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Theoretical Contribution

TEENAGE PREGNANCY IN THE UNITED KINGDOM: A BEHAVIORAL ECOLOGICAL PERSPECTIVE

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Abstract
In this paper we describe teenage pregnancy and motherhood in the United Kingdom. This has been regarded as a key social policy issue for some time and is the focus of policy intervention under the current administration. We argue that policy has been based on simple models of teenage pregnancy that have failed to take into account the complex biological nature of reproductive behavior. Our claim is that the U.K. government would be well advised to take a life-history approach to this issue, and we outline what this means and what is currently known as a consequence of research in this area, concluding with lessons that should be drawn by those working in policy.

Keywords: Teenage pregnancy, teenage motherhood, life-history theory, developmental induction

Introduction

Governments work with populations and economies. To this end they are interested in epidemiological level data that show behavioral patterns at the population level. For example, particular patterns of health related behavior within particular sectors of society might well concern governments. Those from relatively low socioeconomic strata invest less in their long-term health and engage more in risky behaviors such as smoking and poor diet (Marmot, 2010). These people die sooner than others and from specific diseases. So overwhelming are the health inequalities in the United Kingdom that particular socioeconomic groups can be understood to be suffering from epidemics of particular diseases.

When governments turn their attention from capturing such problems at the population level to solving them, the policies they come up with are more often than not

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directed at behavior change. It is the case that some governments try to generate more wealth through macroeconomic interventions, and that some governments are more controlling than others when it comes to wealth distribution, but in the United Kingdom the predominant type of policy intervention is pedagogical, irrespective of party ideology around market economics. Awareness campaigns are often at the forefront of new policy initiatives. But it is also the case that funding is directed to research into key diseases, and into care for those who are suffering, and other activities. So the effort is to change behavior, whilst caring for those for whom it is too late.

There is much to say about the details of interventions, and the history in each area of policy, but this is not our focus. Instead a simple point emerges from this broad view of policy – the patterns that governments discern are assumed to be the consequence of individual behaviors, and those behaviors are to be understood as the outcome of decision and choice. So, the explanatory transition is from the population to the individual, and the policy action is more often than not directed at individual decision-making. As a consequence of various interesting developments in behavioral economics and cognitive psychology, the rationality of individuals is now much questioned and increasingly governments understand that information is processed partially and in particular ways (Thaler & Sunstein, 2008; indeed the U.K. government's Behavioral Insights Team, that advises on policy, is now referred to as "The Nudge Unit"). But even with these sophisticated notions in play, the fundamental activity of governments is to design policy to manipulate behavior to some end, and under this description, government is understood as an inherently psychological activity.

The psychological focus of government is a proximate one. Behaviors are to be changed, reasoning to be affected, through local level interventions. The population level data that alerts government to an issue is also fundamentally proximate in nature, dealing with a small-scale historical snapshot of group behavior. Policy makers are thus confronted with an epidemiological map of variation in behavior across many individuals, clustered into seemingly meaningful groupings, such as those defined by socioeconomic status. To change this, they assume that behavior is flexible in response to key information. Thus behavioral variation is predicated upon behavioral plasticity, albeit limited by cognitive heuristics and biases.

Evolutionary behavioral science can make two kinds of offer to policy makers. First, they can provide ultimate analyses of population level behavior, thereby bringing policy into contact with the framework of Mayr (1963; Scott-Phillips, Dickins & West, 2011) and providing a functional analysis of why such patterns exist and persist, and how they impact upon average lifetime inclusive fitness. Second, and following from this, they can use this ultimate analysis to finesse models of behavioral plasticity through the careful individuation of proximate psychological mechanisms that underpin the kinds of biases reported by behavioral economists. In this paper we will outline the first of these two offers by showing how life-history theory can be used to understand the issue of teenage pregnancy and teenage motherhood in the United Kingdom, a lesson which can be applied more broadly. From this outline we will then make some comments at the proximate level, which we hope will act as spurs to future research in both academic and policy circles. Intellectually our approach is one of synthesis (Sear, Dickins & Lawson, 2007), seeking to use both human behavioral ecology and evolutionary psychology to better understand this core issue. Practically we believe that our offer will not only help with policy but will also help to rethink the nature of a problem that the U.K. government has long grappled with.

The paper is structured as follows. We begin with an outline of the problem of teenage pregnancy within the U.K. and a discussion of the prevailing views about its cause. This leads onto an overview of some existing, non-evolutionary explanations that might nonetheless be enhanced by the perspective we offer. We introduce this perspective in a section on life-history theory and go on to review the application of this to early fertility, in particular focusing on the move to developmental induction as a proximate account of this phenomenon. This leads naturally to a discussion of the policy implications arising from this work and a positive conclusion.

