

# THE MENOPAUSE – ANOTHER MATERNAL STRATEGY?

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by  
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## ABSTRACT

The menopause is a mystery – why should the human female alone universally cease reproduction a mere half way through her maximum potential lifespan? The suggestion that this phenomenon is merely a function of more general senescence is not supported by the evidence of a programmed and relatively abrupt decline in fertility around 37.5 years, leading to a complete cessation at around 50 years of age.

The principal hypotheses relating to the putative evolutionary function of the menopause are the grandmother hypothesis and the ‘good mother’ or ‘stopping early’ hypothesis. The evidence adduced for both is mixed and, in any case, no study which examines the behaviour of women in extant societies is able to do more than offer explanations of the environmental circumstances that influence the *maintenance* of the menopause across all manner of societies and populations today.

Hypotheses on the environmental challenge which set in motion the evolution of the menopause must be speculative but this thesis advances one such hypothesis, relating menopausal origins to the physiological and cultural challenges prompted by the invention of cooking. The body of the thesis, though, concentrates on the light that can be shed on the function of the menopause by examining the main hypotheses for maintenance.

The grandmother hypothesis, which has been tested in traditional, agrarian and historical societies with varied results, relies on calculating the fitness benefit to be derived from some concrete measure, reduction in infant mortality, nutritional gains by daughters’ offspring, for instance. This thesis does not dispute the existence of a grandmother effect, that benefits will flow to grandchildren from having a post-menopausal grandmother. Rather it seeks to establish the priority or paramountcy of the effect of maternal investment on offspring and, in particular, daughters. Using its own data, collected on mother/child and daughter/parent relationships, and national data on grandparenting, the thesis examines maternal investment in comparison with grandmaternal investment.

On a whole series of behavioural criteria, maternal investment in adult daughters is found to exceed that in adult sons. Furthermore, women invest more in their daughters

before they have children than after. The thesis proposes that this is a daughter-led pattern in which young women seek to prepare themselves for appropriate mating, culminating in first birth, at the current age in the UK of 29 years.

The role of fathers is examined and a value placed on fathers' contribution to parental investment of around two thirds of mothers'. The adverse effect of father or mother absence in step-families is also tested, using national data on household food expenditure.

Using a similar set of behavioural criteria to those for mothers and their offspring, grandparental investment is analysed. The greater value of mothers (compared to fathers) is echoed in the greater value of grandmothers compared to grandfathers; but, in particular, the predominance of matrilineage is demonstrated. This preferential treatment of daughters' offspring, combined with mothers' greater investment in childless daughters, leads to the conclusion that grandmaternal investment is essentially a form of maternal investment.

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# CHAPTER 1

## INTRODUCTION

### 1. 1. HUMAN BEHAVIOUR AND THE MENOPAUSE

The subject of this thesis is the mystery of the menopause. Why is it that around the age of 50, universally across all cultures, women experience a total shutdown of their capacity to reproduce, a mere half-way through their maximum potential lifespan? From another perspective the menopause occurs with thirty years of average life expectancy still remaining for women in populations across the developed world. The menopause involves clear physiological changes and explanations at the proximate level are therefore plainly rooted in biology. The analysis of human behaviour, however, does not have to depend on biological foundations and may encompass primarily cultural explanations or a balance of both. Furthermore, whether behaviour is underpinned by biology or mainly arises from cultural causes does not, of itself, answer the question of whether such behaviour is a product of evolution by natural selection, that is, whether it is an adaptation.

The examination of human behaviour to discover if it is adaptive is the function of human behavioural ecology. A trait is deemed to be adaptive if it increases the fitness, that is the differential passing on of genes to the next generation, of those who carry the trait, compared to those who do not (Barrett *et al*, 2002). Human behavioural ecology has grown out of the belief that the discipline of behavioural ecology, which seeks adaptive explanations of the behaviour of animals in general, with judicious analysis and proper safeguards relating to human phenotypic plasticity, can be applied to the behaviour of human beings.

Krebs and Davies (1993) describe behavioural ecology as follows.

“Behavioural ecology is concerned with the evolution of adaptive behaviour in relation to ecological circumstances. Natural selection can only work on genetic differences and so for behaviour to evolve (a) there must be, or must have been in the past, behavioural alternatives in the population, (b) the

differences must be, or must have been heritable; in other words a proportion of the variation must be genetic in origin, and (c) some behavioural alternatives must confer greater reproductive success than others.”

### 1.1.1. HUMAN BEHAVIOURAL ECOLOGY

Krebs and Davies are at pains to point out that behavioural ecologists, in discussing the genetic underpinning of behaviour, are not implying genetic determinism (Krebs & Davies, 1997). Thus discussions of genetic influences on behaviour refer not to deterministic, hardwired circuitry but to indirect and complex connections between genes and behaviour via proteins and physiological systems, interacting with developmental and environmental factors (Plomin *et al*, 2001). The instructions given by the genes to the developing organism may allow for alternative outcomes, offering a development that is phenotypically plastic. If we accept that the human species is the product of evolution, it is reasonable also to assume that widespread behavioural phenotypes are probably adaptive, even though apparent differences in behaviour among human cultures are unlikely to be based on genetic differences (Hughes, 1988). It might be claimed that it is unnecessary to make any genetic assumptions at all about adaptations, with the *caveat* that any non-genetically inherited adaptation must have predictable consequences for future gene frequencies. This would lead to the postulation of selection for a genetically programmed ability to make flexible behavioural decisions, rather than the genetic selection of the behaviours themselves (Dunbar, 1982).

### 1.1.2. ENVIRONMENT OF EVOLUTIONARY ADAPTEDNESS

Thus, the highly flexible behavioural responses of human beings to the range of environmental problems and opportunities presented to them does not, on the one hand, have to be considered in isolation from the varying degrees of behavioural plasticity of the rest of the Animal Kingdom; nor is it necessary, on the other hand, to search for all the evolutionary roots of modern human behaviour in some discrete period in the past, such as the Pleistocene (some 1.64 million years ago to 12,000 years ago), often referred to as the environment of evolutionary adaptedness (EEA), (Barkow *et al*, 1992), especially when the EEA is defined as “...not a place or a habitat or even a time period...[but] a statistical composite of the adaptation-relevant



properties of the ancestral environments encountered by members of ancestral populations, weighted by their frequency and fitness consequences” (Tooby & Cosmides, 1988).

### 1.1.3. RECENT GENETIC EVOLUTION

Human beings, like other animals, given a reasonable length of time to respond to particular situations in a novel environment, will ultimately evolve appropriate survival traits, which may be genetic adaptations, occurring in the context of cultural evolution (Strassmann & Dunbar, 1999). For instance, the adaptation to lactose tolerance, involving three separate gene mutations and vitamin D synthesis, and present in European and a few other cattle-keeping populations like the Masai, is a response to the spread of livestock-herding after the agricultural revolution some 10,000 years ago (Durham, 1991). The adaptation of resistance to malaria in West Africa, (which, in an individual homozygotic for the relevant allele, manifests itself in thalassaemia), is another example of a genetic response to an environmental challenge, brought about by otherwise beneficial cultural change, in this case related to patterns of movement in lowland herding (Brown, 1986).

### 1.1.4. CULTURAL EVOLUTION

Most cultural evolution, though, does not find expression through genetic adaptation; *prima facie* benefits are assumed to arise from cultural norms which influence long-term behavioural change in humans, the ‘phenotypic gambit’ (Grafen, 1984), but these behaviours must maintain a biological linkage, which will eventually pull cultural traits up short if they start to swing away from providing fitness benefits (Richerson & Boyd, 1989). For example, for a millennium, in the *r*-reproducing period of human history before the demographic transition, the European population swelled (and crashed) but ultimately began to grow exponentially, placing strictures on the inheritance of land and property. This led to forms of primogeniture as an inheritance system among the higher classes in various countries; younger sons had to seek their fortunes either as warriors or in pursuit of religious objectives (or in the case of the Crusades, both) (Dickemann, 1979; Boone, 1988).

It was, in these circumstances, viable and appropriate for the catholic church to maintain a celibate priesthood, which reduced the inheritance pressures on younger sons, while the celibate son embarked on a path that was by no means necessarily a total denial of fitness: at the least he would be fed, clothed and housed, with no cost to the family patrimony; at the most he could increase that patrimony, benefit the offspring of his brothers and sisters, and perhaps also produce progeny of his own (Alexander, 1979a; Thomson, 1980; Chadwick, 1981). In the modern post-industrial period, it is no coincidence that the catholic church is in difficulty with vocations to the celibate priesthood in Europe, when the European birth rate is at its lowest, with catholic countries the lowest of the low; Spain's birth rate at 1.15 and Italy's at 1.19 are the lowest in the world and well below the replacement level of 2.1 (Kohler, 2002). No catholic parent, however devout, is likely to encourage his or her *only* son to a vocation requiring celibacy. This is the biological leash on culture, in action.

#### 1.1.5. INCLUSIVE FITNESS

This development raises another aspect of cultural evolution in the post-agricultural world of complex social structures: human beings might not always be fully in control of their own destinies. In hierarchically structured societies, despots can not only enjoy greatly enhanced reproductive success themselves, but are able to prevent others doing the same (Betzig, 1982). As with despots, so it may be with many parents, not just Portuguese nobility of the 15<sup>th</sup> and 16<sup>th</sup> centuries, referred to earlier, but also the practitioners of institutionalised female infanticide in pre-modern populations in high-caste Northern India and in China (Dickemann, 1979, 1981; Boone 1988). These practices might seem at first sight to run counter to inclusive fitness principles in so far as they are embodied in kin selection. If parental care is a special case of caring for close relatives, how can it be that kin of equal relatedness (sons and daughters) can be discriminated against either by age or sex? The sacrifice of certain offsprings' reproductive success (and even their lives) to the long-term fitness goals of the lineage clearly illustrates that an organism's promotion of the inclusive fitness of its genes is a comprehensive goal achieved in a complex manner (Hamilton, 1964; Alexander, 1974; Dawkins, 1979; Flinn, 1988d; Borgerhoff Mulder, 1989; Volland, 1989; Davis & Daly, 1997).

Clearly some cultural behavioural traits are inimical to the fitness interests of some individuals, while being strongly in the fitness interests of others. This is a situation that obtains in modern societies, that existed before the demographic transition, and no doubt also existed in the putatively more egalitarian societies of hunter-gatherers, to judge by evolved versions of those societies extant today (Chagnon, 1979; Betzig, 1982).

#### 1.1.6. TRADITIONAL AND MODERN SOCIETIES

The behavioural ecological approach means that, useful as studies of traditional societies are, as a way of gaining some insight into the historic conditions under which aspects of human behaviour might have evolved, especially when those societies were still functioning in natural fertility modes and before the intervention of modern medicine, such populations must still be seen in the context of their own particular physical and historical environments (Marlowe, 2004). A very few traditional societies remain that are almost wholly hunter-gatherer in their mode of subsistence. But even these differ hugely in the habitats they occupy and the balance they maintain between hunting and gathering, the proportions of meat to plant food eaten: compare, for instance the Tanzanian savannah-dwelling Hadza's largely plant-based diet with the forest-living Paraguayan Ache's of more than 50% meat and the Arctic Inuit's almost total reliance on hunting (Hill, 1982; Kaplan *et al*, 1987; Speth, 1989; Hawkes *et al*, 1991; Hill & Hurtado, 1996). Some otherwise traditional societies incorporate horticulture into their subsistence, like the Yanomamö of Venezuela who derive three-quarters of their caloric intake from garden produce (Hames, 1990); other pre-industrial, agrarian societies display a differing balance between pastoralism and crop cultivation. But just as one may compare differences and similarities between one hunter-gatherer people and another or between one agricultural society and another, so one may take the same approach to post-industrial societies.

There is no more reason to think that the people who make up modern, post-industrial societies do not behave adaptively, (even if every individual does not do so), than that the members of other, more traditional types of society do not behave adaptively. Indeed, the huge and global spread of the human population since the demographic

shift is clear *prima facie* evidence of the successful contributions to fitness of the cultural changes attendant on the adoption of agriculture, the growth of urbanisation and the exponential development of technology.

## 1.2. THE FUNCTION OF THE MENOPAUSE

### 1.2.1. OBJECTIVES OF THE THESIS

This thesis attempts to shed light on the function of a physiological event common to all women, susceptible to very little secular variation, a non-facultative and irreversible cessation of fertility, well before the senescence of other somatic systems (Pavelka & Fedigan, 1991; Peccei, 2001). The median age of the menopause around the world is around 50 years of age, with some small variations of a few years between populations and larger variations within populations, (smoking and perhaps socio-economic conditions are factors which lower the age of onset), (van Noord *et al*, 1997; Peccei, 1999).

Three principal questions arise in examining the possible function of the menopause:

1. Is the menopause an adaptation which evolved at some unspecified time in the past to meet a particular environmental challenge?
2. If so, are we able to suggest a time and/or hypothesise the nature of this environmental challenge?
3. Are we also able to identify, in today's altered and variable modes of existence, what evolutionary pressure *maintains* the menopause across all types of population from those still living in traditional, rural hunter-gatherer societies, through different kinds of agrarian societies, to women in highly urbanised and technologically underpinned, post-industrial societies?

This introduction will approach question 1 by summarising the arguments for and against the menopause as an adaptation, question 2 by outlining some possible hypotheses for the environmental challenge which was met by the evolution of the menopause and question 3 by outlining the two principal hypotheses for an adaptive function for the menopause. The remainder of the thesis, in the succeeding chapters, will use a variety of data to test aspects of these latter hypotheses.

## 1.2.2. IS THE MENOPAUSE AN ADAPTATION?

In spite of the clear and relatively invariable physiological aspects of the menopause, it is by no means generally agreed that the menopause is an adaptation generated by a specific set of environmental circumstances at some time in the prehistory of the genus *Homo*.

### (i) An Epiphenomenon

Arguments against the menopause as adaptation include the suggestion that the menopause is simply an artefact of the extension of average life expectancy under post-industrial conditions of superior hygiene and medical advances. This possibility is countered by evidence from both biblical and classical sources of a post-menopausal period in women 2,000 years ago and earlier (Peccei, 2001), and by looking at life expectancies of populations as adults rather than those at birth: for example, in a modern !Kung population whose mean life expectancy at birth was 34.57 years, 40% were still alive at age 50 (Howell, 1979); and in a population of Swedish females in 1828, while life expectancy at birth was only 43.6 years, 41% of the population were still alive at age 60 (Pavelka & Fedigan, 1991).

### (ii) Reproductive Senescence

Others claim that menopause in human females requires no evolutionary explanation because the cessation of reproduction flows from the increase in anovulatory cycles and chromosomal aberrations due to ageing, and is consistent with the reproductive senescence that can be found in other mammals, especially primates, when removed from the predation pressure of the wild and kept in captivity. Pavelka & Fedigan (1991) review a number of the studies of primate reproductive senescence, relating to rhesus monkeys, pigtail macaques and chimpanzees respectively, and find that, in most cases, reproductive senescence cannot be separated from the ageing of other physiological systems, that reproductive senescence sometimes co-exists with continued cycling in conspecifics of the same age and that conclusions are drawn too often from fertility decline in single individuals (Hodgen *et al*, 1977; Graham *et al*, 1979; Gould *et al*, 1981).

Packer and colleagues' field study of lions and baboons is also cited in relation to the reproductive senescence explanation for human menopause. The post-reproductive period evident in each mammal is suggested to arise from animals reaching an age at which selection is too weak to oppose the force of reproductive senescence (Packer *et al*, 1998). Yet Packer and colleagues allow a different percentage of the lifespan (maximum and average) as a post-reproductive period for each species, in accordance with the time it takes to "fledge" the offspring, with the greatest percentage hypothesised for humans. They rule out this differential reproductive cessation as an adaptation on the basis that juvenile (not infant) survival is affected neither by maternal mortality nor by subsequent reproduction. Yet they acknowledge that mothers do not invest in subsequent offspring until the prior brood has been "fledged", something that specifically does not happen in humans. This, at the least, indicates a phenomenon worth investigating (Sherman, 1998; Hill & Hurtado, 1999).

Other animals, such as rats and mice bred for the laboratory, can have their cyclicity manipulated through dietary and other regimes. For instance, restricting the food intake of mice interrupts cyclicity and retards the rate of follicle depletion, enhancing reproductive potential at later ages (Nelson *et al*, 1985). But the question arises whether, outside of the laboratory, female rodents would ever be subject to continuous oestrous cycles, leading to early cessation of cyclicity. In any case, mice and rats do not have an abrupt and permanent cessation of cyclicity during ageing but manifest a series of transient changes preceding persistent anoestrus (vom Saal *et al*, 1994). There remains the as yet unexplained phenomenon of the short-finned pilot whale, where 25% of females, killed or found dead in the wild, upon examination are found to be post-reproductive (Marsh & Kasuya, 1984).

These non-human cases studies might, of course, suggest mechanisms for the evolution of the menopause, whether it is adaptive or not, and ultimately, the study of present-day adaptiveness must depend on fitness outcomes. But since we are only able to study women who experience the menopause, we cannot empirically test hypotheses relating to its origins, but only observe the fitness outcomes relating to its maintenance. It is, of course, possible that the menopause did not arise as an adaptation but may be adaptive in its present-day environmental circumstances. However, certain physiological factors suggest otherwise.

