.0; DF: 8; Pr>ChiSq.: 0.8). This result supports the final model's adequacy for these data.

Table 4. Risk factors the previous years before being a teenage mother. Unadjusted Odds Ratio for each factor separately and the final stepwise logistic regression model. Only first time events.
Women born in 1981, followed from 1981 to 2003. Denmark. Aged 14 to 19 year old.

Risk factors included	Type	% among controls: years at risk N=158,838	% among cases	No of teenage mothers n=1.038	Un-adjusted single factor OR	Step-wise Final model OR	% Counter factual reduction
Social background:							
Parental substance abuse	III	6.2	11.7	121	2.0***	Ns	
Parental mental illness	III	11.8	21.4	222	2.0***	Ns	
Domestic violence	III	4.9	13.4	139	3.0***	1.2 *	-2.4
Parental suicidal behaviour	II	0.2	0.3	3	Ns	Ns	
Battered child syndrome	II	0.9	2.9	30	3.1***	Ns	
Family background:							
Child in care (out-of-home or at-home)	II	5.4	25.2	261	5.8***	1.7***	-10.3
Family separation	II	39.6	71.1	738	3.8***	1.7***	-29.5
Intergenerational transfer:							
Mother teenager	II	3.8	13.6	141	4.0***	1.8***	-5.9
Educational qualifications of parents:							
Mother has professional qualification	II	25.3	6.7	70	0.2***	0.4***	10.6
Father has professional qualification	II	21.1	5.3	55	0.2***	0.4***	6.8
Parental employment and poverty:							
Parental unemployment > 21 weeks	II	55.5	85.5	887	4.7***	2.1***	-44.4
Poverty (<40% of median income)	II	21.1	55.3	574	4.6***	1.7***	-22.0
Parental disability pension	II	11.0	27.8	289	3.1***	1.4***	-7.1
Ethic background:							
Ethnic majority	I	93.8	86.8	901	0.4***	0.7***	38.6
Health of teenager:							
Induced abortion previous year	I	0.9	6.6	68	7.7***	2.8***	-4.0
Psychiatric disorder	II	2.2	8.3	86	4.0***	1.3 *	-1.9
Attempted suicide	II	0.1	1.1	11	10.6***	Ns	
Drug addicted	II	0.1	1.1	11	10.3***	Ns	
Alcohol abuse	II	1.4	6.2	64	4.7***	2.0***	-2.9

Note: 'Ns' stands for: 'Not significant'. * 0.05-level; ** 0.01-level; *** 0.0001-level.
Type I: exposed to risk factor the previous year. Type II: exposed to risk factor at least one of the previous years.
Type III: risk factor observed for at least one of the years under investigation.
Counter factual reduction is seen as the reduction in incidence that would be achieved if the population had not been exposed by the current/actual risk factor, compared with the current exposure pattern. The total reduction is 74.9 per cent or 778 fewer teenage mothers if all the included risk factors were eliminated, and the advantageous factors "Mother has professional education", "Father has professional education" and "Ethnic majority" are unchanged.
Hosmer and Lemmeshow goodness-of-fit test (chi-square: 14.8; DF: 8; Pr>ChiSq.: 0.06). This result supports the final model's adequacy for these data.