The Problem

The United Kingdom has the highest rate of teenage pregnancy in Western Europe and the second highest in the developed world, with the U.S.A. in the top slot. Between 1998 and 2008, the U.K. rate of conceptions for girls aged between 15 and 17 years has consistently been around 40 per thousand, and between 40% and 50% of these conceptions have ended in abortion each year. In 2009 the rate dropped slightly to 38.2 per thousand, but the percentage abortion is within the usual range (see Figure 1 for details).

These rates are national averages. Rates of conception change across socioeconomic strata such that increasing deprivation is associated with increased rates of teenage conception, and teenage motherhood. The Department for Education, Teenage Pregnancy Unit published their latest analyses in May 2011 online[1], in which they plotted the 15-17 year old conception rate for 2007-2009 against all local authorities in the United Kingdom in rank order of the index of multiple deprivation. This index reviews local morbidity and mortality, crime, education, and various other indices to see how well a local authority is doing relative to all others. The least deprived authorities had rates around 20 per thousand and the most had rates around 50 per thousand, with some into the sixties. Clearly there are some specific socioeconomic niches where teenage pregnancy, and teenage motherhood, is far more common than in others (Arai, 2009; Lee et al., 2004).

These socioeconomic patterns have been well known to the U.K. government for some time, leading to the formation of joint policy from the Social Exclusion Unit and the Teenage Pregnancy Unit under the last administration in 1999. This policy was operated at the local level, improving sex education and health advice, with the express aim of reducing the national rates of teenage pregnancy to around 20 per thousand by 2010 and encouraging girls and young women into education and training. As can be seen from the data above, this ambition was not met.

[1] Available at: http://www.education.gov.uk/childrenandyoungpeople/healthandwellbeing/teenagepregnancy/

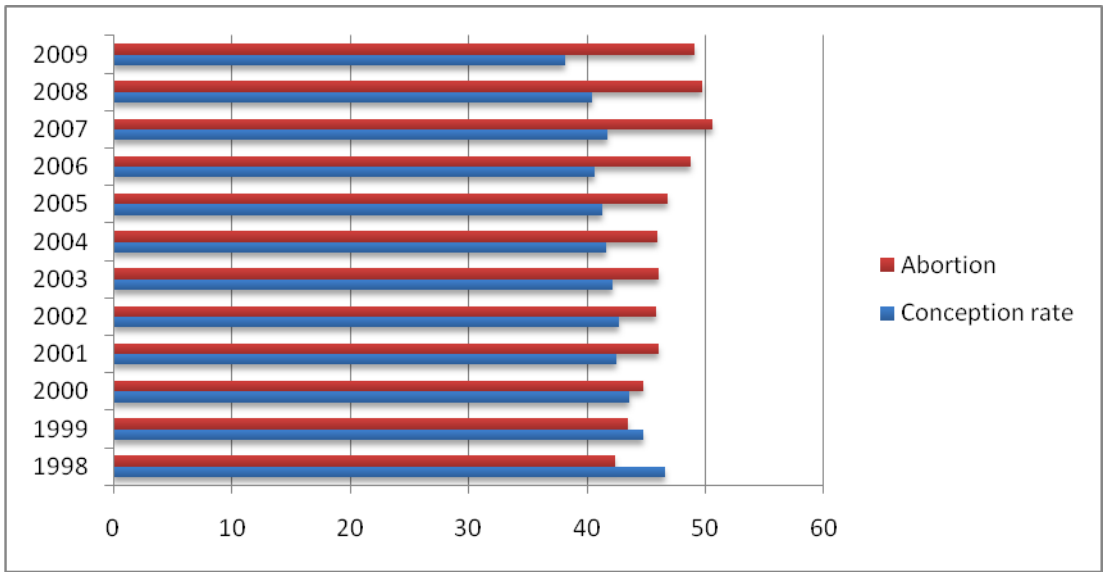


Figure 1a: Percentage abortions and conception rates per 1000 for all 15-17 year old females in the United Kingdom from 1998 to 2009.

