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TEENAGE PREGNANCY AND MOTHERHOOD: HOW MIGHT EVOLUTIONARY THEORY INFORM POLICY?

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Abstract. Teenage pregnancy and motherhood are considered to be pressing social concerns and, in the majority of developed countries, are often viewed as problems in need of solutions. While a number of factors are associated with teenage motherhood, the underlying causes remain elusive. Despite a lack of consensus, policy aimed at 'solving' teenage motherhood is typically based on these proposed proximate correlates; addressing these, rather than the cause. Recent appraisals of this approach suggest that it may not be working effectively, if at all, and policy makers might be in need of some novel approaches. This paper discusses how policy decisions concerning reproductive timing may benefit from the perspective provided by evolutionary life-history theory, and why policy ought to take into account the hypothesis that teenage motherhood is the outcome of an adaptive response of an evolved reproductive strategy to conditions of risk and uncertainty; that having children at an earlier age may promote lineage survival when personal future is uncertain.

Keywords: teenage pregnancy, reproduction, life-history theory, evolutionary biology

INTRODUCTION

Teenage pregnancy and motherhood are considered to be pressing social concerns and, in the majority of developed countries, are often viewed as problems in need of solutions (FERGUSSON and WOODWARD 2000; MCVEIGH 2002; MILLER 2000; MOORE 2008; SCALLY 1999; SHAW, LAWLOR and NAJMAN 2006). Although a plethora of studies across different disciplines have identified a number of social correlates of teenage motherhood, the underlying causes remain elusive. Usually there is a focus on such correlates, but explanations as to why particular antecedent conditions should lead to early age at first birth are not forthcoming. An evolutionary life-history approach, however, might provide a useful way of answering this 'why' question. This paper will present this approach, focusing upon teenage motherhood in the UK and to some extent the USA; countries with the highest rates of teenage pregnancy in the developed world. In so doing we hope to present a case

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study for the possible application of evolutionary behavioural science to social policy. The paper is not directed at policy makers, but at scientists with an interest in practical application.

Policy in this area is predominantly locally enacted, with national governments establishing objectives for their regions. To this end our discussion will focus upon within nation-level population variation in teenage pregnancy rates rather than between nation variation. However, it should be noted that between nation variation exists. Indeed, WILKINSON and PICKETT (2009) have established that big disparities in income between the wealthy and the poor, such as in the UK and USA, are associated with higher teenage pregnancy rates. Countries, such as Japan, where income is more equitably distributed, have a far lower occurrence. Discussion of this issue is beyond the scope of this paper.

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When the Labour government came into power in the UK in 1997 one of their stated aims was to halve the teenage pregnancy rate by 2010. In order to do this they implemented the Teenage Pregnancy Strategy that was to be overseen by the Teenage Pregnancy Unit (see below). In February 2010 the Office for National Statistics and the Teenage Pregnancy Unit published the latest figures on teenage conceptions for England (Teenage Pregnancy Unit 2010), just two months before Labour lost the general election to a Conservative-Liberal Democrat coalition. The data show that since 1998 there has been a general decline in the rate of teenage pregnancy, categorized by the UK government alternatively as conceptions to females either under the age of 18 or 16. None the less, the rate has remained above 40 per thousand in the under 18-year-old category and above 7 per thousand in the under 16-year-old category, and there have been mild fluctuations in rates (see *Table 1*). The clear policy aim has failed (although see HARDEN et al. 2009, for a nuanced review of the relative successes and failures of specific policy initiatives).

Rates per thousand are presented to take account of population dynamics. However, if we look at the actual number of under-18 conceptions in 1998 compared with 2008, the difference is between 41,089 and 38,750. Taking into account terminations by legal abortion (see *Table 1*) approximately 23,362 women aged 15-17 became mothers in 1998 compared to 19,492 women in 2008; a reduction of only 3870. Across the 10 years from 1998 to 2008 approximately 42% of under-16 conceptions and approximately 46% of under-18 conceptions become births. Overall, in England and Wales, there were 635,901 live births in 1998 and 708,711 live births in 2008, an increase of 72,810. These changes may or may not be negligible in terms of the distribution of government resources but the fluctuations in rate and actual conceptions suggest that teenage fertility rates are reactive. Neither the raw data nor the rates help us to understand what is causing these population dynamics. After a decade of government initiatives marshalling interventions we think it is time to rethink the scientific framework and theoretical bases of current policy.