### **(iii) The Physiology of Menopause**

The menopause, a universal human trait, occurs at around 50 years of age, a mere half-way through the maximum potential human lifespan. Maximum human lifespan (as opposed to average life expectancy at birth) is believed to have remained constant over the evolutionary history of *Homo sapiens* (Smith *et al*, 1989) and to be set at between 100 and 115 years as a characteristic of the genotype, (Cutler, 1981), or perhaps potentially even longer (Carey & Judge, 2001). Judge and Carey believe that even before the advent of modern humans there was a substantial post-reproductive period in female hominid life history (Judge & Carey, 2000). But taking current average female life expectancy as a marker, (80.15 years in the UK in 1999), a woman at menopause in the UK can look forward to around 30 years of post-reproductive life. This sets her apart, not only from other mammals, but also from the male of her own species, who experiences at a later age a decline in reproductive function that is more in line with his general senescence.

A few months before birth, a female foetus carries nearly 7 million oocytes (ovarian follicles) in her ovaries. By birth this number has dropped to about 1 million through a process of programmed cell death – atresia. There are 250,000 remaining at puberty, about 400 are ovulated during the reproductive years, yet only about 1000 remain at the commencement of the menopause. That number seems to be a critical threshold in maintaining the hormonal feedback loop which leads to the maturation of the ovarian follicles; below this threshold it appears there is insufficient ovarian oestrogen to stimulate FSH (follicle-stimulating hormone), which in turn stimulates ovarian oestrogen (Pavelka & Fedigan, 1991; Boyd & Silk, 1997).

Proximal explanations that the survivability of oocytes in general hit a natural 50-year barrier are not borne out by the greater age of reproduction in, for instance, the long-lived Elephantidae. It is true that the frequency of chromosomal abnormalities in human pregnancies rises with maternal age but this occurs well before and apparently independently of an age-related decline in uterine function; spontaneous abortion rises sharply at around only 37 years of age (Stein, 1985). Furthermore, human males continue to produce viable gametes into old age, even though they too become more liable to produce abnormalities through deleterious mutations in sperm cell

replication, as they get older. According to Gosden & Telfer (1987), human females have the number of oocytes predicted for a mammal of their body weight at maturity. So it seems telling that the sharp rise in spontaneous abortions due to chromosomal defects, described by Stein (1985), occurs at almost exactly the same age at which oocyte numbers begin to fall sharply. Faddy and colleagues produced a bi-exponential model of the decline in follicle numbers which shows a steady but shallow decline from birth to 37.5 years, followed by a sharp decline to menopause at 50. Furthermore, if the atresia rate, which doubles at  $37.5 \pm 1.2$  years, maintained the same level of decline it displays up to that age, the threshold number of 1000 follicles would not be reached until past the age of 71 years (Faddy *et al*, 1992). Again, perhaps not co-incidentally, around 70 years is the age at which the human male's steady but shallow decline in fertility takes its sharp downward plunge (Rose, 1991).

#### **(iv) Life History**

The life history of an organism involves the variable allocation of its energy towards somatic growth and maintenance, reproduction, rearing offspring to independence and the avoidance of death. Finite energetic resources must be traded off between one biological function and another. Within reproduction, further trade-offs might be expected between current and future reproduction and quality versus quantity of offspring. Natural selection is assumed to shape the timing of these life events in order to maximise fitness (Charlesworth, 1980; Stearns, 1992; Smith & Tomkins, 1995; Kaplan, 1996; Hill & Kaplan, 1999).

Questions that arise from the human female life history are:

1. Why do human females cease to reproduce at the life-stage they do? Would they not maximise reproductive success by continuing to reproduce for another 20 years (as men do even with their increasingly unreliable gamete production)?
2. Is there a trade-off between quantity and quality of offspring and does quality entail a prolonged period of dependence in the human juvenile? What is the function of the slow growth of the human juvenile? Is it to grow a bigger brain?



(a) Optimality Theory

The answer to the first question is best supplied by the theory of optimality. As suggested first by David Lack in relation to altricial birds, the optimal clutch is the one that produces most fledglings, ie the greatest number of birds that the parents can raise to independence in the particular environmental conditions in which they find themselves (Lack, 1947, 1966). However, a trade-off approach to optimal clutch size is offered by the reproductive effort model, which predicts that either decreasing returns from reproductive investment or mortality that accelerates with reproductive investment will limit reproductive effort (Stearns, 1992). Although, unlike most birds and many mammals, humans reproduce in a series of characteristically single births, the same evolutionary pressures obtain in relation to optimising the number of offspring that can be raised to independence, given the constraints imposed by the environment in terms of factors like climate, resource availability and predation, as they bear on populations as a whole or on specific sub-groups within populations (Blurton Jones, 1986; Borgerhoff Mulder, 1992; Mace, 1996).

(b) Juvenile Growth

In response to the second question, Charnov's model (Hawkes *et al*, 1998) finds the key to the evolution of human life history traits in adult mortality. The model assumes that given adult mortalities, selection sets the period of independent growth according to the trade-off between the benefits of growing longer versus those of reproducing sooner. The lower the energy allocated to the avoidance of death, the greater the energy available to grow for longer. The greater the time taken to reach maturity, the greater are the benefits of larger size, one of which may be to develop a larger brain and extend learning capacity. This model, unlike other hypotheses about the slow growth of human juveniles, draws "time's causal arrow" from long childhood to learning and not the other way round. Hand-in-hand, though, with prolonged juvenile growth, go shorter interbirth intervals than for any other great ape (6 years for orangutans compared to 2.8 years, the mean of the median for !Kung and Ache), making humans unique among K-selected species in having to rear a number of dependent offspring at the same time (Hawkes *et al*, 1998; Hill & Kaplan, 1999). Under the analysis of Hawkes and colleagues, the menopause represents not an early cessation of fertility but an extension of post-reproductive longevity, which evolved as a result

of the differential fitness of those post-reproductive women who were able to assist their daughters' fertility.

(c) Menopause Costs

The human female trade-off involves a further cost to put into the cost/benefit balance, in that, once women pass through the menopause, they become more susceptible to diseases of the circulatory system and cancers. This is not simply a case of the weakening force of natural selection allowing disease propensities to survive that would be selected out at an earlier age. The profile for adult mortality in the USA (excluding maternal deaths, motor vehicle and violent deaths) differs substantially between men and women. While male and female profiles for neoplasms (cancers) are virtually identical, there is a clear differential between male and female deaths from cardiovascular disease: a relatively small female advantage in the early reproductive years increases through the later reproductive years, giving women their maximum advantage in their late 40s or 50s, and only creeps back up from their 60s towards parity with men around the age of 90. It seems clear that both oestrogen and progesterone offer protective effects against cardiovascular disease, reducing overall female mortality rates until after the menopause (Hill, 1996). Other conditions mediated by oestrogen loss may include gustatory dysfunction and cognitive deficits, and, in some cases, depression (Avis, 2003). The menopause is also associated with increased risk of osteoporosis, leading to possible bone fracture, though there is considerable variation across populations and therefore a suggestion that environmental (including dietary) factors might affect its incidence (Stini, 1995).

(v) **General Senescence**

In outlining his view of senescence as an unfavourable character that ought to be opposed by selection, Williams suggested that genes might have opposite effects on fitness at different ages, or rather in different *somatic environments*. These effects may be antagonistically pleiotropic, selected to be beneficial in youth at the cost of being deleterious later. A similar and complementary idea is that of mutation accumulation in which detrimental mutations that act only in later life will not be eliminated because the force of natural selection is weaker with age (Williams, 1957; Stearns, 1992; Partridge & Barton, 1993). Williams also holds that senescence should always be a generalised deterioration and never due to the changes in a single system.



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viewed at some period in prehistory in which high uncertainty of paternity combined with males' higher mortality rates, is a sufficient explanation for female menopause (Gaulin, 1980).

Differential parental investment, in the sense that parents may discriminate between daughters and sons is illuminated by the Trivers-Willard hypothesis that, depending on the condition of the mother, sex ratios at birth will be skewed. If the mother is in poor condition, the skew will be towards daughters, since female offspring in poor condition will face less competition in future mating than male offspring in poor condition. The greater variance in male reproductive success, brought about by intra-sexual competition for mating opportunities, means that males in poor condition are likely to be outcompeted for mates by better condition males. If, on the other hand, the mother is in good condition, then the skew will be towards the production of male offspring in good condition who will be able to outcompete their rivals for mates (Trivers & Willard, 1973). Parental control over mating relationships, already discussed as an element contributing to inclusive fitness, is another means to effect differential parental investment: sons other than the eldest are discriminated against in primogeniture systems; unwanted daughters in certain societies are the objects of infanticide. But a particularly widespread device is the enforcing of daughters' premarital chastity and of parental choice of marriage partners, both to maximise certainty of paternity of any daughters' offspring and to ensure that mating arrangements contribute financially and socially towards daughters' reproductive success and therefore parents' own fitness (Dickemann, 1979, 1981; Flinn & Low, 1986; Flinn, 1988b, 1988d).

### 1.2.3. POSSIBLE ORIGINS OF THE MENOPAUSE

Major changes in physiology or social organisation among early hominids are believed to be associated with climate, habitat or dietary change, or a combination of these. For instance, a prolonged learning period in juveniles, whether the cause or consequence of a longer growth period, was proposed by Hawkes *et al* (1998) to be tied in with the ecological skills of foraging. Similarly, the costs involved in foregoing continued reproduction suggest a change in the environmental ambience for which various candidates have been proposed by researchers.

### **(i) The Environmental Challenge**

Candidates for the possible environmental challenges that might have caused human females to forego potential fitness benefits from future offspring in favour of investing in their existing offspring must be speculative. As Dunbar points out, distinguishing between possible explanations for an observed phenomenon means that not only must we understand the biological mechanisms that brought the phenomenon about but also, in suggesting hypotheses for the origins of the phenomenon, we may only claim that the theory offered (after due marshalling of evidence and argument) is not excluded as a possible explanatory candidate (Dunbar, 1982).

Even accepting Charnov's model in which human adult longevity drove prolonged juvenile development, leading to greater encephalisation, greater opportunities for learning and the need for greater parental investment, the greater burden is placed on the female, who has more to gain from continuing current investment than the male; he may trade present lower investment for increased future mating opportunities, while she has not only made a greater level of investment already but would also have to make a greater level in the future. Nonetheless, there is something of a mystery about what might constitute the environmental challenge which wrought such a fitness advantage for the first woman who experienced an early cessation of fertility that it spread to fixation and has maintained itself ever since.

### **(ii) Human Origins**

In the absence of completely coherent tangible evidence many hypotheses have been proposed for the evolution of hominid social behaviour. It has been suggested, for instance, that the occupation of drier and more seasonal habitats 5-2 million years ago, with a consequent greater reliance on meat-eating, drove the development, in a context of male-bonded alliances, of family groups to accommodate the need for paternal as well as maternal care for their increasingly large-brained offspring and the emergence of a discernible division of labour between hunting, principally a male activity and gathering, principally female (Foley, 1989, 1996). Around 300,000 years ago, it is suggested, an important shift took place in the rate of hominid encephalisation, when increasing group size created the environmental challenge that led to the development of language (Aiello & Dunbar, 1993).

### **(iii) Hunting**

Supporters of meat-eating as an evolutionary lynchpin point to the complex of abilities required in efficient hunting, both in terms of the skill and co-ordination needed, the co-operation between hunters, the necessity of sharing large food packages and the consequent tendency to increased grouping that would lead to lower mortality and favour a longer juvenile period and increased cognitive skills (Hill, 1982; Kaplan *et al*, 2000). Other researchers counter that the early history of meat-eating is more concerned with scavenging than hunting (Blumenschine, 1986, 1989; Cavallo, 1989) and in any case is not a sufficient condition for the development of larger brains. Chimpanzees hunt, though not on the same scale as humans; there are other carnivores whose diet is exclusively meat, such as lions and hyenas, whose social systems testify to the complex, co-operative behaviour required for the most effective hunting, but again this is an insufficient condition for the development of proportionate encephalisation at the level displayed in humans.

### **(iv) Gathering**

Speth and others have argued that, insofar as the hunting hypothesis involves reliance on an argument about the value of the increased protein intake obtained through hunting, the human requirement for protein has been exaggerated and in any case can be derived perfectly adequately from plant foods or other opportunistically acquired animal food sources, such as invertebrates, fish and small animals (Speth, 1989, 1991; Oftedal, 1991; Southgate, 1991; Sept, 1994; Stewart, 1994). O'Connell and colleagues propose that the shift towards drier, more seasonal conditions, resulting in more open habitats in tropical Africa around 2 million years ago, led to the need to exploit tubers (O'Connell *et al*, 1999).

### **(v) Cooking**

Whereas the greater availability of meat on the savannah offered a readily digestible source of energy from marrow and fat, crucial to the hypothesis of the exploitation of tubers is the invention of cooking. Although traces of fire in hominid contexts have been dated to around 1.5 million years ago, the earliest evidence of the use of controlled fire dates to no earlier than 500,000 years ago, and it is more probable that systematic use of fire did not arise till 200-300,000 years ago, concurrent with and

probably facilitating the movement of populations into western Europe under glacial climatic conditions (Clark & Harris, 1985; James, 1989; Bellomo, 1994).

#### **(vi) Nutrition**

Cooking does more than improve the nutritional yield of simple starches, it also serves to make available to the human diet range many plant sources, protected by toxins, and secondary compounds indigestible in the raw state (Brower Stahl, 1984). Furthermore, although marrow is easily digestible and other raw meat can be made more so by breaking down the connective tissue, cooking serves to eliminate many of the pathogens found in game animals (Fessler, 2002). Hawkes and colleagues connect the availability and exploitation of tubers with a need for female foragers with dependent infants to receive help from female relatives, since younger human juveniles do not have the strength and skill necessary to extract tubers (Hawkes *et al*, 1989, 1997; O'Connell *et al*, 1999). Yet several species of baboon extract tubers as part of their diet, as well as other non-primates. Rather than the difficulty of tuber extraction, it is the invention of cooking, arising from the control of fire, which is the more likely candidate as an environmental challenge of sufficient magnitude to lead to the cascade of effects, physical, cultural and social, which were likely to bring about such a profound evolutionary change as the menopause.

#### **(vii) Social Change**

Wrangham and colleagues take up the idea of cooking as a catalyst for evolutionary change, starting with the practice of tuber extraction, but developing a more extensive hypothesis of its scope and thus its effects on human social systems (Wrangham *et al*, 1999). Because of changes in dentition and a reduction in sexual dimorphism with a sharp increase in female body size, they propose that cooking originated in the period of *Homo erectus*, around 1.8 to 1 million years ago; thus they rule out *circa* 200,000 years ago, when early modern humans moved into the colder areas of Europe, the period favoured by some as a likely impetus for the introduction of cooking (Brace, 1996). The Wrangham social hypothesis is somewhat fanciful, with females forming alliances with single males to protect themselves from other males who would otherwise scrounge their hoarded food supplies. It provides, though, a neat counterpoint to the hunting hypotheses of the origins of human social behaviour, in which females do the scrounging of surplus meat and attach themselves to single

males to ensure a ready supply for themselves and their offspring. Perhaps one might posit that meat-eating (whether hunted or scavenged) brought one major change to human energetics and physical and social development in the period of *Homo erectus*, while proposing that the cooking and processing of otherwise indigestible food types brought another to early modern man, around 300,000 years ago.

### **(viii) Anatomical Change**

Aiello and Wheeler support this two-stage encephalisation process in proposing their expensive tissue hypothesis, which sees the energy needed for the brain expansion of *Homo erectus* coming from a reduction in the size of the gastro-intestinal tract, which would otherwise, together with the liver, be as metabolically expensive as the brain. This reduction in gut size, they suggest, was facilitated by the dietary change of increased meat-eating, while cooking served as a technological way to externalise part of the digestive process (Aiello & Wheeler, 1995). Since most brain growth occurs *in utero* and during the post-natal period before weaning, the costs of brain growth are borne by the mother. Human beings are not unique in the phenomenon of infant post-natal brain development. Chimpanzees, for example, are born with a neonate brain mass 47% of that of an adult, reaching adult size by the age of 4 years; human neonate brains, on the other hand, have only 25% of adult mass and by the age of 4 years have reached only 84%. Even at the age of 5 years, in spite of the human infant's greater altriciality, its energetic requirements are three times as great as a chimpanzee's (Foley & Lee, 1991). Clearly then a correlation between the increase in brain size and the increase in female body size in *Homo erectus* makes sense, but any consequent changes in hominid social organisation must be speculative (McHenry, 1994). McHenry proposes, however, that other recognisable human life history parameters, such as age of weaning, length of interbirth intervals, gestation length, age at maturity and age at first breeding did not develop until the period 500-200,000 years ago. Tellingly, Wrangham and colleagues add to the benefits of cooking the effect that making food more digestible decreases interbirth intervals (Wrangham *et al*, 1999).

### **(ix) Menopause Origins Hypothesis**

The stage is set, therefore, for us to hypothesize that somewhere between 500,000 and 200,000 years ago, the development of cooking enabled a step-change in the availability and exploitability of the range of foods that could be utilised by early



modern humans. One of the by-products of this development, apart from a further leap in brain size and concomitant increase in neonatal altriciality, was the reduction in human interbirth intervals, setting up a conflict between, on the one hand, the trend towards greater quality of offspring, obtained through longer growing times and increased brain size, and the opportunities that encephalisation allowed for increased learning of the burgeoning skill set, and, on the other hand, the trend towards producing a number of increasingly altricial offspring at relatively close intervals with overlapping levels of dependence.