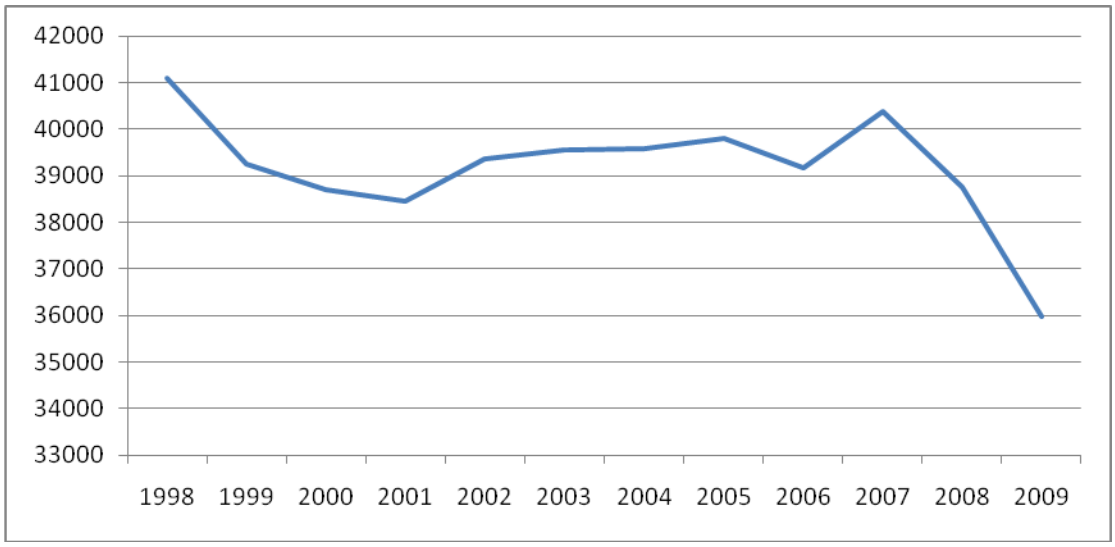


Figure 1b: Actual number of conceptions for all 15-17 year old females in the United Kingdom from 1998 to 2009[2].

Government and Media Viewpoints

The current coalition government in the United Kingdom has expressed various views on family formation. For example, speaking on *Newsnight* on the BBC (Wednesday, October 6, 2010) culture secretary Jeremy Hunt declared the "number of

[2] Source: http://www.education.gov.uk/childrenandyoungpeople/healthandwellbeing/teenagepregnancy/a0064898/under-18-and-under-16-conception-statistics

children that you have is a choice, and what we're saying is that if people are living on benefits, then they make choices but they also have to have responsibility for those choices." His view was that people should adjust their family size according to their income, the implication being that poorer couples should perhaps think carefully about their total parity and live within their means in order to reduce the burden on the welfare state and thus the government[3].

The implication of this suggestion is that people spend much time reasoning about their future families and understand the family as a utility that can be maximized relative to wealth in order to ensure a particular self-sustaining standard of living.

In response to the drop below 40 per thousand in 2009, the Minister for Children, Sarah Teather, made the following statement:

> I welcome the continued decline in the teenage pregnancy rate in 2009, which has now fallen to its lowest level for almost 30 years.
>
> There is still much more to do, to further reduce the number of teenagers whose lives are changed forever by an often unwanted pregnancy. Teenage parents and their children are more likely to suffer from poor health, unemployment, and poor achievement at school than their peers.
>
> There remains a huge variation in the progress that has been made in reducing teenage pregnancy rates across the country. Some local authorities have seen their rates decline by up to 45%, while others have struggled. It is important, therefore, that local areas learn from each other and share what has worked, so that they invest in the things that will really make a difference.
>
> Teenage pregnancy is an issue of continuing concern and the government will recognize the need to continue supporting local good practice in the Department for Education's youth policy statement and the Department of Health's Sexual Health Strategy, which are both due to be published later this year. (February 22, 2011[4])

The minister clearly recognizes the relationship between socioeconomic position and early pregnancy and early motherhood, but this recognition is phrased in a way that implies poverty, poor health, and educational outcomes are all a consequence of early motherhood. Both Hunt and Teather regard some acts of reproduction as stretching fiscal means. Teather also believes that teenage pregnancies are often unplanned. Indeed, at the end of her statement she pledges support for more educational initiatives which will presumably act to instill the kind of responsible attitudes Hunt referred to in his statement. Moreover, those local authorities with higher rates of teenage pregnancy are effectively seen as failing, and the suggestion is that they need to adopt the successful

[3] As far as we can tell, the average total parity for U.K. families/mothers is approximately the same across socioeconomic gradients. This is not the case in all developed world countries. For example, data for 2008 published by the Ministry of Social Development in New Zealand (http://www.socialreport.msd.govt.nz/people/fertility.html) shows that Maori and Pacific women have total fertility rates of 2.95 (the overall population rate is 2.18). In 2008 the teenage pregnancy rate for Maori women was 80.7 births per thousand 15 – 19 year olds. For Pacific women between 2005 and 2007 the rate was 42.5 per thousand. The overall teenage pregnancy rate in New Zealand for 2008 was 31.3 births per thousand.