Table 1. Actual conception, percentage abortion and conception rates for the under 16 years of age and under 18 years of age categories in England, 1998 until 2008. Data from the Office for National Statistics, released February 2010

Year	Under 16 conceptions*	Under 16 percentage legal abortion	Under 16 conceptions per 1000 females	Under 18 conceptions**	Under 18 percentage legal abortion	Under 18 conceptions per thousand females
1998	7,855	52.9	8.8	41,089	42.4	46.6
1999	7,408	53.0	8.2	39,247	43.5	44.8
2000	7,620	54.5	8.3	38,699	44.8	43.6
2001	7,407	56.0	8.0	38,461	46.1	42.5
2002	7,395	55.7	7.9	39,350	45.8	42.7
2003	7,558	57.6	7.9	39,553	46.1	42.2
2004	7,181	57.6	7.5	39,593	46.0	41.6
2005	7,473	57.5	7.8	39,804	46.8	41.3
2006	7,330	60.2	7.7	39,170	48.8	40.6
2007	7,718	62.0	8.3	40,366	50.6	41.7
2008	7,123	61.8	7.8	38,750	49.7	40.4

* Under 16 years = 13–15 years of age
** Under 18 years = 15–17 years of age
Note: Available at: http://www.dcsf.gov.uk/everychildmatters/resources-and-practice/IG00200/

Evolutionary life-history theory (STEARNS 1992) provides novel insight into why particular environments or social situations increase the likelihood of teenage motherhood by exploring how reproductive timing relates to risk and uncertainty. Different individuals living in different environments will vary greatly in the constraints that affect their reproduction, with an individual's reproductive decision-making being greatly influenced by their life circumstances (VOLAND 1998). Results of empirical and theoretical research within this framework have suggested both implicitly and explicitly that having a child as a teenager may be the outcome of an evolved, conditional, reproductive strategy that is sensitive to perceived levels of mortality, uncertainty and risk; when these are high an earlier age of reproduction will be adaptive (BARBER 2001; CHISHOLM 1999; CHISHOLM and BURBANK 2001; JOHNS 2003; LANCASTER 1994; LOW et al. 2008; ROWE, VAZSONYI and FIGUEREDO 1997; WAYNFORTH, HURTADO and HILL 1998; WILSON and DALY 1997). Taking an evolutionary life-history perspective when developing teenage pregnancy policy would, therefore, be a novel, yet theoretically and empirically sound decision. An approach to this issue grounded in life-history theory may be able to provide definite solutions, instead of yet more proximate correlations and conjecture.

POLICY APPROACHES

Current policy approaches towards the issue of teenage pregnancy and motherhood vary, but often specific units or interest groups are established to interpret or report upon national fertility statistics, and to provide research-driven briefing reports that place teenage parenthood into context and outline potential solutions and policy directions. In the United States, for example, which has the highest teenage birth rate in the developed world (UNICEF 2001), the US public health agency, the Centers for Disease Control and Prevention (CDC), funds both national and state organisations that use "science-based" approaches to prevent teenage pregnancy. One such national organisation is The National Campaign to Prevent Teen and Unplanned Pregnancies, whose mission is 'to improve the lives and future prospects of children and families and, in particular, to help ensure that children are born into stable, two-parent families who are committed to and ready for the demanding task of raising the next generation' (The National Campaign to Prevent Teen and Unplanned Pregnancy 2008). Although this organisation is both private and non-profit, it has benefited from CDC funding and incorporates a bi-partisan congressional advisory panel with members from both the US Senate and House of Representatives. It describes itself as being seen as the United States' top resource on teenage pregnancy prevention. It 'regularly advises national and state policymakers and their staff' and states that it has achieved its goal of reducing teenage pregnancies by a third between 1996 and 2006. This organisation recognises, however, that the teenage pregnancy rate continues to be high, and is aiming to reduce it by a further third by 2015. To achieve its targets a variety of approaches are used including a focus on increasing access to contraception and strengthening a culture of personal responsibility towards sex and pregnancy (The National Campaign to Prevent Teen and Unplanned Pregnancy 2008).