The life history and pleiotropic perspectives meld together here to make it inevitable that the volume of energy expended by the human female on producing offspring (though at a later absolute age than other primates) at a *relatively* early age of first birth, and rearing (and instructing) them simultaneously rather than sequentially, had to be compensated for by the cessation of reproduction by an age which would forestall the insurmountable task of trying to accomplish the same set of reproductive objectives in the later years, not least because the early years' objectives were still incomplete. In this scenario and others like it, such as Peccei's, (1995), to continue reproducing and rearing offspring until the age of 70 would have been quite simply impossible. To slow down reproduction into the later years by increasing interbirth intervals would have run into the problems of increasing deleterious mutations and more taxing physical demands through increasing general senescence, leading to reduced life expectancy; all these factors support the life history trade-off hypothesis of investing in reproductive effort during an optimum period. It is not that human females could not have increased their interbirth intervals and carried on reproducing till they were 70 years old; it is, rather, that those females who concentrated their reproduction optimally would have left more descendants.

Human learning involves a cumulative aspect that ultimately led to (or was accelerated by) the invention of language (Tomasello, 1999). Human females could have gone on producing and nurturing offspring at a purely physical level beyond their 50s, allowing for the increasing difficulties described above and with their younger children being themselves grown and parents. But the older offspring of those mothers whose investment was limited by continued reproduction and the younger offspring of the same mothers whose investment was curtailed by maternal

death, would have been at a huge disadvantage in their long-term learning of the skills, cognitive and otherwise, and acquisition of the cultural processes, which would have begun to be cumulatively transmitted, attendant on such a revolutionary invention as cooking. For the first woman for whom a chance mutation halted fertility at the mid-way stage of her potential lifespan, the opportunity occurred to transmit to her offspring all her accumulated culture and learning to a level which enabled her offspring to outbreed other women's children not similarly equipped. For Tomasello, the emergence of uniquely human cognitive skills occurred somewhere around 300,000 years ago, with a genetic event which changed the nature of social cognition and opened the way for a new social-cultural transmission process (Tomasello, 1999). He does not say what the genetic event was, but the menopause must be a very good candidate.

#### 1.2.4. THE MAINTENANCE OF THE MENOPAUSE

There are two principal competing theories for the function of the menopause, the grandmother hypothesis and the good mother (or stopping early) hypothesis. The problem with supporting either hypothesis as a theory about the *origins* of the menopause with studies of contemporary menopausal women, even if conducted in traditional hunter-gatherer societies, is that examining the behaviour of a group of women who are already post-menopausal does not thereby necessarily explain how they came to be menopausal in the first place. Sear and Mace (2000) acknowledge that their findings may provide an explanation for the *maintenance* of the menopause. This argument applies too, to a certain extent, to the good mother hypothesis, even where pre-menopausal maternal behaviour is being studied, since it could be argued that mothers are investing in offspring with fore-knowledge of the future occurrence of their menopause. It may also be the case that menopause is maintained by different factors from those that led to its genesis in the distant past (Harrison *et al*, 1988). But its universality across every type of society and its apparently tight genetic control would suggest that aspects of human life, physiological, social or cultural, or all three, support its continuance as a valuable human trait. In proposing his theory of reciprocal altruism, Trivers is careful to distinguish its features from those of kin selection, yet he accepts that reciprocal altruism may have its roots in kin selection in the early history of hominids (Trivers, 1971). It can similarly be argued that studying

the behaviour of women, both before and after the menopause, in whatever form of society is chosen, while being directed principally at factors that maintain the menopause, might also provide useful clues to its origins.

### **(i) The Grandmother Hypothesis**

Lancaster and King (1985) suggest that all the adaptive hypotheses for the origins of the menopause involve some form of parental investment and the grandmother hypothesis can partly be seen in this light. As proposed by Hawkes, O'Connell and Blurton Jones, postmenopausal women of the hunter-gatherer Hadza in Northern Tanzania spend more time in food acquisition than younger women, thus helping their daughters to provision offspring, and thereby increase their own fitness (Hawkes *et al*, 1989, 1997, 1998). Hill and Hurtado, however, from their studies of the Ache, found that their grandmothers worked less than other women and that fertility of sons' and daughters' offspring was not enhanced by the presence of postmenopausal mothers or grandmothers. Nor did the presence of grandmothers, when the Ache still lived a hunter-gatherer existence in the forest, have any significant effect on infant mortality, though maternal mortality increased child mortality fivefold and paternal mortality increased it threefold; and if mother died in the first year of an infant's life, its mortality was 100% (Hill & Hurtado, 1991, 1996). Sear and Mace found that in an agricultural society in the Gambia, maternal grandmothers improved the survival of their grandchildren by enhancing their nutritional status, but daughters' fertility was improved only by paternal grandmothers, that is their mothers-in-law (Sear *et al*, 2000, 2003). In studies of historic European populations, maternal grandmothers reduced the mortality of weanlings in 18<sup>th</sup> and 19<sup>th</sup> century north Germany, while in a similar period in Finland and Quebec, post-reproductive women gained an extra two grandchildren for every ten years they survived beyond age 50 (Volland & Beise, 2002; Lahdenperä *et al*, 2004).

Hadza grandmaternal investment is variable. The more productive foraging of post-reproductives, leading to differential weight gain of daughters' offspring, took place only in the dry season, when large stones had to be levered to extract quite deeply rooted tubers. Hadza grandmothers do other things than food-sharing; they baby-sit, they do housework and generally help out. Such grandmaternal assistance as a whole might be characterised as opportunistic, useful activities that the post-menopausal

female finds herself with the time to perform. Furthermore, of the eight Hadza subjects, only two were maternal grandmothers; two were paternal grandmothers (though the hypothesis focuses on the benefits of post-menopausal women helping daughters), two were mothers' sisters, one was a great-grandmother and one was a more distant relation, not specified. Therefore, what the Hawkes and colleagues' study has demonstrated is an example of female alloparenting, a valuable helping-at-the-nest behaviour, contributing to inclusive fitness, but not necessarily a peculiar strategy of maternal grandmothers (Turke, 1988; Flinn, 1988d; Hawkes *et al*, 1989; Lee, 1989).

### **(ii) The Good Mother Hypothesis**

Peccei, in proposing the good mother hypothesis, suggests a *Homo erectus* origin for the menopause, in which increasing secondary altriciality in human infants, caused by increased encephalisation, required increased maternal investment in current progeny, not only through lactation but during continuing brain growth thereafter, leading to a trade-off against investment in future reproduction (Peccei, 1995, 2001). She maintains, however, that offspring nutrition with its energetic costs for mothers, is not the whole answer. Hadza and Ache males, for example, provide more calories and protein through hunting than do females through foraging (although, as Hawkes and colleagues point out, not necessarily to their own wives and children), and therefore subsidize the energetics of reproduction. Males and females have an equal need for surviving offspring. But women are better off investing in the survival and fertility of their own sub-adult offspring than in grandchildren or non-descendant relatives.

Peccei's is a theoretical approach and empirical evidence has been hard to come by to support a good mother/stopping early hypothesis. Strassmann and Gillespie, observing that tests hitherto had found a positive relationship between human female fertility and reproductive success, were the first to adduce evidence for a non-linear relationship between human female fertility and reproductive success. Using three different methods of analysing reproductive data from the Dogon people of Mali, in West Africa, they calculated that a predicted maximum reproductive success of  $4.1 \pm 0.3$  surviving offspring was attained at a fertility of 10.5 births. They also concluded that assumptions that contemporary foragers behave more adaptively than agriculturalists or that adaptive fertility behaviour ceased with the Neolithic

revolution some 9,000 years ago were not supported by their results (Strassmann & Gillespie, 2002).

### **(iii) The Mixed Model**

Other researchers have reached the conclusion through mathematical modelling that neither the good mother hypothesis nor the grandmother hypothesis are sufficient on their own to account for the evolution of the menopause but that taken together they represent a complex interplay between life history parameters that is not simply the sum of their constituent parts (Shanley & Kirkwood, 2001; Grainger & Beise, submitted). Shanley and Kirkwood point out that the effect they demonstrate is not great, but the point is, surely, that *once having got started* it required no great effort to maintain the menopause. Marginal benefits in one generation would have amounted to much greater accumulated benefits in fitness terms over time. The first menopausal mother very soon became a post-menopausal grandmother; the maternal capacity to impart skills and learning to offspring and the subsequent grandmaternal opportunity to oversee the continuance of investment already made, offered advantages that improved the quality, survivability and future reproductive success of those offspring, compared to their rivals. In any case, the argument that factors that maintain an adaptation do not have to be equivalent to, but may grow out of factors that contributed to its origin, means that new benefits could have accrued over time. It is these benefits, one might argue, that are visible as variable factors in maternal and grandmaternal behaviour in modern, post-industrial societies today.

### **1. 3. OUTLINE OF THE THESIS: PARTS I & II**

The present study is not designed to compare fitness outcomes between subjects according to the varying degrees of investment received from mothers and grandmothers. It is, rather, intended to throw some light on the *nature* of women's investment in their offspring and their offsprings' offspring that might serve to maintain the menopause in a modern, post-industrial society. The chapters that follow will attempt to explore the differing attitudes and behaviour of mothers and grandmothers towards their children and grandchildren in the UK in the 21<sup>st</sup> century, in an endeavour to answer three main questions:

QUESTION ONE: Is there any difference between maternal and grandmaternal investment, not just in volume but also in kind and direction (sex of offspring to whom directed)?

QUESTION TWO: If there is, how are those differences expressed quantitatively and qualitatively?

QUESTION THREE: What are the implications, if any, arising from such differences for an understanding of the adaptive origins or function of the menopause?

Part I will examine maternal attitudes and behaviour. Chapters 2 to 4 will describe the methodology and analyse data from the author's own survey, carried out in 2002-2003. Chapter 5 will describe the methodology of the Family Expenditure Survey of 2000-2001 and analyse data from it relating to step-parenting.

Part II will examine grandmaternal attitudes and behaviour, based principally on a major study of grandparenting, carried out by the British Social Attitudes Survey in 1998. Chapter 6 will describe the methodology of this survey and review the study's findings, and chapter 7 will further analyse the data from the survey, with particular reference to maternal grandmothers.

Chapter 8 will discuss the conclusions to be drawn from the preceding chapters.

# PART I: MATERNAL INVESTMENT IN OFFSPRING

## CHAPTER 2

### METHODS

#### 2. 1. ORIGINAL DATA

The data used for analysis in chapters 3 and 4 were collected through the administering of a questionnaire, designed to elicit details of women's attitudes and behaviour both to their sons and daughters and to their mothers and fathers. Approximately 545 questionnaires were distributed either personally or by email over the autumn and winter of 2002-3; (the number is uncertain because of some copying on of emailed questionnaires). 274 questionnaires were returned.

##### 2.1.1. THE QUESTIONNAIRE

Prior to this distribution, the questionnaire was piloted in order to iron out difficulties of comprehension, ambiguities of expression and to test the willingness of participants to answer the full range of questions. Alterations in layout were made as a result. Where some respondents failed to comprehend that in certain questions one answer at one strength level was required (ie that possible answers were mutually exclusive), even after a precise style of wording was adopted from regularly issued public questionnaires, the possibility of inappropriate multiple answers to such questions was left to be dealt with by a coding protocol (*Appendix B*).

Because the questionnaire was handed out or emailed to volunteers rather than conducted by an interviewer, working face-to-face or by telephone, the questions were confined to the lowest number of pages that would yield the most useful information without setting up a resistance to filling and return because the task was too daunting. Thus the questionnaire (*Appendix A*) amounted to six pages, printed double-sided, encompassing 30 questions plus relevant biographical details, and took from 10-15 minutes to complete.

Biographical information required included:

- Age (in groups, to maximise return of information)
- Marital status
- Parental status
- Numbers, sex and ages of children
- Birth status of children, ie whether they were biological, adopted, step- or foster children
- Employment status
- Grandmaternal status
- Numbers and ages of grandchildren and whether they were children of sons or daughters
- Sibling status
- Sex and age of siblings

The questions covered:

- Attitudes to children, including feelings of closeness to sons compared to daughters, and feelings of closeness of sons and daughters to subjects (their mothers) compared to their fathers.
- Proximity of residence of sons and daughters (measured in time taken to travel between one home and the other in the judgment of the respondent).
- Contact with sons and daughters either in person or by other means, such as telephone or email.
- A range of eight regular activities with sons and daughters, from giving advice, visiting friends and relatives, going shopping, through going on holiday or on leisure activities together, to helping with housework and giving or lending small or large sums of money; the question of what constituted a large or small sum was left to the interpretation of the respondent, since over a range of incomes (about which there was no question) such a sum would vary according to the respondent's perception.
- Contact with and childcare (where appropriate) of the children of sons and daughters.
- Assistance from mothers and fathers when respondents were having their own children.



- Proximity of residence of mothers and fathers (measured in time taken to travel between one home and the other in the judgment of the respondent).
- A range of activities with mothers and fathers, similar to the range with sons and daughters, referring to past activities if parents were deceased.
- Closeness and other feelings and attitudes towards mothers and fathers.

### 2.1.2. QUESTIONNAIRE SUBJECTS

All subjects were adult women aged 18 years or over. Subjects for the questionnaire were sought among the membership of various women's organisations; a number of such organisations were approached, such as the Townswomen's Guild, The Women's Institute, The Co-operative Women's Guild, the National Association of Women's Clubs and the Soroptimists. In most cases, having made contact with the regional branch of an organisation, it was possible to visit local meetings, give a brief explanation of the purposes of the study, without favouring any particular hypothesis, and leave a set of questionnaires with prepaid envelopes to be returned by post. By far the largest contributors were members of Townswomen's Guilds from the Merseyside area; Soroptimists participated by email and came from a number of different regions; questionnaires were also distributed by staff at Blackburne House in Liverpool, an organisation set up for the empowerment through a return to education of women who might not have pursued such goals at school.

Subjects were not asked an income question, but based simply on knowledge of the respondent organisations, the range would have varied from the lowest income level among the mature students of Blackburne House to the highest income level among the Soroptimists, with the vast majority of respondents placed in the middle, though there were a large number of retired women (including widows) among the Townswomen. The ages of subjects ranged from young adults aged 18-25 years to elderly women aged over 75 years. The mean age group was 56-65 years and the median and mode 66-75 years. For those women seen at meetings the racial profile was overwhelmingly white; it is not possible to say what the profile was for unseen respondents, since race was not posed as a biographical details question. The willingness of respondents who returned questionnaires delivered at meetings to go out on a wet Wednesday in winter indicates a level of motivation which may exceed

that of the general older female population. On the other hand, the usual poor return of questionnaires from the unmotivated makes the active search for volunteers an essential tool. It is not suggested that the respondents are wholly representative of their age cohorts, simply that they are a group of women whose responses are worth consideration, more particularly when on certain parameters they do accord with data drawn from more extensive, cross-sectional national surveys.

### 2.1.3. CODING RESPONSES

A number of imputations (the insertion of missing values derived by inference from relevant data in other variables) were made when coding the responses. For instance: there were originally 6 age groups offered for respondents to check but a 7<sup>th</sup> group was imputed for the over 75 year-olds, based on whether subjects had children aged 50 years or over. It is possible that some women under 75 had children over 50 years, but just as likely that some women over 75 had children under 50; thus the imputation seemed reasonable in the circumstances and enabled finer graining in some statistical tests. Some questions, offering mutually exclusive responses to check, occasionally attracted multiple answers; the stronger response (from three levels) was coded, or if two boxes were checked at equal levels, then the alternative of an equal response to both possibilities was coded (for instance in feeling closer to son or daughter or equally close to both, in question 2). Activities with children were coded only for children aged 11 years and older on the basis that only at secondary age do children begin to have some control and choice in what activities parents prescribe for them. In coding grandmaternal childcare, a cut-off of 14 years was used as the age at which practical baby-sitting ends. Where multiple levels of response were offered in questions, responses were coded with highest numbers for the highest level (greatest frequency, greatest distance, and so on) down to 1 for the lowest (and 0 for never, where appropriate) in order to facilitate both graphs and inferential statistics. In relation to parental contact with subject when subject was having children (question 18), since more than one answer was possible, in order to preserve intended frequency/intensity levels, "kept in touch" was considered subsumed by either "dropped in often" or "came to stay", if it was checked in addition to one of these responses. Furthermore, if both of these two latter responses were checked, a new higher-level score was coded (*Appendix B*).

## 2. 2. FAMILY EXPENDITURE SURVEY 2000-2001

The data used for analysis in chapter 5, which looks at differential investment in stepchildren, derive from the Family Expenditure Survey 2000-2001, an annual household survey carried out by the UK ONS.

The UK government's Office of National Statistics carries out an annual survey of all expenditure in a randomly selected sample of households in Great Britain. The sample is a multi-stage random sample with clustering, drawn from the Small Users file of the Postcode Address File. 672 postal sectors were randomly selected after being arranged in strata defined by region, socio-economic group and car ownership. Interviewers call many times to secure maximum co-operation, which entails the participation of every member of the household. Out of 10,406 households approached in the survey of 2000-2001, 6,115 co-operated fully. Households were visited and interviews recorded on portable computers. Information was collected about all household expenditure and in addition every member of the household aged 16 years or over was asked to keep an expenditure diary for two weeks; (children from 7 to 15 years kept a simplified version). The total number of individuals for whom data were available, at some level, was 15,925.

# PART I: MATERNAL INVESTMENT IN OFFSPRING

## CHAPTER 3

### MOTHERS' INVESTMENT IN THEIR CHILDREN

#### 3. 1. INTRODUCTION

If, as has been suggested in the introductory chapter of this thesis, grandmothing emerges from and may be a consequence of mothering, then before we examine what constitutes grandmothing behaviour in a modern, post-industrial society, we ought to look at some of the traits shown by mothers, beyond the obvious and essential maternal investments of gestation, lactation and infant nurture.