[4] Available online: http://www.education.gov.uk/childrenandyoungpeople/healthandwellbeing/teenagepregnancy/a0074764/minister-responds-to-latest-teenage-pregnancy-statistics

measures taken up elsewhere. Whilst some measures are clearly more successful than others (Harden et al., 2009) there must surely be something more meaningful to say about the relationship between indices of multiple deprivation and teenage pregnancy?

The views expressed above by two ministers of the current government are not isolated examples, nor are they peculiar to this administration. The last administration believed that teenage motherhood acts to continue a cycle of poverty, with former Prime Minister Tony Blair's forward in the *Teenage Pregnancy* White Paper (Social Exclusion Unit, 1999) declaring the document:

> (R)eveals the scale of the problem we face in this country and the cycle of despair in which many teenage parents are trapped... most teenagers who are likely to become pregnant come from poor areas, and from disadvantaged backgrounds. Often they feel they have nothing to lose by becoming pregnant.

Other politicians and journalists have argued that teenage girls become mothers in order to claim benefits that will improve their economic circumstances, the most well known negative stereotype being the view that young women get pregnant to claim local housing. At the 1992 Conservative Party Conference, the Social Security Minister attacked "young ladies who get pregnant just to jump the housing list." The media have also attacked young mothers and created reactionary headlines suggesting babies are used as a "passport to a better life" (*Scandal of teenage mothers as divorces hit a record level. End of family life in Britain* in *The Daily Express*, August 23, 1995; and, more recently, *'Deterrent' is a dirty word for dealing with teen mothers* in *The Daily Mail*, February 26, 2010).

It would appear there is some confusion in the public and political mind around these issues. Either teenagers become mothers, through unwanted pregnancies, with no insight whatsoever, or they decide to do so in order to gain benefits. Whilst both of these claims are logical possibilities, most behavioral biologists would find them crude accounts with little explanatory value.

Against this backdrop of views, British governmental policy for at least the last thirteen years has been focused on persuading teenage girls to delay becoming pregnant or giving birth, and considerable sums have been spent on educational and health initiatives dedicated to this aim. The Teenage Pregnancy Strategy Evaluation (2005) estimated that "New Labour" (1997-2010) had spent over £167.7 million in attempts to reduce the rate of teenage conceptions between 1999 and 2004, with a later Public Health White Paper, *Choosing health: Making healthy choices easier* (Department of Health, 2004) promising a further £300 million in investments over three years to ensure that young people fully "understand the real risks of unprotected sex and to persuade them of the benefits of using condoms to avoid the risk of...unplanned pregnancies" (Department of Health 2004, p. 5). Thus the focus has been upon scheduling and family planning, with later motherhood the desired outcome.

Creating a family is the most basic of biological functions. Arguably all organisms are in the business of reproduction; they spend the majority of their time preparing for it or dealing with the consequences of being a successful reproducer. Given this, it is unsurprising that there is in fact evidence of teenage mothers planning their pregnancies for their life circumstances (Frost & Oslak, 1999; Lee et al., 2004; Zabin et al., 1993). To this end, we believe that responsible and effective policies around fertility and reproduction can only begin to be developed once "we begin to understand how social

phenomena affect core biological relationships" (Low et al., 2008, p. 15). This does not simply mean understanding rudimentary reproductive physiology, although that is useful, but rather understanding that young people live in specific reproductive ecologies and this impacts upon their physiology and behavior. More importantly, the application of evolutionary biology to this issue provides a definitive view of the utilities that are in fact being maximized, and once these are understood, policy makers are better placed to model their interaction with economic variables. We clarify this position with an account of the application of evolutionary biology to the issue of teenage motherhood, drawing on various sources, in an attempt to demonstrate the complexity of the situation. We hope that the explanatory power of this approach, which encompasses the reproductive behavior of not just humans but all sexually reproducing species, will cause a re-evaluation of previous views expressed by government and the media.

Life-history Theory

The key utility within evolutionary biology is inclusive fitness, which is the sum of direct (reproduction) and indirect (investment in the offspring of relatives) fitness. Organisms can be regarded as attempting to maximize their average lifetime inclusive fitness, and any trait that they exhibit can be understood as having been selected in this context. Life-history theory captures the dynamics of (inclusive) fitness maximizing as a system of trade-offs across the whole of the lifespan from conception to death. This perspective is not dissimilar to economic analysis such that we can regard an organism as having to make decisions about how much to invest in building and then maintaining its somatic capital and when to divert resources from this effort into reproduction (Kaplan & Gangestad, 2005).