In the United Kingdom the Social Exclusion Unit (SEU), which reports directly to the Prime Minister, compiled a report and developed associated policy for tackling teenage pregnancy and motherhood (SEU 1999). This document was one of a number of reports researched and authored by the unit, which was established by the newly elected British Labour government in December 1997, with its main objective to help the government deal more effectively with all forms of social exclusion. The report was partly commissioned in response to the finding that the overall teenage pregnancy rate for the United Kingdom, was, as it is now, the highest in Western Europe (BRADLEY-STEVENSON and MUMFORD 2007; WELLINGS et al. 1999; WESTALL 1997). The conclusions of this report, in addition to work undertaken by the government funded Teenage Pregnancy Unit, have been central to the development and implementation of the UK's teenage pregnancy strategy; the goal of which is to halve the rate of conceptions to girls under the age of 18 by 2010 and to encourage more teenage parents into education, training, and employment to reduce their social exclusion (Social Exclusion Unit 1999). The Teenage Pregnancy Unit has approached these goals by prioritising the development of initiatives at a

local level (for example, many British counties have their own appointed teenage pregnancy co-ordinators), and developing strategy for improving health advice and sex education.

CORRELATES OF TEENAGE MOTHERHOOD

The way a society responds to unmarried teenage mothers may be a barometer of its social tolerance (WHITEHEAD 2001). In the United States, the government and the media were denouncing teenage pregnancy as one of the top domestic problems faced by the 1978 Carter presidential administration, even though the overall US adolescent pregnancy rate had been higher in 1957 than at any time during the 1970s (VINOVSKIS 1988). This perspective was also shared by the Clinton administration in 1995 (HOFFMAN 1998), and the (1997–2010) UK Labour government. In contrast, in the earlier half of the twentieth century teenage childbearing, provided it was legitimate, was not viewed as a social concern. Vinovskis (1992) suggests that teenage pregnancy and motherhood was not seen as a major social problem in, for example, the 1950s because most pregnant women married their baby's father before the birth. Furthermore, abortions were difficult to obtain, and career and education were regarded as less important goals for women to pursue (VINOVSKIS 1992). Today teenage parenthood is most definitely perceived as a significant social and public health problem (SCALLY 1999; UNGER, MOLINA and TERAN 2000), even though this label may not be entirely justified (LAWLOR, SHAW and JOHNS 2001).

Several studies have attempted to assess the risk factors that can lead to teenage pregnancy and birth. A review of the teenage fertility literature indicates that teenage motherhood correlates strongly with inequality, and unstable and deprived family environments and areas of residence. Some of the major hazards are growing up in care (HOBCRAFT 1998) and being adopted (WELLINGS et al. 1999), parental divorce (KIERNAN and HOBCRAFT 1997), physical and sexual abuse (ADAMS and EAST 1999; BOYER and FINE 1992; FERGUSSON, HORWOOD and LYNSKEY 1997; HERRENKOHL et al. 1998; KENNEY, REINHOLTZ and ANGELINI 1997; KIRAGU and ZABIN 1993; MICHAEL et al. 1994), having an absent father (MOFFITT et al. 1992; STEINBERG 1988; SURBEY 1990), living with a step-parent (VIKAT et al. 2002), undergoing puberty at a young age (ANDERSSON-ELLSTRÖM, FORSSMAN and MILSOM 1996; BUGA, AMOKO and NCAYIYANA 1996; HELM and LIDEGAARD 1990), having low socioeconomic status (BOTTING, ROSATO and WOOD 1998; HOGAN, SUN and CORNWELL 2000; VIKAT et al. 2002), educational underachievement (COLEY and CHASE-LANSDALE 1998; FERGUSSON and WOODWARD), and living in a deprived family (SMITH and ELANDER 2006).