We must also try and separate out those traits that women display *qua* women -- (a greater tendency to keep in touch with relatives, especially female relatives, for instance) -- (Dunbar & Spoor, 1995, Salmon & Daly 1996). But whether this potential confound is a cause or a consequence of preferential female investment in daughters (should such a preference emerge) is also a question for proponents of the Grandmother Hypothesis. When groups of Hadza women of all ages go to gather fruit together in the wet season, the post-reproductive women among them may be demonstrating affiliative association with, as much as productive assistance to, their daughters with children. However, the extra work that Hadza grandmothers do in the dry season, with the physical effort required in tuber extraction and the more dispersed nature of the task, support an investment argument; they are carrying out vital energy-consuming activities, to the benefit of their daughters with children, that could not be performed to the same degree if they were still involved in the costly process of reproduction and post-natal nurture. (Hawkes *et al*, 1989, 1997, 1998.)

As both Dench and Euler have demonstrated, grandparents are reluctant to pick out one grandchild for favour (Euler & Weitzel, 1996; Dench & Ogg, 2002); we would expect parents to show the same tendency. Therefore, when we put questions about maternal attitudes (feelings and emotions) to sons and daughters, we expect an element of self-censorship, combined no doubt with a genuine inability to discriminate between children on emotional grounds. On the other hand, questions about physical situations and practical

activities ought to be answered with a greater approximation to the truth (always allowing for unconscious bias even in these response).

So in addition to attitudinal questions, subjects were also asked physical (locational) questions about proximity of residence and frequency of contact and a set of questions about a series of typical activities that mothers might carry out with their children at various ages. (As previously described, a starting age of 11 years was selected for commencement of coding for responses about joint activities with children, on the basis that it was the age up until which children might be seen as being required to participate in various activities with their parents.)

In looking at mothers' behaviour towards their children, it is not necessary to demonstrate that that behaviour is different from fathers', since hypotheses relating to the menopause bear on the cost of mothering behaviour. Whether fathering carries an equal or similar cost is of limited relevance, since there is not seen to be any competing cost for fathers as there is for mothers, in foregoing the supposed alternative of continuing reproduction.

Nonetheless, if mothering behaviour, in so far as it is part of a continuum from the mother's more onerous reproductive and infant-nurturing role, is demonstrably different from fathering behaviour, then it may be possible to throw some light on the difference between maternal and paternal investment when we come to consider subjects' attitudes towards their mothers and fathers in a later chapter.

### 3. 2. GENERAL HYPOTHESIS

The general hypothesis in relation to maternal investment in offspring is that when or if there is a discrimination between either attitudes (emotions or feelings) to sons and daughters or activities with them, the expectation is that daughters will be favoured. This expectation is suggested for a number of reasons:

1. for the broad affiliational reasons referred to above (though this itself requires an explanation – why do these female preferences occur?);
2. to offset a familial inequality, where otherwise boys will thrive at the expense of girls: Hill & Hurtado (1996), for instance, suggest that among the Ache, sisters have their fertility negatively affected by brothers in the family;

3. for grandmaternal reasons, linked to certainty of paternity, in order either to increase the fertility of daughters or to reduce the mortality of grandchildren through supplementing the nutritional input provided by daughters, or both, (in accordance with Hawkes and various others).

### 3.3. ATTITUDES TO SONS AND DAUGHTERS

#### 3.3.1. QUESTIONS

A number of questions arise from these suggested reasons, firstly in relation to attitudes:

1. Do attitudes involving emotions show that feelings towards daughters are significantly different from those towards sons?
2. Is there any difference in the attitudes of sons and daughters towards their parents?
3. How are emotional distinctions associated with practical situations like proximity of residence or frequency of contact, (if at all)?

#### 3.3.2. DATA AND METHODS

In the questionnaire, four questions were asked about emotional ties with sons and daughters: one was asked about closeness of subject to sons and daughters, for response by those subjects with both sons and daughters; two were asked about the closeness to mother and father (excluding deceased or unacknowledged fathers) of sons and daughters respectively, offering some perspective on differences between offsprings' attitudes to mothers and fathers, and the fourth question asked which, if any, of her sons and daughters the respondent had a special relationship with.

For the questions on closeness, respondents were offered three levels of agreement on their own feelings of closeness to sons or daughters and on their perceptions of sons' and daughters' closeness to either mother or father: agree a lot, agree a bit, not sure. For the purposes of statistical analysis, these categories of agreement were transformed into one category with three options for each question, (i) closer to son, closer to daughter or equally close to both sons and daughters; (ii) son closer to subject, closer to father, or equally close to both mother and father; and (iii) daughter closer to subject, closer to father or equally close to both. These transformations were made in order to perform  $\chi^2$  tests.

Affiliative connections but also the possibility of more practical or circumstantial elements in affective ties were covered by the fourth question asking about special relationships with children. Although at first glance it could be argued that logically one could not have a special relationship with more than one child, consideration of how that translates into real-life situations, ie different kinds of special relationships for different reasons, for example a young son is delicate and spends a lot of time off school as a child or a young daughter assists in the delivery of a baby, leads to the conclusion that it is not a problematic question to answer and, while still attitudinal, offers a wider scope for making distinctions than closeness does.

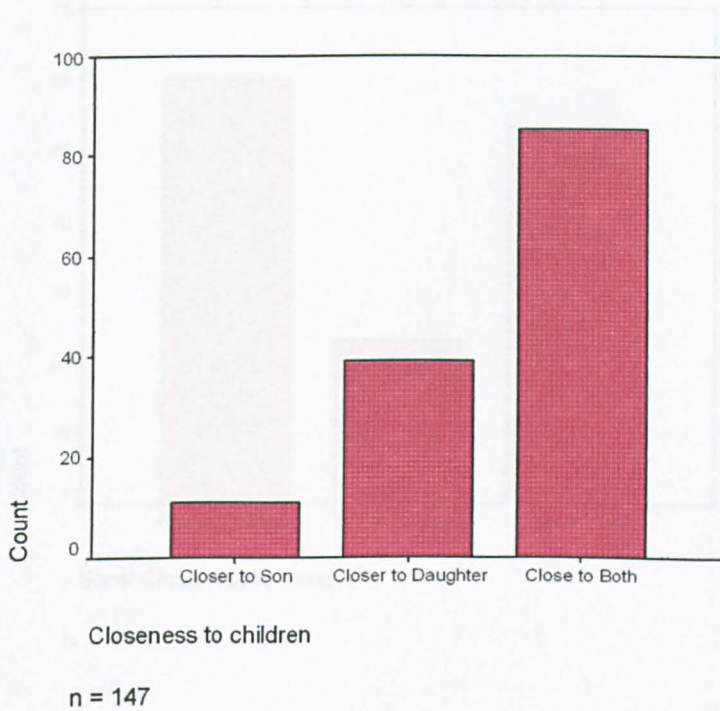
The wording of the original question allowed for discrimination between one or all of the offspring of one sex or the other, as well as no discrimination or the possibility that offspring was an only child; but no strength ratings were offered for responses. From responses a variable was coded to offer a simplified distinction between sons, daughters, all children, no children in particular and 'only' children. But for analysis purposes, 'no children in particular' and 'only' children with whom a subject may or may not have a special relationship but who offer no contrast with other siblings, were excluded.  $\chi^2$  tests were then performed on the remaining possibilities.

### 3.3.3. RESULTS

#### **(i) Closeness of Subject to Sons and Daughters**

To the first question about closeness to sons and daughters a  $\chi^2$  test shows a significant difference in the scores for the three possibilities: closer to son, closer to daughter, close to both,  $\chi^2(2) = 60.041$ ;  $p < 0.001$ .

Figure 3.1: Feelings of closeness to sons and daughters in subjects who have both sons and daughters



If one partitions the  $\chi^2$  into combinations of pairs:

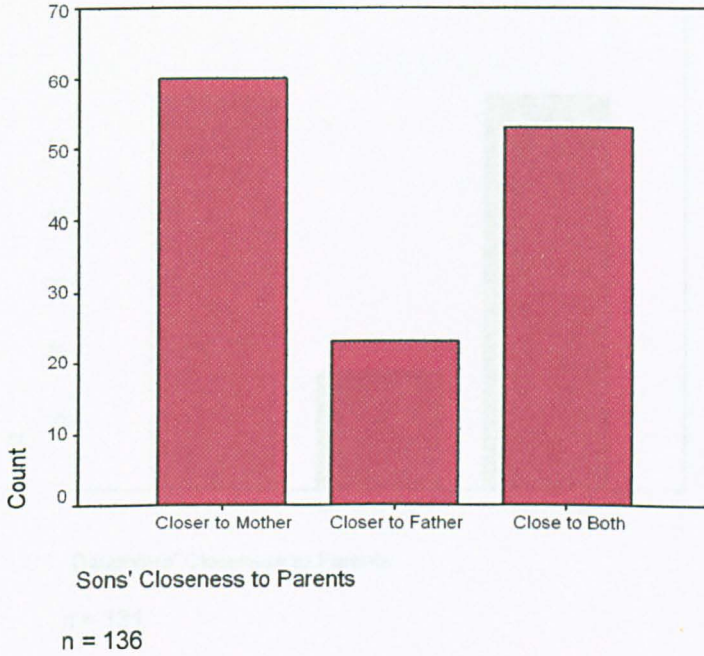
1. subjects are significantly more likely to feel equally close to both sons and daughters than to feel closer to the next largest group, daughters, ( $\chi^2(1) = 16.609$ ;  $p < 0.001$ );
2. where a minority of subjects do report feeling closer to one sex of child than the other, that child is significantly more likely to be a daughter than a son, ( $\chi^2(1) = 14.745$ ;  $p < 0.001$ ).

### (ii) Closeness of Sons and Daughters to Parents

$\chi^2$  tests show a significant difference in the three possibilities for both sons and daughters: closer to mother, closer to father or equally close to both. For closeness of sons to parents,  $\chi^2(2) = 17.044$ ;  $p < 0.001$ .



Figure 3.2: Subjects' perception of sons' closeness to subject (mother) and to father

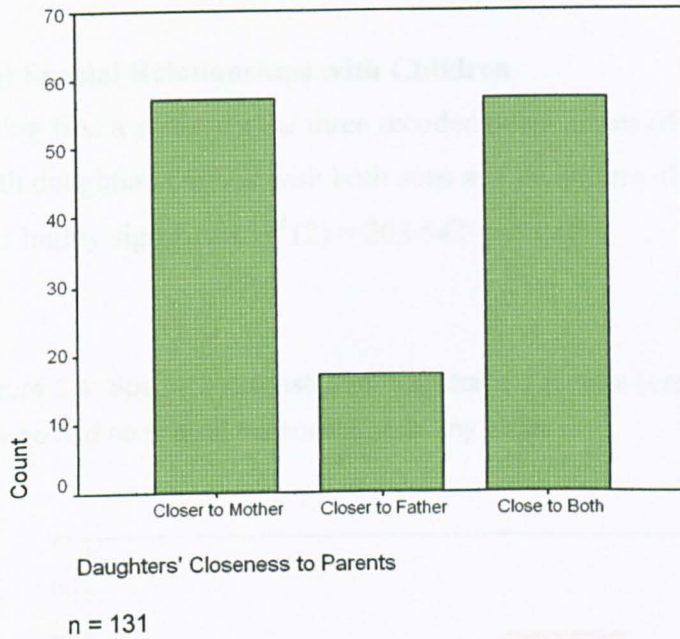


If one partitions the sons'  $\chi^2$  into pairs, with no significant difference between closeness to both parents and closeness to mother:

1. sons are highly significantly more likely to feel close to both parents than father alone,  $\chi^2(1) = 11.842$ ;  $p = 0.001$ ;
2. sons are highly significantly more likely feel closer to mother than to father,  $\chi^2(1) = 16.494$ ;  $p < 0.001$ ;

A  $\chi^2$  test of daughters' closeness to parents, closer to mother, closer to father or equally close to both, also shows a highly significant difference,  $\chi^2(2) = 24.611$ ;  $p < 0.001$ .

Figure 3.3: Subjects' perception of daughters' closeness to subject (mother) and to father



If one partitions the  $\chi^2$  into pairs, again with no significant difference between closeness to both parents and closeness to mother:

1. daughters are highly significantly more likely to feel close to both parents than to father alone,  $\chi^2(1) = 21.622$ ;  $p < 0.001$ ;
2. daughters are highly significantly more likely to feel closer to mother than to father,  $\chi^2(1) = 21.622$ ;  $p < 0.001$ .

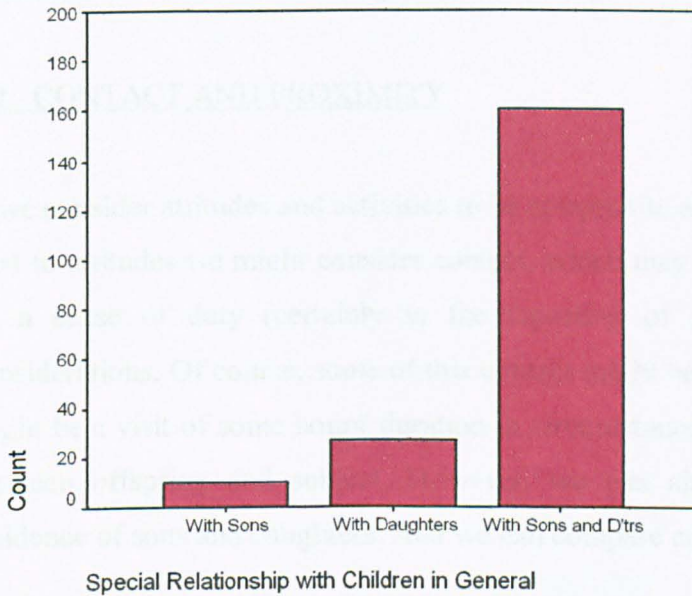
In comparing subjects' reporting of their own feelings towards sons and daughters with their estimate of their sons and daughters feelings towards themselves and the fathers of their children, there is clearly a greater propensity not to discriminate in their own feelings towards their sons and daughters than there is in assessing the feelings of their sons and daughters towards themselves compared to someone else. Fortunately the message we want to take away at this point is not whether children are closer to their mother than to their father (they may be and we shall return to that possibility later) but whether there is any emotional distinction made by mothers between sons and daughters – and there is not. Not only do mothers feel equally close to both sons and daughters, but also sons and daughters each report feeling similarly close to mother. We should not, however, ignore what one

might call a sub-distinction – that in the minority of cases where a distinction is made between sons and daughters, it is made in favour of daughters.

### (iii) Special Relationships with Children

Using first a  $\chi^2$  test on the three recoded possibilities of special relationships with sons only, with daughters only or with both sons and daughters, the difference is obvious to inspection and highly significant,  $\chi^2(2) = 203.643$ ;  $p < 0.001$ .

Figure 3.4: Special relationship with children in general (excluding subjects who had only one child or who had no special relationship with any child)



n = 197

Partitioning the  $\chi^2$  shows:

1. a special relationship with both sons and daughters is highly significantly more likely than a special relationship with the next largest group, daughters on their own,  $\chi^2(1) = 94.594$ ;  $p < 0.001$ ;
2. where the special relationship is with children of one sex rather than the other, once again it is significantly more likely to be with daughters rather than sons,  $\chi^2 = 7.811$ ;  $p = 0.005$ .

Furthermore, the differences in  $\chi^2$  tests for closeness to sons and daughters and special relationships with them remain highly significant when adult offspring only (ie  $\geq 18$ ) are considered: for closeness to sons and daughters ( $n = 128$ ),  $\chi^2 (2) = 48.250$ ;  $p < 0.001$ ; for special relationships with sons and daughters ( $n = 166$ ),  $\chi^2 (2) = 162.952$ ;  $p < 0.001$ , eliminating the possibility that either is an effect relating to maternal feelings for dependent children only.

As suggested, a special relationship may be much more widely interpreted than closeness and refer to place in family, historical situations and other types of environmental circumstance beyond pure affiliative connection. Does this mean that if we move on to other more environmental or circumstantial questions we will find similarity of situation or treatment between sons and daughters?

### 3.4. CONTACT AND PROXIMITY

If we consider attitudes and activities to be at opposite ends of a relationship spectrum, then next to attitudes we might consider contact, which may be driven by affiliative connection, by a sense of duty (certainly in the reporting of it) but also by possible practical considerations. Of course, some of this contact might be a perfunctory phone call and some might be a visit of some hours' duration in circumstances of a similar distance of residence between offspring and subject. However, we can also compare average proximity of residence of sons and daughters. And we can compare contact in relation to proximity.

#### 3.4.1. DATA AND METHODS

Subjects were asked about their contact with sons and with daughters. All types of contact were given equal weight, (ie personal visit, telephone, letter or email), since to discriminate between each type for each son and daughter would have required finer grained testing than the potential sample size could have supported. Responses were required to be given only for those not resident at home, thus excluding not only children up to the age of 18, but also a certain number of offspring of both sexes who were still living at home beyond that age. The levels of contact for each son and or daughter were divided into 4: at least once a week, at least once a month, at least once a year and less often than yearly, with no option of 'never' but with each level being treated as continuous from the next. Mean contact scores

for all sons and all daughters of a family were then calculated and a paired samples t-test applied.

For questions about sons' and daughters' proximity of residence, 6 levels of proximity were offered: (1) more than ten hours away; (2) 6-10 hours away; (3) 1-5 hours away; (4) 15 minutes to 1 hour away; (5) less than 15 minutes away; (6) at home – at least part of the time (to include students), each level considered to be continuous with the next. A paired t-test was then applied to the average proximity of sons and that of daughters.