Clearly, diverting resources from somatic maintenance to reproductive effort is a trade-off. One should expect that ecological variables predict evolutionarily stable strategies. For example, it is well understood that unpredictable ecologies lead to earlier reproductive effort and thus fewer resources being invested in somatic growth and maintenance (Sear et al., 2004). Alternatively, a stable ecology might lead to greater somatic investment, as building a larger and more robust body will potentially increase longevity and therefore the opportunity to make successful inclusive fitness investments. Under times of ecological stress, building such a body will become more difficult to achieve and its expense may reduce inclusive fitness opportunities relative to individuals who grow and mature faster, and reproduce sooner. In other words, taking a long time to grow increases your chance of dying before reproduction in risky environments. This set of relationships can be captured as a current versus future reproduction trade-off, which has only three outcomes: no current reproduction, some resource allocation to the present and some to the future, or total current reproduction followed by death (Kaplan & Gangestad, 2005).

Another key life history trade-off is that between the quantity of reproduction and the quality of the offspring produced. Producing a large number of offspring might be favored by natural selection when resources are poor, or the ecology unpredictable. Under such circumstances, having many offspring and consequently not investing heavily in each individual will increase the chances of fitness gains, even though some may not survive due to under investment. Alternatively, in well-resourced and predictable environments, increasing investment in fewer offspring in order to increase quality may be the better allocation of resources. Such infants are more likely to be reproductively

successful adults and will be better able to face a downturn in circumstances at some future point.

These trade-offs, between quantity and quality of offspring and current versus future reproduction, have been referred to in terms of *r* and *K* selection (MacArthur & Wilson, 1967; Pianka, 1970). In ecological equations, *r* refers to the growth rate of a population, while *K* indicates the carrying capacity of the environment in which that population exists. Thus, in unpredictable environments, individuals are subject to *r*-selection, which leads to faster maturation, smaller growth, earlier and greater reproduction, and wide dispersal of offspring. *r*-selected individuals are unlikely to gain fitness benefits from entering into competition with others due to the changeability of the environment, and they tend to colonize ecological niches that are not overly crowded – in other words, they are a long way from the carrying capacity of the local environment. The best strategy for these individuals is simply to grow fast, reproduce a lot, and disperse their young. *K*-selection, on the other hand, occurs in stable, predictable environments. *K*-selected individuals compete for access to resources and invest in specializations to exploit their ecology. As a consequence, the population size of *K*-selected individuals is often near to the carrying capacity of the local environment. Such individuals mature slowly, requiring much parental effort, grow larger, live longer, and reproduce at a lower frequency than *r*-selected individuals.

This model is often viewed more as a continuum with most species falling somewhere between total *r*-selection and total *K*-selection. This is not too surprising, for any individual within a predominantly *r*-selected situation would gain some fitness advantage from the development of even minimal specializations that gave a competitive edge. As a consequence, such traits would reach fixation and shift the species toward the *K* end of the spectrum. Thus organisms develop evolutionarily stable strategies that position them somewhere on an *r/K* continuum.

The details of *r/K* selection have been criticized, most notably by Stearns (1977), who has argued that *r* and *K* are not equivalent concepts and cannot be mounted on a continuum. Nonetheless, the notion of a continuum is thought to have heuristic utility. This heuristic sees organisms as distributed on a fast to slow life-history continuum. Thus, an organism on a slow life history will have relatively slow growth and development, later reproduction, and a longer-life. Those at the fast end will grow fast, reproduce early, and die sooner. The slow-fast continuum more explicitly captures both the current versus future and quantity versus quality trade-offs at the heart of life history theory.

Fertility Scheduling and Developmental Induction in Human Populations

Applying life-history theory to reproductive decision-making, and teenage motherhood more specifically, provides us with a number of insights. Teenage mothers, by definition, are relatively young, reproducing well before the population mean in Western democracies (Kramer & Lancaster, 2010) and therefore can be seen as opting for current rather than future reproduction. As such, we can argue that they are on a fast life history relative to the overall population in which they live, although we must note that Western populations in fact consist of distinct ecologies (Johns, 2011; Nettle, 2010). Given this, we should predict differences in growth and development and sexual behavior. We might further predict that life-history strategies are to some degree heritable

(Kirk et al., 2001) and that teenage mothers have had specific kinds of parenting experiences themselves.