CONSEQUENCES OF BECOMING A TEENAGE MOTHER

Much of the adolescent pregnancy research conducted since the 1970s has focused on the consequences of teenage childbearing (FURSTENBERG 1976; HUDSON and INEICHEN 1991; KLEPINGER, LUNDBERG and PLOTNICK 1995; MENKEN 1972; MILLER 2000). There is a propensity for reports, especially those in the mass media, to assume that if teenage motherhood and social problems are associated, that childbearing must cause the social problems of teenage mothers (GERONIMUS 1991). For example, Campbell postulated in 1968 that 90 percent of a girl's life script was written for her if she had an illegitimate child at the age of 16 (CAMPBELL 1968).

Such notions persist, even though it has been shown that teenage mothers are generally women who would have been at risk of not completing their education, of being poor and receiving governmental financial support, and of undergoing difficult births and pregnancies even if they had not become pregnant at a young age (BOTTING et al. 1998; GERONIMUS 1991 1992; MALES 1993). Teenage mothers are more likely to reside in inner city neighbourhoods or isolated rural communities (HAYES 1987), and to have grown up in families with low socio-economic status (ABRAHAMSE, MORRISON and WAITE 1988; BOTTING et al. 1998; HUDSON and INEICHEN 1991). Such research suggests that poverty does indeed precede pregnancy and that deprivation, risk, and poverty are often fundamental parts of a teenage mother's life for years before she becomes pregnant.

Poor maternal and child health outcomes have also been much cited consequences of teenage pregnancy. A considerable literature has developed which documents adverse pregnancy outcomes for young mothers (FRASER, BROCKERT and WARD 1995; HEDIGER et al. 1997; HERMAN and YU 1997; HUDSON and INEICHEN 1991; JOLLY et al. 2000; KOTAGAL 1993; L'HOIR et al. 1998; RUSSELL 1982; SEU 1999). However, some researchers suggest that claims of poor health outcomes for both mother and child may have been exaggerated due to the lack of adequate controls for socio-economic status (PARANJOTHY et al. 2009; TRUSSELL 1988) and maternal smoking (SMITH and PELL 2001). Teenagers are also often integrated into a family support structure that assumes 'caretaking' responsibilities (RHODE and LAWSON 1993) which may alleviate some of the difficulties that a new mother of any age faces.

When socio-economic factors are accounted for it has been suggested that women under the age of 18 may actually require less obstetric intervention. They have fewer caesarean births and operative vaginal deliveries, have a reduced incidence of gestational diabetes, and are no more likely to have stillborn or small-for-gestational-age infants when compared to women aged between 18 and 34 years. Teenage mothers have also been found to have a decreased risk of intrauterine growth retardation (once they are over the age of 16), and are at lower risk for pre-eclampsia and eclampsia (JOLLY et al. 2000; MACKAY, BERG and ATRASH 2001; SMITH and PELL 2001; VAN EYK et al. 2000). It has even been suggested that older

teenagers (16 to 19) may have better obstetric outcomes than older women, and are physically more suited to having a baby (AMINI et al.1996). It must be recognised, however, that a trade-off will always exist between reproduction and growth; if a woman becomes pregnant while she is still growing this could result in competition with her foetus for nutrients and result in lower infant birth weight (SCHOLL et al. 1994). Although the health consequences of teenage motherhood in the developed world may not be as dire as some research suggests, it is still not ideal from a public health perspective for a still growing, socioeconomically disadvantaged woman to become pregnant.