One-way ANOVAs were performed to measure contact with sons and with daughters by their proximity of residence to subjects, excluding sons and daughters living at home.

Another factor that might bear on subjects' proximity to offspring is whether sons and daughters have children of their own. It might be expected that, in line with the grandmother hypothesis, daughters with children might live closer than daughters who do not have children and that daughters with children might live closer than sons with children. On the other hand, one might ask how far the predominant patrilocality of humans in traditional societies, where females move away from their birth village and males remain within, is reflected in living patterns in modern societies.

A paired t-test was performed to test proximity to sons and daughters when both had children. A mixed ANOVA with sex of offspring as the within subjects variable and grandparental status of the subjects as between subjects variable was also performed to see if there was any significant difference between means if one sex of offspring had children and the other did not.

### 3.4.2. RESULTS

#### **(i) Contact with Sons and Daughters**

A paired samples t-test shows that there is no significant difference between the contact means of sons and of daughters ( $t(125) = -1.484$ ;  $p = 0.140$ ), indicating that subjects are no more likely to be in touch with their daughters than with their sons over any specified period of time.

**(ii) Proximity of Sons and Daughters**

On average there is no significant difference between the distance from subject that sons live and the distance that daughters live ( $t(124) = -0.219; p = 0.827$ ). However, this tells us nothing about variations in particular distances between sons and daughters. It is clear from the descriptive statistics and accompanying graphs that more adult sons live at home than do adult daughters, that similar proportions live under 15 minutes away, that more sons live more than 5 hours away than do daughters and that more daughters live between 15 minutes and five hours away than do sons.

Figure 3.5: Level of proximity of residence of adult sons to subject



1 = over 10 hours away, 2 = 6-10 hours, 3 = 1-5 hours, 4 = 15 mins-1 hour, 5 = under 15 mins, 6 = at home.

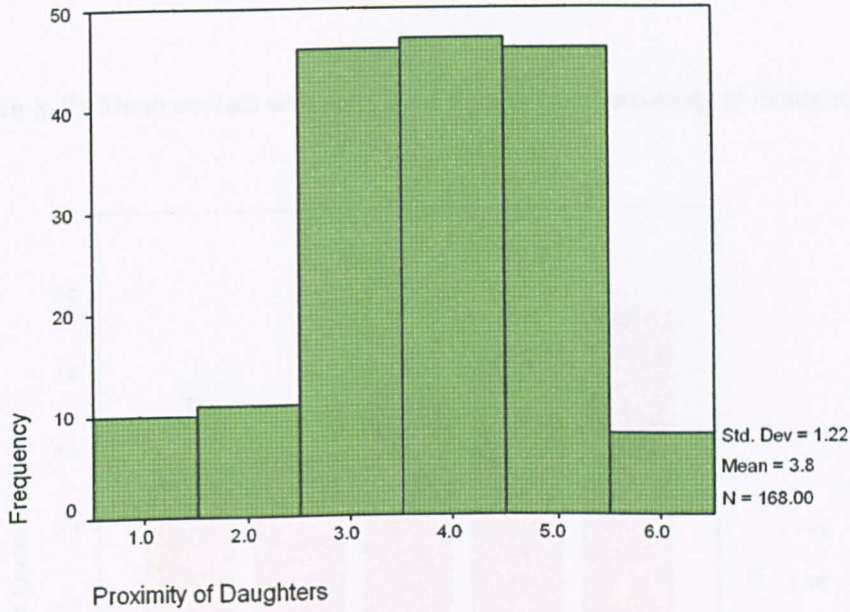
**(iii) Control in Relation to Proximity**

There is a significant difference in control with sons (measured at four levels of frequency) depending on their proximity of residence.

Table 3.1: ANOVA: Mean for control with sons by proximity of residence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.117	3	.372	1.172	.329
Within Groups	1.117	159	.007		
Total	2.234	162			

Figure 3.6: Level of proximity of residence of adult daughters to subject



1 = over 10 hours away, 2 = 6-10 hours, 3 = 1-5 hours, 4 = 15 mins-1 hour, 5 = under 15 mins, 6 = at home.

However, a paired t-test comparing, for instance, adult sons at home (14) with adult daughters at home (9) shows that the difference in frequency is not significant, ( $t(133) = 1.515; p = 0.132$ ).

The British Social Attitudes Survey for 2002 indicates that 19% of adult men still live with their parents as opposed to 11% of women. The percentages in the present study, which is skewed to an older age range of respondent, are 9% for men and 5% for women, a similar ratio. Certainly, across the range of proximities, the similarities between sons and daughters appear to be greater than the differences.

### (iii) Contact in Relation to Proximity

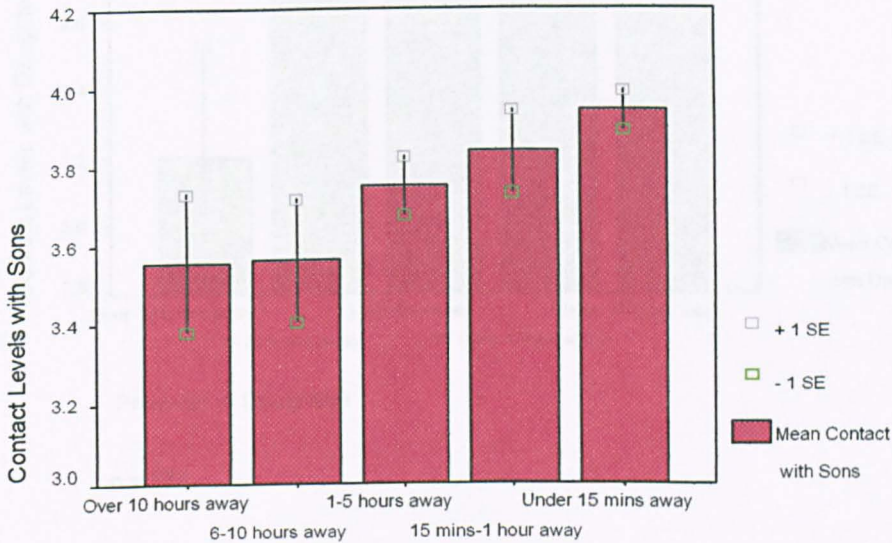
There is a significant difference in contact with sons (measured at four levels of frequency), depending on their proximity of residence.

Table 3.1: ANOVA: Mean contact with sons by proximity of residence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.619	4	.655	2.472	.047
Within Groups	40.260	152	.265		
Total	42.879	156			

But Tukey's *post hoc* multiple comparisons do not show a significant difference between any one level and another.

Figure 3. 7: Mean contact with sons according to sons' proximity of residence



Proximity of Sons

n = 157

With daughters there is a much sharper and highly significant effect for contact in relation to proximity.

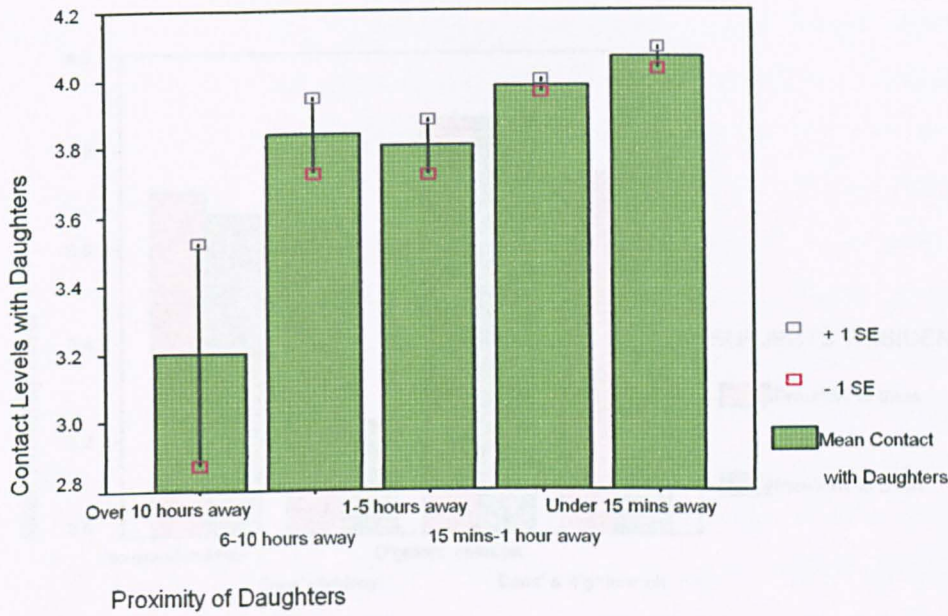
Table 3.2: ANOVA: Average contact with daughters by proximity of residence

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.060	4	1.765	9.545	.000
Within Groups	31.067	168	.185		
Total	38.127	172			

Tukey's *post hoc* multiple comparisons show that daughters living more than 10 hours away are significantly less likely to be in contact with their mothers than daughters who live 6-10 hours away and highly significantly less likely to be in contact than daughters who live closer.



Figure 3 .8: Mean contact with daughters according to daughters' proximity of residence



n = 173

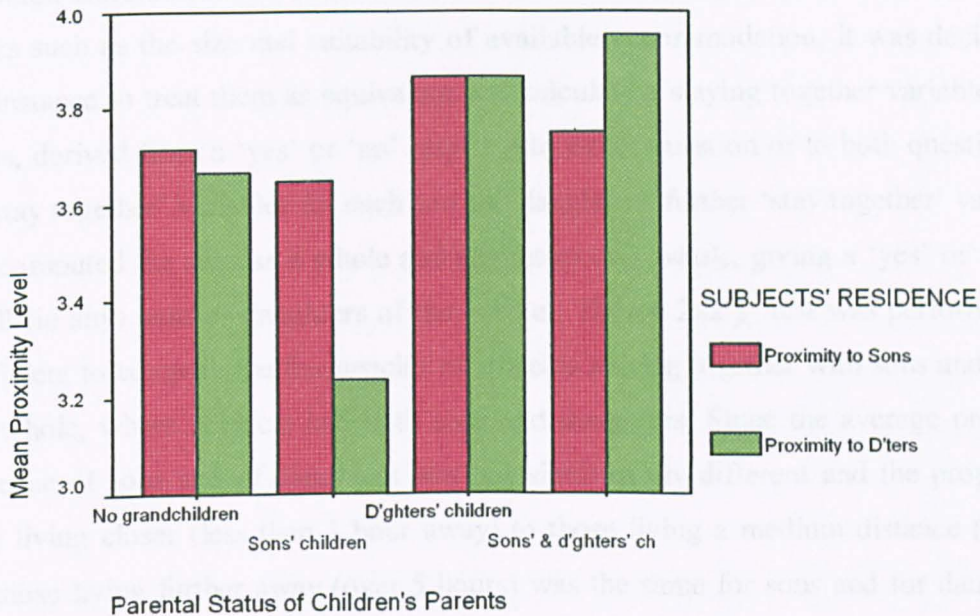
Given that the reduction in contact with sons who live at some distance is not significantly greater when comparing any individual level of proximity, the highly significant diminution of contact with long-distance daughters suggests some kind of deliberate distancing on the part of those daughters, though their number (10) is small.

**(iv) Proximity according to Grandparental Status**

Just as there is no difference in the average proximity of sons and daughters in general, there is also no difference when both sons and daughters have children. In a paired sample t-test,  $t(111) = -0.313$ ;  $p = 0.755$ .

The mixed ANOVA (to test whether there is any significant difference in average proximity of sons and daughters, when one sex has children and the other does not) again shows no significance in average proximity between sons and daughters. However, the descriptives and graph do seem to suggest an interesting difference between sons with children and daughters without.

Figure 3.9: Proximity of residence of sons and daughters to subject according to grandparental status of subject (ie whether subject's son or daughter does or does not have children)



n = 266 (sons = 133; daughters = 133)

It appears that when both sons and daughters have children they live a similar distance from mother, and when daughters have children and sons do not they still live equally close to mother, in line with the patrilocality hypothesis for sons. On the other hand, when sons have children and daughters do not, sons still live at the same approximate distance from mother but their childless sisters live somewhat further away. This might support the idea that, even in modern, industrial societies, women disperse in the first instance to widen their scope for mate-seeking, though in a paired samples t-test of cases with childed sons and childless daughters the difference in proximity was not significant ( $t(16) = 1.130$ ;  $p = 0.275$ ).

### 3. 5. STAYING TOGETHER WITH SONS AND DAUGHTERS

One further way to explore the question of quality of contact, insofar as it bears on differences in behaviour towards sons and daughters (if any), is to examine visits between mothers and their sons and daughters.

### 3.5.1. DATA AND METHODS

Subjects were asked both whether they went to stay with their adult children and whether their adult children came to stay with them. Since these two possibilities are constrained by factors such as the size and suitability of available accommodation, it was decided in the first instance to treat them as equivalent and calculate a staying together variable with two values, derived from a 'yes' or 'no' response to either question or to both questions. From the 'stay together' variables for each son and daughter a further 'stay together' variable was then computed for sons as a whole and daughters as a whole, giving a 'yes' or 'no' rating for all (ie any) sons or daughters of the subject. Then a 2x2  $\chi^2$  test was performed with  $\phi$  coefficient to compare the frequencies of subjects staying together with sons and daughters as a whole, where subjects had both sons and daughters. Since the average proximity of residence of sons and of daughters was not significantly different and the proportions of those living closer (less than 1 hour away) to those living a medium distance (1-5 hours) and those living further away (over 5 hours) was the same for sons and for daughters, the test was not further controlled for proximity of residence.

Proponents of the Grandmother Hypothesis would perhaps expect a tendency for mothers to stay together preferentially with daughters, suggesting a connection with care of grandchildren. So, to test the difference, if any, that grandchildren made to subjects staying together with their sons and daughters, further 2x2  $\chi^2$  tests were carried out, first for childless sons and daughters then for sons and daughters with children. Then the samples were split for further tests between, on the one hand, sons with and without children, and on the other, daughters with and without children.

Because there may be an age difference between average childless sons and daughters and average childed ones, and because age is likely to be an indicator of whether sons and daughters possess accommodation which is suitable for mother to go and stay in, it is also apposite to consider separately going to stay with son or daughter and having son or daughter come to stay. 2x2  $\chi^2$  tests were performed for sons and daughters coming to stay with subject and subject going to stay with sons and daughters, with and without factoring in the parental status of the sons and daughters.

### 3.5.2. RESULTS

#### (i) Staying Together with Sons and Daughters

The 2x2  $\chi^2$  test comparing sons and daughters as a whole, staying together regularly with subject, shows a significant association between sex of offspring and staying together with mother, with daughters staying together with mothers more than expected and sons less: (n = 246),  $\chi^2 = 4.929$ ; df = 1;  $\phi = 0.142$ ; p = 0.026.

#### (ii) Staying Together with Sons and Daughters by their Parental Status

In the first test, of childless sons and daughters staying together with mothers, there is a significant association between staying together and sex of offspring, with mothers staying together more than expected with childless daughters and less than expected with childless sons: (n = 140),  $\chi^2 = 3.963$ ; df = 1;  $\phi = 0.168$ ; p = 0.047

In the second test, where both sons and daughters have children, there is again a significant association between staying together and sex of offspring: mothers again stay more than expected with childed daughters and less with childed sons: (n = 227),  $\chi^2 = 3.978$ ; df = 1;  $\phi = 0.132$ ; p = 0.046.

But when childless and childed offspring of the same sex are compared with each other, childed sons with childless sons and childed daughters with childless daughters, then there is no association between the parental status of the offspring and whether they do or do not stay together with subjects. With daughters (n = 186):  $\chi^2 = 0.532$ ; df = 1;  $\phi = -0.053$ ; p = 0.466. With sons (n = 181):  $\chi^2 = 0.059$ ; df = 1;  $\phi = -0.018$ ; p = 0.808.

Table 3.3: Percentage rate of subjects (who have both sons and daughters ) staying together with offspring according to offsprings' parental status

Stay	Together	With Mother
	<i>Childed</i>	<i>Childless</i>
Sons	25.89%	27.54%
Daughters	38.26%	43.66%

These figures thus fail to demonstrate a grandmaternal effect; indeed, if a tendency can be discerned at all, albeit not significant, it is towards daughters staying together with mothers more when they do not have children than when they do.

One may conclude, then, that mothers will always be significantly more likely to stay together with daughters than with sons, whether they have children or not. Rates of staying together with offspring are higher when both sexes are childless (and therefore younger) and lower when both have children, but in the case of neither sex significantly so.

**(iii) Sons and Daughters Coming to Stay with Subject**

When staying together with children is split back into its components of children coming to stay with subject or subject going to stay with children, in the first condition of children coming to stay with mother, the 2x2  $\chi^2$  test shows no significant association between coming to stay and the sex of the offspring. With  $n = 246$ ,  $\chi^2 = 1.162$ ;  $df = 1$ ;  $\phi = 0.069$ ;  $p = 0.281$ .

When the parental status of offspring is factored into tests, for sons there is no significant association between coming to stay and whether they do or do not have children; with  $n = 181$ :  $\chi^2 = 0.166$ ;  $df = 1$ ;  $\phi = - 0.030$ ;  $p = 0.684$ . For daughters, the association approaches significance in the direction of childlessness; with  $n = 186$ :  $\chi^2 = 3.623$ ;  $df = 1$ ;  $\phi = - 0.140$ ;  $p = 0.057$ .

