Commentary for Coall & Hertwig

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Title: The Generation Game is the Cooperation Game: the role of grandparents in the timing of reproduction

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Abstract
Coall & Hertwig demonstrate the importance of grandparents to children even in low fertility societies. We suggest policy-makers interested in reproductive timing in such contexts should be alerted to the practical applications of this cooperative breeding framework. The presence or absence of a supportive kin network could help explain why some women begin their reproductive careers 'too early' or 'too late'.

Commentary
We commend Coall & Hertwig for addressing an under-researched, but important, issue in the behavioural sciences. Demonstrating that grandparents matter in post-demographic transition, low fertility-low mortality societies is extremely useful. We propose that this cooperative breeding framework may help to explain variation in the timing of reproduction, which is currently of great concern to policy-makers in the developed world. Many developed countries, particularly the US and UK, have strategies in place to reduce teenage pregnancy, seen as detrimental to mother, child and society. Equally there is concern about some women 'forgetting' to have children, by delaying first births until their fecundity has started to decline.

Relatively early reproduction, including teenage pregnancy, may result partly from a set of circumstances in which kinship networks are still intact and families less dispersed. The proximity and availability of potential grandparents and other close kin may signal to women that early reproduction is feasible and desirable, since this has been a prerequisite for successful reproduction throughout most of our species' history. In contrast, where women leave their kin networks in order to take advantage of education and employment opportunities, they lose these signals from supportive kin that reproduction is likely to be successful, resulting in delayed births.

Within the evolutionary literature, it is becoming accepted that early reproduction is a strategy which makes sense under a particular set of socio-economic circumstances, where young women who have few expectations of being able to increase their human capital through education, for example, make the decision to allocate resources to reproduction (Johns, Dickins and Clegg, in submission). These decisions clearly happen at a conscious level to some extent (Lee et al. 2004; Cater and Coleman, 2006). However, it is also clear that exposure to specific risks during infancy and childhood also contributes to early fertility in humans. Lack of paternal investment and low birthweight increase the likelihood of a teenage pregnancy markedly (Nettle, Coall and Dickins, in press) and appears to induce more rapid development leading to a smaller adult size and earlier onset of menarche (Nettle, Coall and Dickins, in prep). In some populations it appears that those women who begin their reproductive life sooner also reproduce more (see, for example, Ministry of Social Development, New Zealand, The Social Report 2009).

Coall and Hertwig's demonstration that grandparents may be particularly beneficial under conditions of duress, together with this overrepresentation of teenage pregnancy in low socioeconomic status (SES) groups, suggests to us that the role of grandparents – i.e. the parents of the teenage mothers – should be conceptualized as a role under harsh conditions. It is possible that the presence of grandparental resources might be a 'deciding' factor in early fertility. Second, it would seem that cooperative breeding of this sort may be linked to relatively high fertility rates. This leads us to speculate that the late and low fertility of higher SES women is perhaps a consequence of a shift away from cooperative breeding strategies in which maternal grandparents play an important role.

Women who do choose to invest in their own human capital – beneficial in terms of increasing their ability to invest in their children – are less able to rely on a supportive kin network, as they disperse from their families and as their kin, particularly parents, become less able to provide practical support with grandchildren as they age. This results in an increase in the perceived costs of child-raising, necessitating a delay in reproduction until women are in a secure enough financial position to buy in help from non-kin. Such a strategy may also involve relying more on male support, so that additional delay may be introduced by waiting for a suitable partner willing and able to invest in children. This delay may inadvertently result in no reproduction at all.

Such demographic shifts will be accompanied by changes in attitude. Lee et al (2004) note that in communities with high teenage pregnancy rates the culture is generally pro-natal and there is often much anti-abortion sentiment. Parents of teenage mothers expose their daughters to a suite of beliefs that encourage reproduction, even in the case of an accidental or unplanned pregnancy. Indeed, Lee et al. (2004) report that the number of abortions in teenage females from low socioeconomic backgrounds in the UK is significantly lower than for wealthy girls. Different fertility decisions are thus exposed and the local culture clearly supports

these decisions. This leaves open the question as to what wealthier putative grand-parents are achieving through their less pro-natal belief systems. One possibility is that by encouraging later, post-higher education fertility, higher SES grandparents-to-be are investing in the quality of their grandchildren, necessary for economic success in a competitive economy.

This also gives the possibility that an alternative explanation for delayed fertility in certain groups of women is not that these women lack the support of their kin for reproduction, but that maternal kin are actively encouraging women to delay until they have invested sufficiently in their own human capital to be able to invest heavily in their offspring. Such grandparents may in fact be investing in their grandchildren, but perhaps in a different currency – financial resources rather than childcare (and a delay in their daughters' reproduction will allow them to accumulate more resources).

Here, we are essentially applying Turke's (1989) and Newson et al.'s (2005) 'kin' hypotheses for why modernisation universally results in fertility decline: modernisation is correlated with a move away from kin-based communities, and greater association with non-kin. Kin help therefore becomes less available and individuals become less exposed to the pro-natalism of relatives, which results in a reduction in fertility. We suggest that similar arguments can be used to explain fertility variation within, as well as between, populations.

Coall & Hertwig end this article by discussing the implications of grandparental investment for fertility. We concur that this should be a priority for future research, and are beginning such a programme ourselves (RS has recently been involved in a project which demonstrated that British women who have close kin in their social networks have earlier first births than those with looser kin ties: Mathews & Sear, in prep). We add that a focus of research should be on the interactions between SES, grandparental investment, paternal investment and fertility behaviour.

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