Draper and Harpending (1982) were among the first to apply the logic of life-history theory to aspects of human reproductive development in this way. They were particularly interested in the effects of father absence upon development. Girls from divorced families, where the father had left, were more likely to be promiscuous during their adolescence and less likely to develop good marital or marriage-like relationships in the future. Those with a father had a different developmental profile in which the onset of sexual behavior is delayed and long-term relationships are sought and more successfully managed. The difference between the two trajectories is that in one the child develops under the expectation of little to no paternal investment in offspring, whilst the other anticipates significant investment from the father of their children. Draper and Harpending argued that these two reproductive strategies maximized fitness under the circumstances in which they occurred. A child would take one or other strategic line as consequence of early childhood experience, in effect rendering such experience crucial for predicting the future. To this end, childhood experience of paternal investment is helping individuals to track the local reproductive ecology and the likely strategy of future mates.

Belsky, Steinberg, and Draper (1991) argued that father-absence is just one aspect of early socialization that can affect future life-history strategies. Belsky et al. (1991) focused upon fitness maximizing strategies, but they also stressed the facultative nature of strategic response, such that humans would have been selected to be flexible in the face of ecological change within certain parameters. This is a move away from seeing species as distributed on an r/K, or fast-slow continuum, but it is not a refutation of that notion. Species can have relatively faster or slower life histories than one another, but within a species, one would expect to see differences in relative life-history speed predicted by local ecological contingencies as this would further maximize fitness (Chisholm, 1993; Ellis, 2004). Thus, according to Belsky et al. (1991):

> (T)he principal evolutionary function of early experience – the first 5-7 years of life – is to induce in the child an understanding of the availability and predictability of resources (broadly defined) in the environment, of the trustworthiness of others, and the enduringness of close interpersonal relationships, all of which will affect how the developing person apportions reproductive effort. (p. 650)

Those whose early experience is negative with respect to the above parameters will begin reproduction sooner and invest in parenting less, compared to those whose experience is positive. Belsky et al. (1991) summed such early experiences in terms of contextual stress and presented a review of the literature supporting their view. What was novel about their review was the prediction, presented with some supporting evidence, that contextual stressors would induce early puberty and hence sexual maturation. Thus, father absence, as discussed by Draper and Harpending (1982), and other factors, should lead to early puberty in girls and a fast life-history strategy. What Belsky et al. (1991) predicted, then, was that stressful early life events cue individuals both physiologically and behaviorally to begin investment in reproduction sooner. Stressed girls will mature faster and begin reproduction sooner, and do so without great paternal investment.

Since Belsky et al. (1991) published their paper, there has been much empirical work demonstrating the relationship between contextual early life stressors and accelerated puberty and also, to some extent, teenage childbearing (Belsky & Beaver, 2011; Belsky, Houts & Fearon, 2010; Belsky, Steinberg, Houts & Halpern-Fisher, 2010; Bogaert, 2008; Chisholm, Quinlivan, Peterson & Coall, 2005; Ellis & Garber, 2000; Ellis, McFadyen-Ketchum, Dodge, Pettit & Bates, 1999; Gaudie, Mitrou, Lawrence, Stanley, Silburn & Zubrick, 2010; Moffitt, Caspi, Belsky & Silva, 1992). These findings help to make sense of the overwhelming relationship between indices of low socioeconomic position and teenage motherhood that are commonly cited in the social science literature (see Arai, 2009, for an overview) and that are at the core of governmental and policy concerns. Poor socioeconomic circumstances are stressed ecologies (Nettle, 2009, 2010) with relatively low life expectancy and higher rates of specific forms of morbidity and mortality, as well as increased incidence of psychosocial stressors that conform to notions of contextual stress, as outlined above.

The evidence in favor of a fast life-history interpretation of teenage pregnancy is strong, but that should go beyond more than simple acceleration of sexual maturation and a bringing forward of age at first pregnancy. Indeed, developmental differences between early and later reproducing mothers, as well as differences in intended age of first pregnancy, have been shown. Nettle, Coall and Dickins (2010, 2011) have recently analyzed the large cohort collected under National Child Development Study. This study has tracked people born in the U.K. within the first full week of March, 1958 (n=16,416) and although there has been attrition in the population size since then, the study still represents a considerable cohort over time. The key predictors of early motherhood in this population were low birth weight for gestational age (so not including preterm babies), shorter period of breastfeeding, maternal separation during the first five years of life, frequent home moves, and a lack of paternal investment. All but the birth weight effect remained significant upon adjustment for socioeconomic position. The effect of childhood socioeconomic position upon the age at first pregnancy was partially mediated by early life conditions, and this last relationship was partially mediated by emotional and conduct problems in childhood (Nettle et al., 2011). Low birth weight was also associated with earlier intended reproduction as expressed at 16 years, and this intention was related to later behavior, indicating some level of planning (Nettle et al., 2010).