In some groundbreaking work, it has been established that in extremely deprived, inner-city communities (where teenage childbearing is a normative life event) the chance of a child's parents and grandparents surviving, able bodied, until the child is 20 years of age is greatly reduced (GERONIMUS, BOUND and WAIDMANN 1999). Additionally, male life expectancy has been found to be negatively correlated with the teenage birth rate in deprived communities (WILSON and DALY 1997). Together these findings indicate that there are clear benefits for an earlier age of reproduction in environments where individuals would be limited in their future reproductive success or parenting success by early occurring death or disability. There may also be other advantages of adolescent motherhood in such communities. Having a child at a young age may represent the only tangible sense of future a teenager can envision in a perceived dangerous and risky environment (BENOIT 1997; GERONIMUS 1996). In some populations, especially those who are socioeconomically disadvantaged and at risk of developing poorer than average health with increasing age, there may be definite advantages in having children at an earlier and healthier age. In fact, becoming a teenage mother under particular circumstances might be a sensible, adaptive reproductive decision; the lower a female's life expectancy at birth, the earlier her reproductive life should begin (LOW et al. 2008).

WHAT CAN AN EVOLUTIONARY APPROACH TELL US?

Evolutionary biologists have long known that organisms adjust their fertility decisions according to local ecological conditions (STEARNS 1992), and that any animal must attempt to 'adaptively modulate its behaviour by systematically responding to specific environmental cues that signal critical contingencies of reproduction and survival' (ROWE et al. 1997: 106). It has been suggested that within-species variations in development and life-history event timings, including age at first birth, are closely allied to the mortality risk in a particular environment (PROMISLOW and HARVEY 1990). When conditions are stable, females can afford to wait to reproduce and can afford to invest heavily in few offspring; there is a limited chance of them dying before they have the opportunity to reproduce, and offspring survival is high. In other words, a bet is taken on the future. In unstable, hazardous environments (or environments perceived as such), however, it is adaptive to reproduce at an earlier

age and to minimally invest in any progeny born (BERECZKEI and CSANAKY 2001; CHISHOLM 1993; PROMISLOW and HARVEY 1990; VOLAND 1998).

For humans, socio-economic status, the wider community-surroundings, and family environment all provide an excellent index of local ecology; they all indicate stability, risk, and availability of the resources that individuals have available to maintain themselves and any offspring. The different fertility decisions of teenagers from varying social, familial, or socio-economic settings could, therefore, be regarded as the outcome of a conditional fertility strategy – one best modelled as a current versus future reproductive trade-off (JOHNS 2011).

As the work of behavioural ecologists, from LACK (1947) onwards has shown, most organisms have flexible life history strategies that allow them to respond to fluctuating environmental conditions (e.g. food availability, mortality risks) (KAPLAN and LANCASTER 2003); that is they are able to discount the future to a greater or lesser extent, and model the future on the present conditions. It appears that humans, like other animals, also have such life-history plasticity and can behave in fitness maximising ways (GIBSON and MACE 2005; HAWKES, O'CONNELL and BLURTON JONES 1997; HURTADO and HILL 1990; LAHDENPERA et al. 2004; SMITH, BORGERHOFF MULDER and HILL 2000). Such research suggests that we have flexibility in our life history event timings, have adapted to discount the future to a greater or lesser extent, and appear to model the future on the present conditions. The socio-environments of both the wider community and the more narrow confines of the home will influence how much uncertainty, instability, and environmental risk an individual will encounter, and life circumstances should directly impact any reproductive decisions made (VOLAND 1998). For example, it has been hypothesised that girls can (subconsciously) determine how stable their future reproductive opportunities might be by assessing their family environment, and should follow an appropriate reproductive strategy accordingly (BELSKY 1997; BELSKY, STEINBERG and DRAPER 1991; BERECZKEI and CSANAKY 2001; CHISHOLM 1993, 1999; CHISHOLM et al. 2005; DRAPER and HARPENDING 1982; ELLIS et al. 2003; NETTLE, COALL and DICKINS 2010; VIGIL and GEARY 2006; VOLAND 1998). Additionally, for women living in erratic neighbourhood circumstances, where uncertainty about future survival and resources availability will be high, it would also seem advantageous to procreate as early as possible once a particular level of somatic maturity has been reached. As predicted by life-history theory, this strategy would at least ensure the birth of one child under conditions of uncertainty and instability, as in such an environment it would not be wise to make long-term goals. Consequently, under such conditions, the value of the future would reduce in relation to the present. It is also worth noting that some of these conditions are likely to be the traditional risk factors recognised as being associated with teenage pregnancy, especially if they adversely influence the life or health of the teenage girl.