Table 3.4: Percentage rates of children coming to stay with subjects (who have both sons and daughters) according to the children's parental status

Children	Stay	With Mother
	<i>Childed</i>	<i>Childless</i>
Sons	17.86%	20.29%
Daughters	20.00%	32.39%

**(iv) Going to Stay with Sons and Daughters**

In the second condition of mother going to stay with children, the 2x2  $\chi^2$  test does show a significant association between going to stay and sex of offspring (in the direction of staying more with daughters): ( $n = 246$ ),  $\chi^2 = 4.397$ ;  $df = 1$ ;  $\phi = 0.134$ ;  $p = 0.036$ .

But when sons and daughters are separated and considered in relation to whether they have children or not, there is no significant association between subjects going to stay with sons and daughters (respectively) and the parental status of those sons and daughters. For sons ( $n = 181$ ):  $\chi^2 = 0.778$ ;  $df = 1$ ;  $\phi = 0.066$ ,  $p = 0.378$ ; for daughters ( $n = 186$ ):  $\chi^2 = 0.755$ ;  $df = 1$ ;  $\phi = 0.064$ ;  $p = 0.385$ .

Table 3. 5: Percentage rates of subjects (who have both sons and daughters) going to stay with children according to children's parental status

<b>Mother</b>	<b>Stays</b>	<b>With Children</b>
	<i>Childed</i>	<i>Childless</i>
Sons	19.64%	14.49%
Daughters	31.30%	25.35%

From these results one may conclude that the primary factor affecting whether subjects stay together with their children is the sex of the offspring. But the preference for daughters extends only to mothers going to stay with their children, not to children coming to stay with their mothers. The parental status of the children makes no significant difference to staying together with childed or childless children, though where there is an insignificant tendency, it is towards childless children coming to stay with subject, and subject going to stay with childed children. Even though subjects are significantly more likely to go to stay with daughters rather than with sons, the findings on offspring's parental status give no support for a grandmaternal effect. These analyses can, of course say nothing directly about who is the driving force in visits in either direction – mother or child – or indeed how much there is a mutuality in motivation. Human parental investment behaviour, though, is as likely to involve feedback loops as that of other animals.

### 3. 6. ACTIVITIES WITH SONS AND DAUGHTERS

Having examined some affiliative and some practical aspects of the relationships between mothers and their sons and daughters, we should now look at the texture of the interactions between mothers and their sons and daughters to see if we can distinguish any mark of

difference, bearing in mind that we have found that affectively there is no significant difference in mothers' feelings towards sons and towards daughters, that mothers do not on average live significantly closer to daughters than to sons, whether they have children or not, and that mothers are not in more frequent basic contact with daughters than with sons, (though they go to stay with daughters more frequently than with sons).

A group of typical activities, based on other sociological and psychological studies, was selected to cover the range of practical assistance, financial support, advice and affiliative activities, some of the activities having a resource cost, some an effort (ie energy) cost, some a time cost, with affiliative activities perhaps offering benefits more than incurring costs. Subjects were asked to check 'yes' if the activity was carried out on a regular/occasional basis, leaving them to interpret how great a frequency would constitute regularity. The eight activities chosen were:

1. give advice to offspring
2. go shopping with him/her
3. go on holiday together
4. visit friends or relatives
5. go out on leisure activities
6. help him/her with housework
7. lend/give small sums of money
8. lend/give large sums of money.

This range of activities sought to encompass both the affiliative and practical aspects of most filial behavioural interactions. Some activities might perhaps be expected to be carried out more with daughters than with sons, (going shopping or doing housework); others might be expected to be carried out more for sons, (different levels of resource provision); yet others might be expected to be neutral, (giving advice or going on holiday). Although, again, it may not be possible to distinguish the prime mover in each activity, taken together they may serve as a general measure of maternal investment in offspring of either sex.

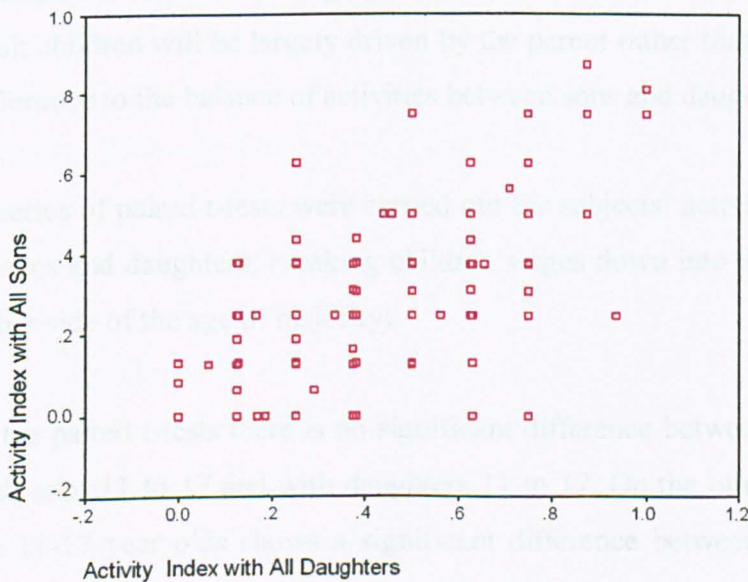
### 3.6.1. ACTIVITY INDICES WITH SONS AND DAUGHTERS

Activity indices were computed for sons and daughters by summing the total number of activities recorded as being regularly carried out with each offspring, then dividing the

result by the maximum potential number of activities to arrive at a percentage scale. As previously indicated, 11 years of age was selected as the starting point from which children begin to be able to make decisions about what activities they will and will not carry out with parents. There is, of course, a continuum of change in the balance of wills, depending on individual children and parental attitudes. But the age of commencement of secondary school seemed a reasonable starting point. Thus subjects' activities with their sons and daughters were coded only for children aged 11 and over. The proximity of residence of sons and of daughters was not controlled for, since not only was there no difference between the average proximity of sons and of daughters, but also the distribution of distances was not significantly different between sons and daughters. Analyses were then carried out to compare the activity index with sons with the activity index with daughters.

A Pearson correlation shows that activity indices with sons are highly correlated with activity indices with daughters,  $r = 0.668$ ;  $n = 138$ ;  $p < 0.001$

Figure 3.10: Scatterplot of activity indices with sons plotted against activity indices with daughters



In a paired t-test, the activity indices of sons and daughters are highly significantly differing in means,  $t(137) = -8.415$ ;  $p < 0.001$ .



Table 3. 6: Paired Samples T Test: Activity indices with sons and with daughters

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Activity Index with Sons	.2674	138	.2036	.0173
	Activity Index with D'ters	.4026	138	.2484	.0211

What these two statistics taken together demonstrate is that mothers who do not carry out many activities with sons, tend not to carry out many with daughters; mothers who do a moderate amount with sons tend to do a moderate amount with daughters; and mothers who do a lot of things with sons tend to do a lot of things with daughters. But overall, whether the activity levels reflected in the indices are low, medium or high, there is a consistent, highly significant difference between the indices of sons and those of daughters.

**(i) Effect of Age of Offspring**

While offspring are under the age of majority, we might expect parents' relationship with them to differ in nature from inter-adult relationships, given parents' responsibility for rearing and educating their children, their need to offer protection, and the co-residential setting in which this upbringing normally takes place. Thus activities carried out with sub-adult children will be largely driven by the parent rather than the child. Does this make any difference to the balance of activities between sons and daughters?

A series of paired t-tests were carried out for subjects' activity indices with each age group of sons and daughters, breaking children's ages down into decades, (apart from the groups either side of the age of majority).

In the paired t-tests there is no significant difference between the subjects' activity indices with sons 11 to 17 and with daughters 11 to 17. On the other hand, each age group above the 11-17 year olds shows a significant difference between activity index with sons and activity index with daughters.

Table 3. 7: Paired t-test differences in subjects' activity indices with sons and daughters in different age groups

Age Group	Mean – Sons	Mean – Dtrs	t	df	Sig. (2-tailed)
11 to 17 years old	.625 ± .144	.653 ± .188	-.243	3	.824
18 to 29 years old	.468 ± .249	.616 ± .235	-3.230	18	.005
30 to 39 years old	.285 ± .187	.443 ± .223	-7.478	75	.000
40 to 49 years old	.206 ± .168	.329 ± .221	-5.010	62	.000
50 to 59 years old	.103 ± .122	.210 ± .239	-2.921	20	.008

*(A paired t-test could not be performed for 60-69 year olds, since there were only two daughters and no sons in this age group.)*

The paired sample of 11-17 year olds is small. Nonetheless it is to be expected that, since parents and children are living together in the same house they will be constrained to perform certain activities, like going on holiday or visiting relatives, together as a family. And other activities like advice-giving and the lending of money one might also expect to be dispensed equally on the basis of the equal closeness to offspring of either sex, discussed earlier. But when it comes to adult offspring there is a clearly and, in most cases, highly significant difference between the activity index with sons and that with daughters. Is this difference driven by a change in attitude by the subject towards offspring of either sex, by a change in attitude of the offspring towards the subject or by a change in the needs of the offspring, either as perceived by or explicitly expressed to the subject?

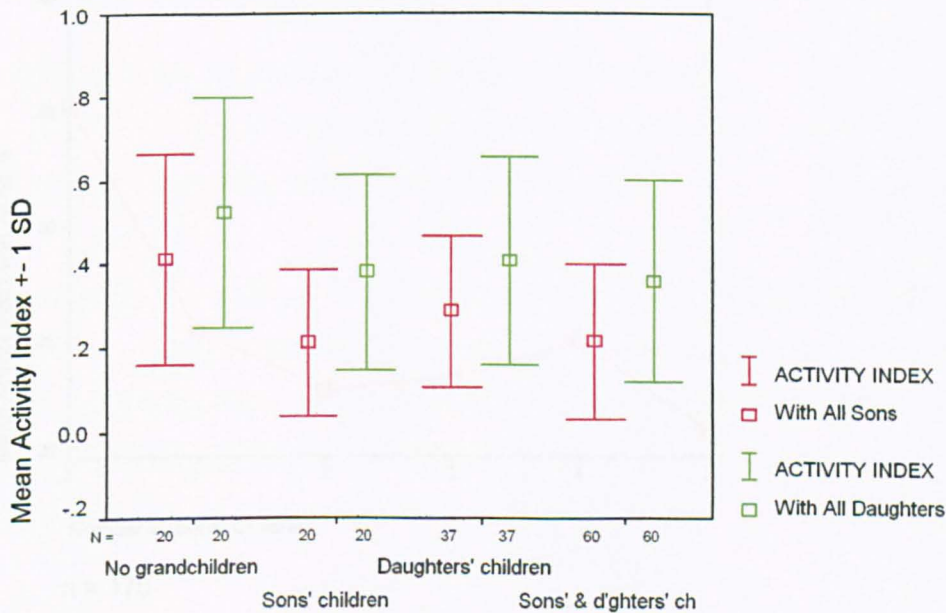
### **(ii) Activity Index by Reproductive Status of Children**

In examining the significance of the greater investment demonstrated in adult daughters than in adult sons, one factor to be taken into account might be the relative reproductive status of sons and daughters.

First of all the general activity indices were tested in a mixed ANOVA with sex of children as the within subjects factor and the grandparental status of subjects as the between subjects factor. Subjects' children in this test were all 18 or over, since codings for grandparental status were only made where offspring were at least 18.

As in the previous tests, there is a highly significant main effect in the difference between activity indices with sons and with daughters:  $F(1,132) = 56.684, p < 0.001$ . There is also a significant effect for grandparental status:  $F(3,132) = 4.408, p = 0.005$ . In the case of both the activity index with sons and the activity index with daughters, the group with no grandchildren shows the highest mean. There is no interaction between sex of offspring and parental status of offspring. Taken together in *post hoc* multiple comparisons, the no grandchildren group carry out significantly more activities with offspring than do the group in which sons alone have children ( $p < 0.05$ ) and the group in which both sons and daughters have children ( $p < 0.005$ ). Only the group in which daughters alone have children has an activity index that is not significantly lower than the no grandchildren group.

Figure 3.11: Activity Index percentage with sons and with daughters depending on subjects' grandparental status



Sex of Grandchildren's Parents

n = 274 (sons = 137; daughters = 137)

### (iii) Activity Index by Numbers of Grandchildren

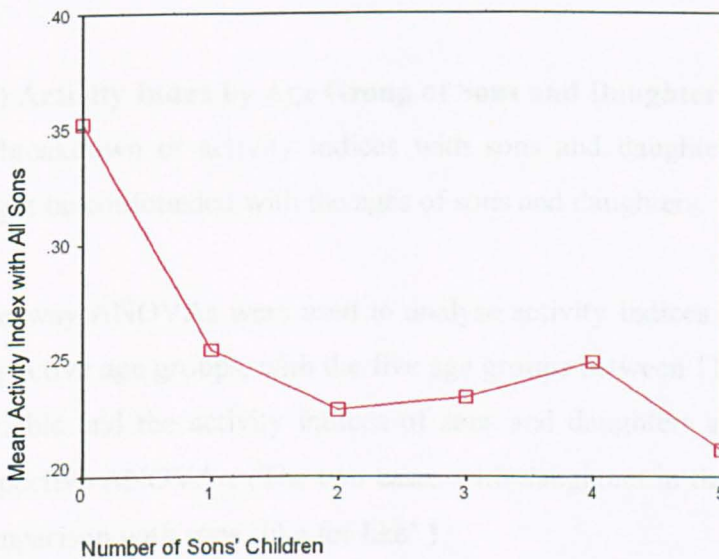
Since there is a clearly significant difference between activity indices when offspring are childless and when they have children (apart from when daughters alone have children), another way of looking for an effect of offsprings' children on subjects' activity indices

with their sons and daughters might be to analyse activity indices by numbers of grandchildren.

One-way ANOVAs were performed on the activity indices of both sons and daughters, with the activity index as the dependent variable and the number of sons' and daughters' children as the respective independent variables.

In the case of sons first, there is a significant difference between groups,  $F(5,164) = 2.883$ ;  $p < 0.05$ . But looking at Tukey's *post hoc* multiple comparisons, the only significant difference is between no grandchildren and two grandchildren. The scale on the y-axis spans only a 14% difference in activity index levels between the highest and the lowest.

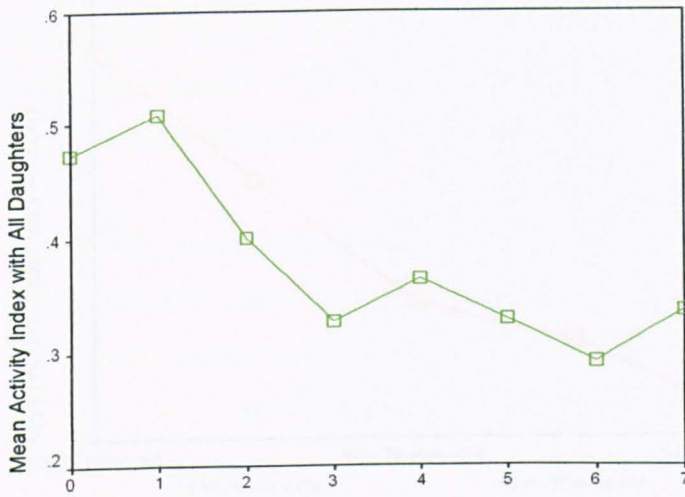
Figure 3.12: Subjects' Activity Index with sons according to number of sons' children



$n = 170$

In the case of activity indices with daughters, however, the difference between groups is short of significance,  $F(7,173) = 1.815$ ;  $p = 0.087$ , even though the values on the y-axis span a range of 21.75 %.

Figure 3.13: Subjects' Activity Index with daughters according to number of daughters' children



Number of Daughters' Children

n = 181

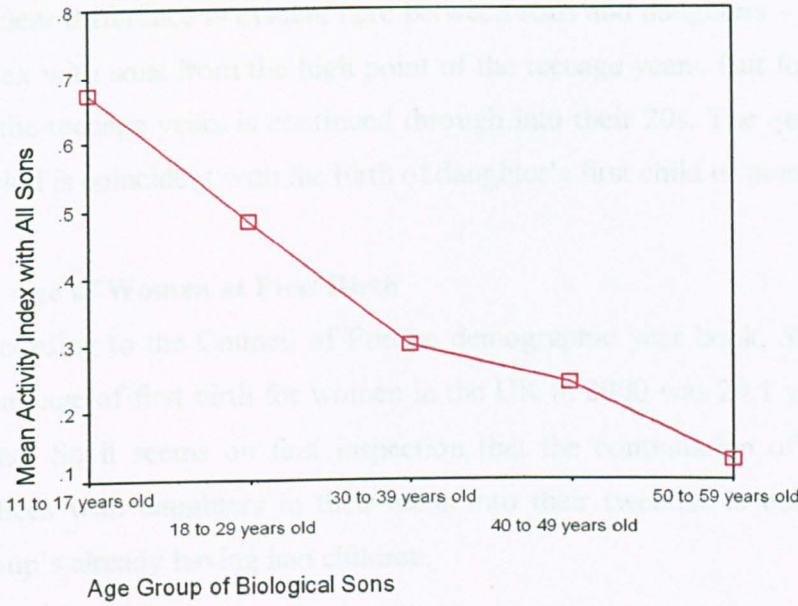
#### (iv) Activity Index by Age Group of Sons and Daughters

A breakdown of activity indices with sons and daughters by numbers of grandchildren might be confounded with the ages of sons and daughters.

One-way ANOVAs were used to analyse activity indices with sons and daughters by their respective age groups, with the five age groups between 11 and 59 years as the independent variable and the activity indices of sons and daughters as the dependent variables in the respective ANOVAs. (The two cases with daughters in their 60s were omitted to make the comparison with sons 'like for like'.)