Whether the planning reported in Nettle et al. (2010) is based upon direct awareness or not is an open question. However, Johns (2011) has recently demonstrated that females' perceptions of environmental risk are a good predictor of teenage motherhood in a U.K. population. Johns argues that such perception may well impact upon temporal outlook (see also Chisholm, 1999; Smith & Roberts, 2011) affecting decisions about the relative trade-offs of current versus future investments. Belsky et al. (1991) argue that the proximate psychology of attachment might enable the kind of life-history calibration they predict.

Overall these findings fit well with the developmental induction model proposed by Belsky, Steinberg and Draper (1991), providing evidence for the role of psychosocial contextual stressors as well as other indices of resource, such as low birth weight.

Policy Implications

How can an evolutionary framework help to move policy makers beyond what might at best be described as an intervention impasse? In spite of the vast amounts of

money spent since 1999, the rate has only just dropped below 40 per thousand, and then only marginally so.

First, policy makers should no longer view teenage parenthood as a problem of education or irresponsibility (Arai, 2009), but rather an appropriate decision made, or strategy followed, in particular contexts (Geronimus, 1996). Trying to simply reduce the number of teenagers having children is doomed to failure if underlying ecological conditions are not taken into account. Policies aimed at reducing teenage pregnancies or supporting teenage mothers should focus on instability in the pre-conception environment, rather than blaming teenage motherhood on sexual naivety or random reproductive accidents. Therefore, a further benefit of this reassessment would be to remove the stigma associated with young parents.

Second, the frequently examined proximate correlates of teenage motherhood should be de-emphasized in teenage pregnancy and parenting policy formation. Although these correlates can contribute to the overall picture of environmental risk and extrinsic mortality perception, they only contribute to one dimension of explanation, and focusing on one or two correlates in policy formation leads to narrow, "Band-Aid" type solutions. For example, it is often stated that peer pressure is a cause of young girls to become teenage mothers (Maxwell & Chase, 2007). This may be a relevant correlate, but it must be asked *why* a particular community of teenage girls should be particularly pro-natalist or believe that having children at a younger age is beneficial and normative. An evolutionary perspective would suggest that the ecology is driving early fertility such that teenage girls, and young women, are organizing themselves to deal with this (Sear & Dickins, 2010) and developing relevant social norms. Those norms do not drive the early reproduction, but act to support it. This is a very different view from that at the heart of pedagogical policy initiatives.

Third, and following from this, an approach couched in life history theory sees humans as inherently local creatures, responding to cues in their immediate environment about the availability of resources and chances of living a long, predictable life. The inequality issue that politicians point to is a fact, but what is required now is a theoretically guided ecological approach to understanding lives as they are lived in particular neighborhoods. This will require a more anthropological focus upon social network structures in terms of kinship and other support groups, data about actual exposure to risks, and morbidity and mortality cues and a different kind of data resource to inform policy (Nettle, 2011).

Fourth, there must be a recognition in policy formation of extrinsic versus intrinsic mortality risks, and how each of these contribute to reproductive, as well as other health related decisions. It has been well-established (Promislow & Harvey, 1990) under an evolutionary life history framework that extrinsic mortality risks, that is, those that cannot be controlled by an individual, exert a strong influence on how much energy should be allocated to the risks that can be controlled, such as adhering to healthy behaviors, and that living in lower socio-economic circumstances increases the amount of extrinsic risk to which an individual is exposed. Where threats from external risks are high, that is, individuals have little control over their own mortality, and consequently when (the probability of) adult mortality is high (life expectancy is low), the optimal strategy is to reproduce at a younger age, as this would guarantee the survival of at least one offspring (Chisholm, 1993; Low et al., 2008). Policy makers should not expect individuals to make "good," rational choices for themselves, without considering the nature of extrinsic risk in the wider environment.

Finally, the idea that teenage pregnancy prevention policies will act to reduce poverty is counter-intuitive (Arai, 2003; Geronimus, 1996). Teenage mothers are women who have already experienced hazardous neighborhoods, unstable family situations, and poverty before they became pregnant, and that these experiences contributed to the timing of pregnancy (Botting et al., 1998; Geronimus, 1991, 1992; Johns, 2011; Males, 1993; Stevens-Simon & Lowy, 1995). Such women do not appear to have randomly elected to reproduce during their teenage years. Rather they made the decision (either consciously or subconsciously) to start reproducing in light of their past experiences and assumed future stability. Policy approaches would ideally be aimed at providing deprived women and girls with the chance to live long, healthy, predictable lives (Geronimus 1996). Attempts to reduce inequality, perceptions of relative poverty, and extrinsic mortality risks should eventually affect reproductive behavior. Most methods aimed at preventing teenage pregnancy today often ignore the fact that many young women may be choosing to have children while they are young and healthy. Taking a behavioral ecology approach instead suggests that this is rational for them. It is appropriate given the context in which they live their lives.