Recent research by LEE et al. (2004) supports these theoretical assumptions. They found that poorer teenage girls believe that their current situation is as "good

as it gets" while wealthier girls believe that a prolonged education and other social advantages will see to a secure family later in life. LEE et al. (2004) note that this is also reflected in the abortion data. Girls from lower socioeconomic backgrounds are far less likely to have an abortion if they become pregnant as a teenager compared with girls from higher socioeconomic backgrounds. The choice of a woman to continue with a pregnancy is therefore of interest as it reflects her definite fertility decisions; while conceptions can occur accidentally, giving birth does not.

PUTATIVE PROXIMATE MECHANISMS

Those with an interest in policy have focused upon the immediate causes and proximate mechanisms of early fertility. This is not a mistake, but without some framework to guide the individuation of proximate factors policy makers at best run the risk of delaying progress. Life history theory, as we hope to have demonstrated above, provides an ultimate, functional perspective with which to focus this task. In this section we wish to discuss possible proximate mechanisms in this light and to suggest some future avenues for research.

Reproductive decision making should operate at both the physiological and psychological level. Accordingly, it has been shown that age at first reproduction appears to be strongly governed by extrinsic adult mortality risk, and where risks are low, females will devote more time to growth and will mature at a later age (ALVAREZ 2000; KIRKWOOD and ROSE 1991). A high level or risk of mortality is theorised to favour stopping growth earlier, yielding smaller adult body sizes (HAWKES 1994), and as the chances of dying before reproduction increases, the optimal age at first birth decreases (HILL 1993; LOW et al. 2008). Fertility decisions will also, to some extent, be the outcome of psychological adaptations that assess the current situation and it has been proposed that a psychological mechanism exists in humans to help us make decisions about the relative value of the future while taking present and past situations into account and that this can be applied to reproductive decision making (CHISHOLM 1999; HILL, ROSS and LOW 1997). Investigating the psychological aspects of this choice is important. When complementary explanations exist at two or more levels, and in particular when proximate mechanisms can be shown to exist for a hypothesised functional explanation, insight into the phenomena being studied will be enhanced (BARRETT, DUNBAR and LYCETT 2002; TINBERGEN 1963).

One way of exploring a potential proximate psychological mechanism relating to reproductive decision making (in this case, pregnancy continuance) may involve the identification of particular personality traits or an examination of individual time preference; that is how individuals view the future. NETTLE (2007) suggests that personality types, as captured by the 'big-five' of extraversion, neuroticism, openness to experience, conscientiousness and agreeableness, might represent key components of heritable life-history strategies that are selected for tightly defined

ecologies. Specifically, he proposes a fluctuating selection model in order to account for the costs and benefits associated with exhibiting varying degrees of each trait, as well as the frequency of occurrence of particular profiles.

NETTLE (2007) puts forward a list of possible costs and benefits for each of the 'big five', with neuroticism being of particular interest to those working on early fertility from a life-history perspective. He argues that the benefits of this trait are those of vigilance to dangers as well as striving and competitive behaviours. The costs are captured by stress and depression. It is possible that higher sensitivity to the risks presented by a particular environment might lead to earlier-than-average fertility decisions. In other words, neuroticism might be a key component of the hypothesized psychological mechanism that related to future discounting in teenage mothers (CHISHOLM 1999) and it might also play a role in perpetuating negative elements of the environment for future generations. Certainly neuroticism has been found to be higher in women of any age who decide to continue with an unplanned pregnancy (BOUCHARD 2005). This, as well as other potential psychological future discounting mechanisms, such as time perspective (ZIMBARDO and BOYD 1999) and perceived life expectancy (GERONIMUS 1996; JOHNS 2003) still need to be explored in conjunction with early fertility in more detail, but may provide more information about why some teenagers abort, while others continue with the pregnancy.