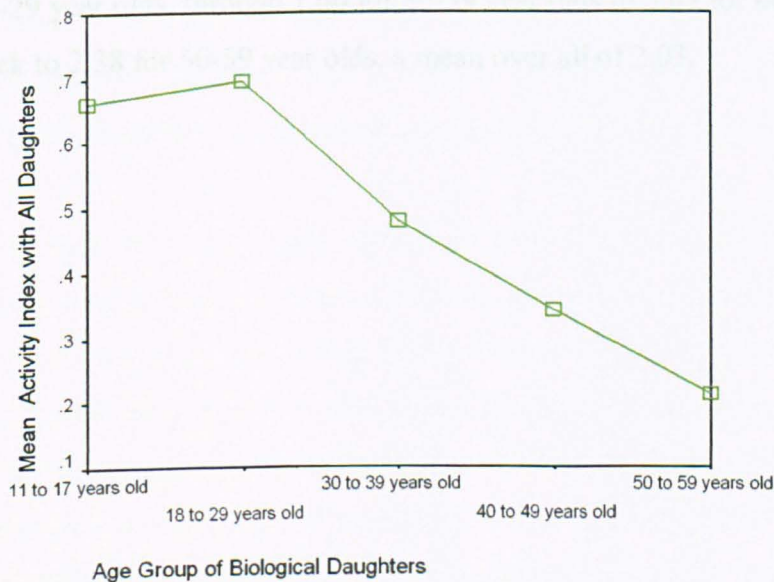
Results show there is a significant difference between groups for both sons and daughters: for sons  $F(4,167) = 19.465, p < 0.001$ ; for daughters  $F(4,164) = 16.090, p < 0.001$ . The means plot for sons shows a fairly steady linear decline and there were several significant differences in *post hoc* multiple comparisons, unlike the plot (shown earlier) of activity index by numbers of sons' children, which shows only one significant difference, that between none and two children.

Figure 3.14: Subjects' Activity Index with sons according to sons' age group (n = 172)



The activity index by age group of daughters also shows several significant differences in *post hoc* multiple comparisons, but the means plot shows a more or less linear descent only from age group 2, 18-29 years, which is itself not significantly different from age group 1, 11-17 years, though both are significantly different from the other three age groups.

Figure 3.15: Subjects' Activity Index with daughters according to daughters' age group (n = 169)



A clear difference is evident here between sons and daughters – a linear decline of activity index with sons from the high point of the teenage years. But for daughters, the high level of the teenage years is continued through into their 20s. The question then is whether this period is coincident with the birth of daughter's first child or precedes it.

#### **(v) Age of Women at First Birth**

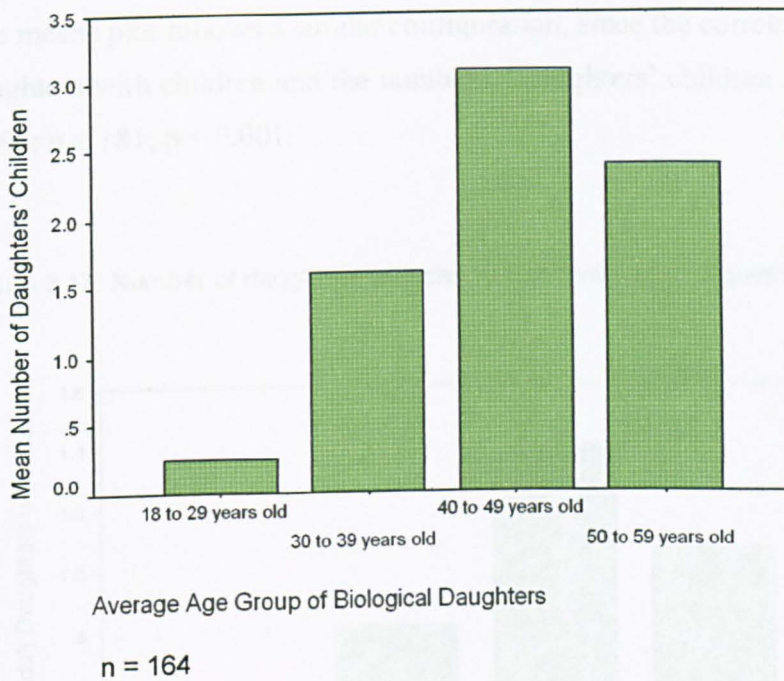
According to the Council of Europe demographic year book, *Social Cohesion* (2001), the mean age of first birth for women in the UK in 2000 was 29.1 years and following a rising trend. So it seems on first inspection that the continuation of the high level of activity indices with daughters in their teens into their twenties is not a function of the second group's already having had children.

#### **(vi) Number of Daughters' Children by Daughters' Age Group**

We can look more precisely at how our data on daughters' parental status fit with the national demographic. A one-way ANOVA was performed to look at the mean number of daughters' children, depending on daughters' age group.

We find a highly significant difference between age groups, (the 60-69 age group has been omitted because its 2 cases are too few to be helpful),  $F(3,160) = 16.615$ ;  $p < 0.001$ . The mean number of daughters' children by the age group of the daughters ranges from 0.25 for 18-29 year olds, through 1.60 for 30-39 year olds to 3.07 for 40-49 year olds, then dropping back to 2.38 for 50-59 year olds, a mean over all of 2.03.

Figure 3.16: Number of daughters' children according to daughters' age group



These are, of course, mean numbers of daughters' children per subject: for example, if a subject has a daughter of 25 and a daughter of 35, she will have on average 1.85 grandchildren.

**(vii) Number of Daughters with Children by Daughters' Age Group**

To look at the actual figures for which daughters do and which do not have children, a one-way ANOVA was performed to analyse the mean numbers of daughters with children per subject, depending on daughters' age group, (again omitting the 60-69 year olds).

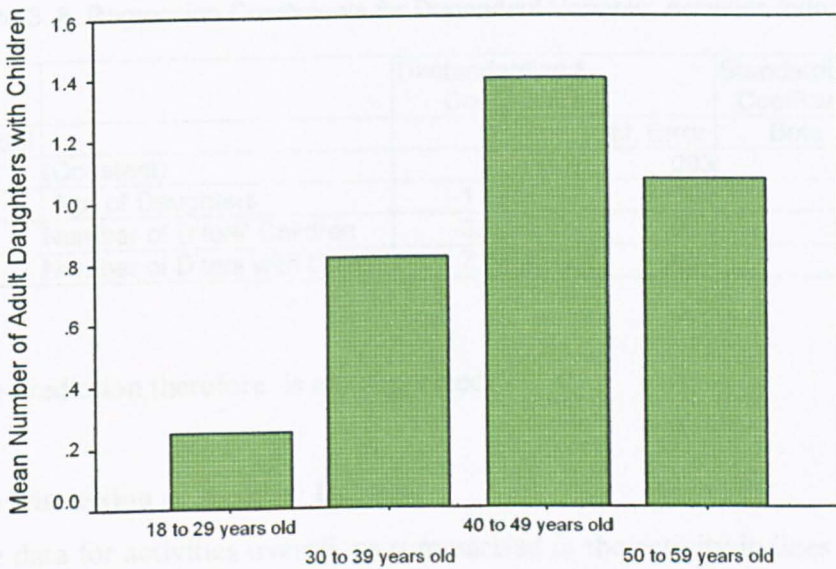
Once again there is a highly significant difference between groups,  $F(3,160) = 14.951, p < 0.001$ ; and the mean number of adult daughters with children ranging from 0.25 in the 18-29 year old age group, through 0.81 for the 30-39 year olds to 1.40 for the 40-49 year olds, and falling back as before to 1.06 for the 50-59 year olds, with a mean over all of 0.98. These means indicate the mean number of daughters with children in the relevant daughter's age group, per case with daughters; for instance, a subject would have on average 1.4 daughters aged 40-49 with children but only 0.25 of a daughter aged 18-29 with



children. In other words, in the latter case, it would take 4 subjects with a daughter in her 20s to find one with a child.

The means plot follows a similar configuration, since the correlation between the number of daughters with children and the number of daughters' children is naturally very high at  $r = 0.896$ ;  $n = 181$ ;  $p < 0.001$ .

Figure 3.17: Number of daughters with children according to daughters' age group



Average Age Group of Biological Daughters

$n = 164$

### (viii) Prediction relating to Activity Index with Daughters

It has already been shown that the younger the daughter is, the higher the activity index, since the maximum activities occur when the daughter is in the 18-25 year-old age group. That is also the age group with both the lowest number of daughters with children and the lowest number of daughters' children. Therefore, one might make the following prediction.

Prediction: In addition to a negative relationship between activity index and age, (the younger the age the higher the activity index), there will also be a negative relationship with both number of daughters' children and number of daughters with children; that is, the fewer the children and the fewer the daughters with children, the higher the activity index.

A multiple regression to test this prediction was performed with subjects' activity index with daughters as the dependent variable and the age (in years) of daughters, the number of daughters' children and the number of daughters with children as the independent variables.

In the multiple regression, the Pearson correlation shows all three variables highly significantly correlated with each other, but the regression coefficients model shows that the additive value of the two factors in addition to daughters' age, (even though the contribution of numbers of daughters' children is in the predicted direction), is not significant.

Table 3. 8: Regression Coefficients for Dependent Variable: Activities Index with All Daughters

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
		B	Std. Error	Beta			
1	(Constant)	1.024	.083		12.401	.000	
	Age of Daughters	-1.565E-02	.002	-.517	-6.923	.000	
	Number of D'ters' Children	-3.115E-02	.021	-.230	-1.469	.144	
	Number of D'ters with Ch'n	7.840E-02	.050	.244	1.565	.119	.275

The prediction therefore is not supported.

### (ix) Discussion of Activity Indices

The data for activities overall, as summarised in the activity indices for sons and daughters, factoring in either grandparental status of the subject or numbers of children of sons and daughters respectively, fail to support the suggestion that such activities as a whole are connected with the parental status of either sons or daughters. What is clear is that activity indices with sons fall away when sons reach adulthood, while activity indices with daughters maintain a similar level in their twenties to the activity indices of their teens, possibly through to the birth of the first child. Once daughters have children there is no significant difference in activity indices related to the number of daughters' children. Of course, another way of looking at these variations is to posit a norm in which there are high levels of investment in childless offspring of both sexes and comparatively lower levels of investment when children of both sexes have children of their own, except that when daughters have only one child, investment levels are the same as for childless daughters.

This means we have the suggestion of a grandmaternal effect in investment in daughters, but of a particular kind. The high level of investment in childless daughters is carried through into investment in daughters with one child. This is what one would expect if grandmothing is a special case of maternal investment and the point of the differential investment in adult daughters is to see them through successfully to the reproductive state.

This, of course, would be highly adaptive behaviour, since the maximisation of a mother's fitness is dependent not only on her own reproductive success but also upon that of her daughter (and her daughter's daughter and so on.) But if each mother exhibits a suite of behaviours which sees her daughters through to successful reproduction, then her maternal investment will have paid off, since it will be expected that she will have taught/'educated' her daughters in such a way that they too will exhibit the same traits to help lead their own daughters to reproductive success in their turn.

### 3.6.2. INDIVIDUAL ACTIVITIES WITH SONS AND DAUGHTERS

The Activity Index serves as a tool to measure maternal investment across a spectrum of component behaviours. However, as explained earlier, the group of activities put together to form the activity index are comprised of behaviours that might have a sex bias in one direction or another, (or no sex bias at all). It is also clear that the suite of activities making up the activity index vary in nature between the affiliative, the practical and a combination of both, and vary in their costs and benefits between low-cost, costly in time, costly in both time and effort, costly in resources, practically beneficial, socially beneficial, and so on. What, then, are the differences, if any, between individual activities carried out with sons and with daughters? We will again begin by including the 11 to 17 year old age group in the sample.

2x2  $\chi^2$  tests were performed on each of the individual activities carried out regularly with sons and with daughters aged 11 years and older by subjects who had both sons and daughters.

The following are the statistics for subjects with both sons and daughters, showing the frequencies among subjects of each activity with each group (sons and daughters),

expressed as percentages, and the significance, if any, of the associations between activity and sex of offspring.

Table 3. 9: Rates (expressed as percentages of activities carried out with both sons and daughters by subjects having both sons and daughters (n = 260; df = 1)

Activity	Sons %	Dtrs %	$\chi^2$	$\phi$	Sig (2-tail)
Advice	56.15	62.13	1.019	0.063	0.313
Shopping	23.85	72.31	61.152	0.485	0.000
Holidays	26.15	47.69	12.947	0.223	0.000
Family Visits	.34.62	49.23	5.703	0.148	0.017
Leisure	40.00	44.62	0.567	0.047	0.451
Housework	7.69	22.31	10.890	0.205	0.001
Small Sums	33.85	33.08	0.017	-0.008	0.895
Large Sums	12.31	13.08	0.035	0.012	0.852

Looking at the eight individual activities for sons and daughters as a whole, four show a significant or highly significant difference between sons and daughters and four show no significant difference. The three activities which one would suggest are constrained by necessity in younger children show highly significant differences in frequencies once all ages of offspring are considered, going shopping, going on holiday, visiting friends or relatives; 24% of respondents shop with their sons while 72% shop with their daughters; 26% go on holiday with their sons, while 48% go on holiday with their daughters; and 35% visit friends and relatives with sons, while 49% visit friends and relatives with daughters. One activity which is not necessarily relevant to young children and also shows a highly significant difference between sons and daughters is help with housework, with 8% helping their sons and 22% their daughters. In terms of expected sex bias, shopping and housework are principally carried out *by* women and it is therefore no surprise if they are also principally carried out *for* or *with* women, for reasons that will be discussed in detail later in the chapter. Visiting relatives is done more *by* women and also might be expected to be done more *with* women, though this is by no means a necessary conclusion. The question of social activities in families (as opposed to among friends) is a more open one; one might, for instance, have expected going on holiday with sons and daughters to be even-handed, though it is not. None of the other four activities offered show any significant difference between sons and daughters, though some might have been expected to. Small and large

sums of money are lent or given equally to sons and daughters (where resource provision might have been expected to favour sons); advice too, perhaps predictably, is not dispensed to any significantly greater degree to daughters than to sons; and, perhaps surprisingly, if there were a bias towards women seeking out the company of other women for social reasons, leisure activities are not carried out with daughters to a significantly greater degree than with sons. Excluding the under 18s, since their numbers are small, makes no substantial difference to these figures.

### 3.6.3. INDIVIDUAL ACTIVITIES BY SUBJECTS' GRANDPARENTAL STATUS

As with the Activity Index, individual activities can be looked at, taking other factors into account, to see what affect they have, if any, on the differences between sons and daughters, where they exist. How, for instance, is the differential investment between childless offspring and daughters with children (particularly those with one child) on the one hand, and sons with children on the other, worked out in individual activities? What is the significance of those activities? How much is there a balancing of costs and benefits?

Further 2x2  $\chi^2$  tests were performed to test for an association between frequency of activity and parental status of offspring for both sons and daughters, with cases again limited to subjects who had both sons and daughters.

Table 3.10: Rates (expressed as percentages) of activities carried out by subjects with their adult sons according to the sons' parental status (n = 194; df = 1)

Activity	Sons %		$\chi^2$	$\phi$	Sig (2-tail)
	Childed	Childless			
Advice	52.14	64.94	3.107	-0.127	0.078
Shopping	19.66	28.57	2.071	-0.103	0.150
Holidays	24.79	22.08	0.188	0.031	0.664
Family Visits	29.91	33.77	0.320	-0.041	0.572
Leisure	37.76	42.86	0.535	-0.053	0.465
Housework	5.13	5.19	0.000	-0.001	0.984
Small Sums	29.91	37.66	1.261	-0.081	0.261
Large Sums	10.26	15.58	1.216	-0.079	0.270

Table 3.11: Rates (expressed as percentages) of activities carried out by subjects with their adult daughters according to the daughters' parental status (n = 195; df = 1)

Activity	Dtrs %		$\chi^2$	$\phi$	Sig (2-tail)
	Childed	Childless			
Advice	60.50	69.73	1.178	-0.094	0.190
Shopping	70.59	73.68	0.220	-0.034	0.639
Holidays	28.57	48.68	8.103	-0.204	0.004
Family Visits	31.09	48.68	6.095	-0.177	0.014
Leisure	27.73	40.79	3.587	-0.136	0.058
Housework	22.69	18.42	0.509	0.051	0.476
Small Sums	31.93	32.89	0.020	-0.010	0.889
Large Sums	11.76	21.05	3.073	-0.126	0.080

**(i) Giving Advice**

This activity, which is the most frequently performed activity with sons and daughters combined, shows no significant association in table 3. 9 between the activity and sex of offspring.

Advice to both sons and daughters is greatest when there are no grandchildren. These differences are not, however, significant, though the greater advice-giving to childless rather than childed sons approaches significance.

**(ii) Giving and Lending Small and Large Sums of Money**

Lending and giving small and large sums of money to sons and daughters are considered together here, since the activity 2x2  $\chi^2$  tests in table 3. 9 show virtually no difference between the percentages of subjects who lend or give sums of money to sons and to daughters, whether the sums are small or large.

When the parental status of sons and of daughters is taken onto account, the 2x2  $\chi^2$  tests in tables 3.10 and 3.11 show no significant association between subjects making gifts or loans and the parental status of their children. However in relation to large sums, the association is almost significant in the case of daughters and in the direction of childlessness.

It may be instructive that these three activities do not carry great costs in time and energy, though lending and giving money does, of course, involve a resource cost.

### **(iii) Going on Leisure Activities together**

The 2x2  $\chi^2$  test in table 3. 9 shows no association between going out on leisure activities and the sex of offspring.