A Practical Suggestion

The preceding section clearly indicates a number of implications for policy makers that arise from applying a life-history perspective. The entire set of possible policies that might emerge after detailed consideration of these implications is potentially very large, not least because it will also be determined by other extrinsic factors, such as available budgets and subtle details of local ecology, and these factors will influence the granularity and scope of approach. To this end, it is beyond the reach of this paper to list all possible policies. Nonetheless, to help focus thinking in this area, we provide a simple, practical suggestion in this section.

According to a principal components analysis conducted by Johns (2011) there are two key factors that people pay attention to in their environment. The first factor captured environmental risk and included 12 items. The highest positively loading items were: "Crime was a problem in the area"; "Vandalism was a problem in the area"; and "There were problems (such as noise, abuse or crime) with neighbors in the area." The second factor included two negatively loading items that captured how included individuals felt within the community. It was the first factor that clearly predicted early pregnancy. As Johns notes, this finding is consistent with a large literature demonstrating a link between dissatisfaction with neighborhoods and poor mental health. Indeed, Aneshensel and Sucoff (1996) have argued that graffiti, crime, violence, and drug use should be conceptualized as ambient hazards to the mental health of adolescents. More recently, Kruger, Munsell, and French-Turner (2011) have applied a life-history approach to explain the link between neighborhood deterioration and low birth weight and premature birth. Clearly, this relationship has implications for early pregnancy as low birth weight is a key predictor (Nettle et al., 2010) and suggests environmental quality acts as a contributory factor in areas of continued high early pregnancy. The proximate mechanisms governing this complex set of relationships are, as yet, unclear. But this does not prevent politicians tackling the principal cause.

Our suggestion is simple. Instead of investing in educational programs of the sort discussed above, investment should be diverted to the maintenance of at-risk neighborhoods. In the U.K., this would mean that public money should be diverted from

the existing teenage pregnancy unit policies and applied as supplements to local authority council tax budgets in key areas with high rates of teenage pregnancy. As it stands, these areas are necessarily stretched in terms of council tax, for this is a property tax based upon the estimated value of the property, and in these neighborhoods, not only is property price low, but more residents are able to claim reductions in their payments as recipients of welfare benefits. These supplements should have restrictions on use that could not be overridden by local council mandates, and would include funding active programs to remove graffiti, repair vandalized property, clear litter, maintain and develop green spaces, and areas for children to play, improve street lighting, and visibility, thereby improving security and reducing the number of opportunities for street crime. Funding might also be diverted to employing more community support police officers in areas of particularly high crime.

It is unlikely that the existing budget for teenage pregnancy reduction will be sufficient to fund this council tax supplement program in its entirety. Funding will have to be sought from elsewhere, and that is likely to be through further taxation. There is much to be said about taxation, and this is not the place to begin that discussion, but we would strongly recommend policy makers read Frank (2011) for an evolutionarily informed discussion of issues around taxation and the public good. For now, we would point out that our suggestion would have benefits beyond teenage pregnancy, in terms of mental health and associated criminality.

In summary, changing perceptions is intrinsically difficult; changing what people perceive is much more straightforward.

Conclusion

The attempt to reduce teenage pregnancy rates through simple proximate correlates, health concerns, or moral issues (as did the SEU report 1999) is unlikely to be successful if young women continue to live in poverty or perceive their environments as being hazardous, have experiences in their family or neighborhood that truncate their future expectations, and, in consequence, make the reproductive decision to start having their children at a young age. The ongoing attempt to reduce the number of births to teenagers may unfortunately have more to do with reducing the associated costs to the government than with improving the life situations of adolescents and adolescent parents, and until antecedents of teenage parenthood, such as environmental risk and instability are accounted for in policy decisions, the United Kingdom will continue to have a high rate of teenage pregnancy. The United Kingdom is an extremely unequal society. Perceived extrinsic risks and threats to life expectancy are surprisingly high in particular localities (Marmot, 2010) and efforts to identify particularly pro-natalist communities living under high extrinsic mortality risks for specific support and intervention may be one way forward. If policies supporting and understanding early reproduction recognize the importance of life history tradeoffs as core to reproductive scheduling, they are not only more likely to succeed, but will be more positive and empowering for those they aid, given that the outcome will be presented as being adaptive rather than irrational.

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