An evolutionary approach to fertility decision making also leads to a number of additional research topics, which should be addressed to further understand life-history trade-offs between current and future reproduction. For example, an examination of the overall scheduling and maintenance of parental care. If teenage mothers are operating an early fertility life-history strategy for the reasons proposed in this paper then we should expect to see shorter than average inter-birth intervals, taking into account a number of key variables. These variables will include the availability of allocare in the teenage mother's environment. If there is good access to grandparental and sibling support, or a stable network of friends who can alleviate some burden then the possibility of managing closely spaced children is greater. This should be an optimal strategy given the advantages of early birth listed above. Allocare is critical in marginal environments (SEAR and MACE 2008) and in Western populations the presence of grandparents in single mother households appears to have an improving effect upon general developmental outcomes during adolescence (DELAIRE and KALIL 2002). Given this, we ought to see much use of allocare in high teenage fertility populations, especially as their access to financial and other resources will be relatively low in comparison to much of the population.

There are doubtless many more research directions to be derived from this life-history approach. Answering these questions will add detail to the 'story' so far but it should also alert policy makers to very different aspects of the situation from those usually considered. Humans, like many organisms, have the plasticity to calibrate themselves to many subtle variations in their environments. All such calibrations are to be understood as the outcome of proximate mechanisms that maximize

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fitness. Given that direct reproduction is perhaps the best method for such maximization it should not surprise policy makers that teenage fertility is a strategic response to ecological cues.

POLICY IMPLICATIONS

The Social Exclusion Unit (SEU 1999) believes that teenage pregnancy in Britain stems from ignorance, mixed messages, and low aspirations. In contrast, evolutionary life-history theory and associated empirical research has demonstrated that early childbearing may be adaptive in certain risky environments (e.g. JOHNS 2003; WILSON and DALY 1997) where the future is unpredictable and mortality risks are perceived to be high. The importance of incorporating evolutionary theory into policy decisions in best summarised by LOW et al. (2008: 15), who assert "if we can begin to understand how social phenomena affect core biological relationships, perhaps we can craft acceptable and more effective policies." Policies aimed at reducing teenage births or supporting teenage mothers should consequently focus on instability and mortality risk in the pre-conception environment, rather than blaming teenage motherhood on factors such as irresponsibility, sexual naivety, and lack of education. Ideally teenage pregnancy policy approaches would be aimed at providing deprived women and girls with the chance to live long, healthy, predictable lives (LOW et al. 2008).

To reduce the number of teenage mothers (if this is indeed the best course of action), a life-history approach suggests that policies need to focus on the reduction of inequality in some of the poorest areas, and on providing support for those living in unstable family situations. 'Band-aid' solutions of improved contraceptive services and sex education, although important for healthy sexuality, will not be enough to change the reproductive behaviours of those who see no future for themselves, not necessarily because they have a lack of aspiration, but because they actually perceive (often correctly) that their lives will be truncated and that the future they face is poor. For example, recent work examining the social determinants of health (CSDH 2008) indicates that health disparities are marked within the UK, and that individuals from the most deprived neighbourhoods have more than a 2.5 fold increase in mortality risk when compared to those from the least deprived areas.

The attempt to reduce teenage pregnancy rates through policy interventions is unlikely to be successful if young women continue to live in poverty or perceive their environments as being hazardous and their mortality risk as being high, have experiences in their family or neighbourhood that truncate their future expectations and, in consequence, make the reproductive decision to start having their children at a young age. Evolutionary life-history theory suggests that until antecedents of teenage parenthood, such as environmental risk and instability are accounted for in policy decisions many countries, including the United Kingdom, will continue to have a high rate of adolescent childbearing.

CONCLUSIONS

Teenage pregnancy and motherhood are viewed as pressing social concerns, and ideally all women would have children in circumstances where they could be happy, healthy, economically viable, and competent mothers. However, many women and girls today live in environments where their futures are uncertain and where they do not know what their situation will be from one day to the next due to family upheavals, deprivation, or neighbourhood dangers. Consequently, they draw conclusions about their assumed futures based, in part, on the negative occurrences in their lives. Having a child as a teenager should be viewed as an alternative, adaptive, evolved reproductive strategy to which some women subscribe when they are faced with conditions under which they have little chance of experiencing a long and fortunate life.

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