The 2x2  $\chi^2$  test on sons with and without children shows no association between going out on leisure activities and the parental status of sons. The 2x2  $\chi^2$  test on daughters also does not show a significant association between activity and parental status of daughters. The result does, though, approach significance, and in the direction of daughters without children.

### **(iv) Doing Housework for Sons and Daughters**

The four activities that do show a significant difference between sons and daughters in the 2x2  $\chi^2$  tests laid out in table 3. 9 indicate, in three instances, a highly significant association between activity and sex of offspring. Doing housework for sons and daughter is the least frequently performed of those four activities but is highly more likely to be done for daughters than for sons.

When 2x2  $\chi^2$  tests are performed to test the association of housework done for either sons or for daughters with their parental status, there is no association between housework done for sons and daughters and whether or not those sons and daughters have children of their own.

### **(v) Visiting Friends or Relatives together**

Visiting friends or relatives with sons and daughters is a moderately frequent activity, carried out significantly more often with daughters than with sons in the  $\chi^2$  test in table 3. 9.

When sons and daughters are tested again in relation to their parental status, (*tables 3.10 & 3.11*), sons show no association between whether they have children or not and their frequency of visiting friends and relatives with subjects. Childless daughters, on the other

hand, are significantly more likely to visit friends or relatives with subjects than daughters who have children.

#### **(vi) Going on Holiday together**

Going on holiday with sons and daughters is another moderately occurring activity, and the 2x2  $\chi^2$  tests in table 3. 9 show that subjects are highly significantly more likely to go on holiday with daughters than with sons.

Furthermore, when parental status is a factor (*tables 3.10 & 3.11*), no association is demonstrated for sons but there is a highly significant association between going on holiday with daughters and whether those daughters have children or not, and that is in the direction of childless daughters.

The reasons for the difference in frequencies between sons and daughters must be speculative. Although one might expect one of the objectives of going on holiday with sons and daughters with children to include an element of childcare, because of the lack of a grandparental effect with sons and the reverse of one with daughters its principal motivations are likely to be affiliative and social.

#### **(vii) Going Shopping with Sons and Daughters**

The last of the activities which shows a highly significant association in the 2x2  $\chi^2$  tests in table 3. 9 between activity and sex of offspring, and records the highest frequency percentage of any activity with daughters – 72%, compared to 24% for sons - is going shopping.

When offsprings' parental status is introduced as a factor (in *tables 3.10 & 3.11*), it can be seen that there is no association between going shopping with sons and daughters and whether they do or do not have children. There is a drop between childless and childed sons from 29% to 20%, but it is nothing like significant. Daughters, however, show very little diminution from 74% childless to 71% with children.

### **3.6.4. QUESTIONS ARISING**

What are we to make not only of the variations between sons and daughters, where they occur, but also of the variability in the frequency with which subjects carry out the



activities? It may be, at least in part, explicable through a pre-existing sex-bias in the activity. Yet the sex differential in going on holiday, for instance is in marked contrast to the purely affiliative and social leisure activity, carried out at a similar level with both sons and daughters. Perhaps this difference is symptomatic of a divergence between activities in accordance with variations in cost, particularly in time/energy terms. Could it be that, in some activities at least, it is actually greater cost that is associated with daughter preference? Or put another way, is non-differential investment in sons and daughters predicated on the activity not being too costly? A regular holiday once a year, or even only once every two years, is a commitment to 14 (perhaps 7) days continuous time and activity with son or daughter. Regular leisure activities take up a few hours, at most once a week, but perhaps only once a month, or even only a few times a year. Shopping is certainly costly in both time and energy and we can test the impact of both of those factors in explaining its investment differential between sons and daughters by running a further test confined to those subjects with the least time and (perhaps therefore) energy available.

A  $2 \times 2$   $\chi^2$  test on going shopping with sons and with daughters was run to include only subjects in employment. The result is an even more emphatic, a highly significant difference between shopping with sons and shopping with daughters ( $n = 60$ ):  $\chi^2 = 21.991$ ;  $df = 1$ ;  $\phi = 0.605$ ;  $p = < 0.001$ . The association between shopping and sex of offspring is still highly significant, but the percentage of subjects in full and part-time employment who go shopping with their daughters is even higher than that of all subjects, at 87% compared to 27% with sons. So shopping is confirmed as an activity for which time is found regardless of the cost in time and energy.

As indicated earlier, activities fall into two groups: those in which there is a significant sex difference between sons and daughters in the level of activity and those in which there is no sex difference. This finding prompts further consideration of the relevance to the frequencies of each of the eight activities of the costs of those activities in time, energy and resources.

### 3.6.5. COSTS AND BENEFITS OF ACTIVITIES WITH SONS AND DAUGHTERS

We can make a more ordered comparison of individual activities performed with sons and daughters through a table of costs and benefits. The table is based on the  $2 \times 2$   $\chi^2$  test

frequencies for sons and daughters, expressed as percentages in table 3. 9, without regard to the grandparental status of the subject; a positive grandparental effect was absent from all activities, in that only in two activities, going on holiday together and going to visit friends and relatives together, was there a significant association between the activity and having children or not, and that was not in a grandparental direction. Childless daughters are significantly more likely to be involved with their mothers in those activities than daughters with children. If the percentages of the frequencies of individual activities for sons and for daughters are summed to derive an average, one can then assign a rating on the following basis: 10-25% - Low; 26-40% - Medium; 41-55% Medium/High; and 56-70% - High. To make comparisons between one part of the table and another, one might then assign values to the ratings of High = 4, Medium/High = 3, Medium = 2 and Low = 1. The rating of costs is arguable, but a similar division into four broad evaluations, in terms of the time energy and resources usually expended on the activities, seems reasonable.

Table 3.12: Cost/Benefit analysis of subjects' activities with sons and daughters, listing firstly those activities where there is not a significant difference between the frequency of the activity between sons and daughters, and secondly those activities in which there is a significant difference

<u>ACTIVITY</u>	<u>DIFFER</u>	<u>FREQUENCY*</u>	<u>NATURE/ BENEFIT</u>	<u>COST</u>	<u>TYPE**</u>
ADVICE	No	High	Instructional	Low	TE
LEISURE	No	Medium/High	Affiliative/Social	Medium	TER
SMALL MONEY	No	Medium	Practical	Low	R
LARGE MONEY	No	Low	Practical	High	R
SHOPPING	Yes	Medium/High	Instructional/ Practical/ Affiliative	High	TER
HOLIDAYS	Yes	Medium	Affiliative/ Social	Medium/High	TER
FRIENDS/ RELATIVES	Yes	Medium/High	Affiliative/ Social	Medium	TE
HOUSEWORK	Yes	Low	Instructional/ Practical	High	TE

\* Percentage rate among subjects

\*\* Cost type:

T = Time  
E = Energy  
R = Resources

The average frequency of the activities in which there is no difference between sons and daughters is virtually the same as the average frequency of those in which there is a

significant difference (scoring 10 compared to 9). But the average cost of no difference activities is appreciably lower than the average cost of significantly different activities (8 compared to 13). One might also conclude, looking at the table, that there are more resources expended than time and energy in the no difference group, and more time and energy than resources expended in the significant difference group.

The table can be further analysed by combining frequency with cost. If we multiply the frequency of each activity by its cost, we can arrive at a set of figures which represent a cost quotient for each activity and a mean cost quotient for each of the two groups of activities (no sex difference/sex difference). The total cost quotient for 'no sex difference' activities is 15, giving a mean cost quotient of 3.75, and the total cost quotient of 'significant sex difference' activities is 28, with a mean of 7.

Thus the mean cost quotient of activities that are carried out significantly more with daughters than with sons is almost double the mean cost quotient of activities that are carried out equally with sons and daughters. One could certainly conclude from this analysis that subjects are on average prepared to incur a higher cost in their activities with daughters than they are with sons, and that that cost is more likely to be in the form of time and energy than resources.

### 3. 7. DIFFERENTIAL INVESTMENT IN DAUGHTERS

Incurring a cost in certain activities that is greater for daughters than for sons implies the provision of greater benefits. However, since we are analysing the contribution of each individual activity it would be useful to note that the greater mean cost quotient for the difference activities is almost entirely driven by shopping, whose cost quotient at 12 is double the next highest quotient of 6 for holidays. What can the benefits be to women of expending so much time, energy and, it is assumed, resources, on going shopping so preferentially with their daughters? Before attempting to answer that question, it might be useful to introduce another factor.

### 3.7.1. INDIVIDUAL ACTIVITIES BY AGE GROUP OF DAUGHTERS

As we have seen, where a significant difference exists in activity levels with sons and daughters, it is always towards a greater investment in daughters; and since it is daughters' age rather than parental status which creates a significant difference in levels of daughters' activity indices with their mothers, we might also ask how their age affects the individual activities that make up the index.

2x4  $\chi^2$  tests carried out to see if there was any association between age group of adult daughters (omitting the 2 cases in their 60s) and the frequency of each of the eight individual activities mothers performed with daughters, produced significant associations in all activities except shopping and housework.

Table 3.13: 2x4  $\chi^2$  tests: Frequency of individual activities with adult daughters by decadal age group of daughters

	$\chi^2$	df	Cramer's $\phi$	Approx Sig.
Give Advice to Daughters	30.022	3	0.428	0.000
Go Shopping with Daughters	5.845	3	0.189	0.119
Go on Holiday with Daughters	9.428	3	0.240	0.024
Visit Friends or Relatives with Daughters	15.684	3	0.309	0.001
Leisure Activities with Daughters	16.440	3	0.317	0.001
Help with Daughters' Housework	6.958	3	0.206	0.073
Lend Small Sums of Money to Daughters	9.680	3	0.243	0.021
Lend Large Sums of Money to Daughters	14.663	3	0.299	0.002

Looking at the descriptive statistics gives some idea of where the differences lie between age groups in the activities in which there are differences.

Table 3.14: Descriptives Statistics: Frequency of subjects carrying out individual activities with adult daughters as a whole by age group of daughters

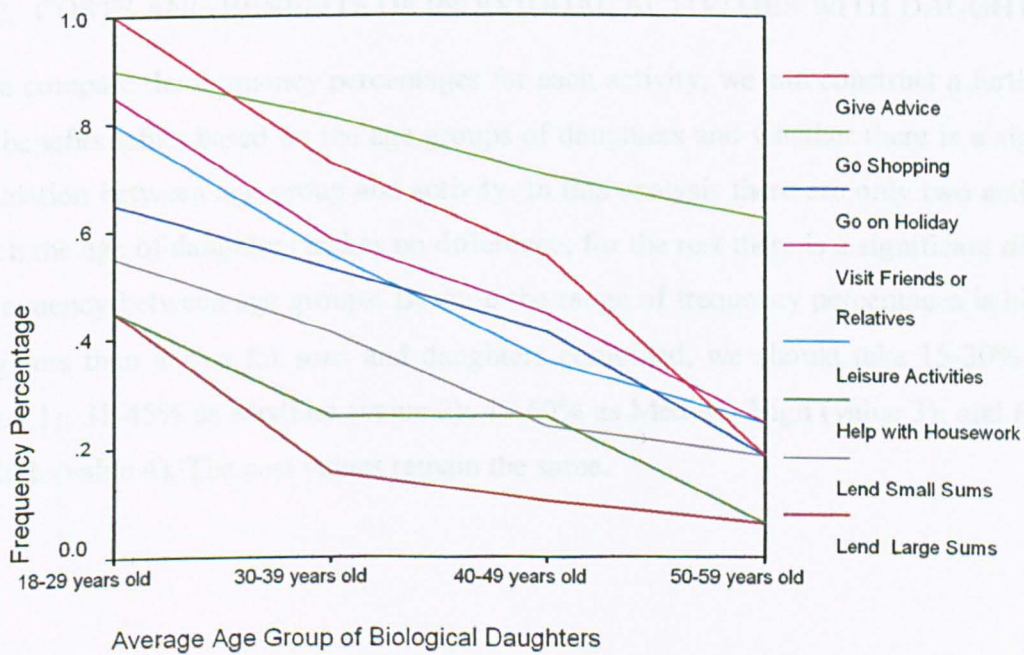
		N	Freq as %
Give Advice	19 to 29 years of age	20	1.00
	30 to 39 years of age	70	.73
	40 to 49 years of age	58	.55
	50 to 59 years of age	16	.19
	Total	164	.65
Go Shopping	19 to 29 years of age	20	.90
	30 to 39 years of age	70	.81
	40 to 49 years of age	58	.71
	50 to 59 years of age	16	.63
	Total	164	.77
Go on Holiday	19 to 29 years of age	20	.65
	30 to 39 years of age	70	.53
	40 to 49 years of age	58	.41
	50 to 59 years of age	16	.19
	Total	164	.47
Visit Friends or Relatives	19 to 29 years of age	20	.85
	30 to 39 years of age	70	.59
	40 to 49 years of age	58	.45
	50 to 59 years of age	16	.25
	Total	164	.54
Leisure Activities	19 to 29 years of age	20	.80
	30 to 39 years of age	70	.56
	40 to 49 years of age	58	.36
	50 to 59 years of age	16	.25
	Total	164	.49
Help with Housework	19 to 29 years of age	20	.45
	30 to 39 years of age	70	.26
	40 to 49 years of age	58	.26
	50 to 59 years of age	16	.06
	Total	164	.26
Lend Small Sums of Money	19 to 29 years of age	20	.55
	30 to 39 years of age	70	.41
	40 to 49 years of age	58	.24
	50 to 59 years of age	16	.19
	Total	164	.35
Lend Large Sums of Money	19 to 29 years of age	20	.45
	30 to 39 years of age	70	.16
	40 to 49 years of age	58	.10
	50 to 59 years of age	16	.06
	Total	164	.16

Giving advice to daughters falls from 100% in daughters' twenties down to 19% in their 50s; affiliative activities like visiting friends or relatives, going out on leisure activities and going on holiday together fall from a high point of 85%, 80% and 65% respectively, down to 25% for visiting friends or relatives, or going out on leisure activities, and 19% for going

on holiday together; while lower-rated activities like helping daughter with housework and lending or giving large sums of money, both fall from 45% to an even lower 6%, between the twenties and the fifties. Lending or giving small sums of money, which drops from 55% for daughters in their twenties to 19% in their fifties, is the only other activity without a significant difference between daughters' age groups apart from shopping. And in shopping the decline is from a high point of 90% in daughters' twenties, gently down to 63% in their fifties.

Putting together all the frequency percentages into a single graph so that all the age-driven slopes are shown on a single scale, clarifies the picture. The most notable factors are the sharp decline in giving advice, where the level drops by 81% over the four age groups, and the gentle decline in going shopping, where the level falls through age groups by 27% (30% of its original level.)

Figure 3.18: Frequency percentages of individual activities carried out by subjects with their daughters according to daughters' age group



n = 164

### 3.7.2. QUESTIONS ARISING

What do these differences mean? The activities as a whole vary in cost, whether it be time, energy or resources; housework, for instance, involves expenditure of time and energy, lending or giving small sums is a resource cost. Both activities are practical and unlikely to be deemed to carry a social or affiliative component, though they obviously support daughters' efforts to maintain their subsistence. In support of the view that it is perhaps practical assistance that is maintained most steadily in the long term, it is clear that the activities that do decline significantly over the years are not the activities which carry perhaps the largest costs in both time and energy, (helping with the housework and shopping), but the affiliative, recreational activities, (visiting relatives, going on holiday together, enjoying leisure activities together) which, while they take time and involve energy expenditure, might be seen perhaps as restorative as well as social, and intuitively might have been expected to continue through the timeline of daughters' age groups without significant diminution.

### 3.7.3. COSTS AND BENEFITS OF INDIVIDUAL ACTIVITIES WITH DAUGHTERS

If we compare the frequency percentages for each activity, we can construct a further costs and benefits table, based on the age groups of daughters and whether there is a significant association between age group and activity. In this analysis there are only two activities to which the age of daughters makes no difference; for the rest there is a significant difference in frequency between age groups. Because the range of frequency percentages is higher for daughters than it was for sons and daughters combined, we should take 15-30% as Low (value 1); 31-45% as Medium (value 2); 46-60% as Medium/High (value 3); and 61-75+% as High (value 4). The cost values remain the same.

Table 3. 15: Cost/Benefit analysis of subjects' individual activities with daughters, firstly where daughters' age group does not make a significant difference, and secondly where it does make a significant difference, to activity level

<u>ACTIVITY</u>	<u>DIFFER</u>	<u>FREQUENCY*</u>	<u>NATURE / BENEFIT</u>	<u>COST</u>	<u>TYPE**</u>
SHOPPING	No	High	Instructional/ Practical/ Affiliative	High	TER
HOUSEWORK	No	Low	Instructional/ Practical	High	TE
ADVICE	Yes	High	Instructional	Low	TE
HOLIDAYS	Yes	Medium/High	Affiliative/Social	Med/High	TER
FRIENDS/ RELATIVES	Yes	Medium/High	Affiliative/Social	Medium	TE
LEISURE	Yes	Medium/High	Affiliative/Social	Medium	TER
SMALL MONEY	Yes	Medium	Practical	Low	R
LARGE MONEY	Yes	Low	Practical	High	R

\* Percentage rate among subjects

\*\* Cost type:

T = Time

E = Energy

R = Resources

Once again the average frequency of activities that are significantly different between age groups is virtually the same as the average frequency when there is no difference between age groups: 2.5 for the no difference activities and 2.67 for the difference activities. Average cost this time is the opposite of the previous cost/benefit table, with an average cost of 4 for the no difference group and 2.16 for the significant difference group. Computing the cost quotient (by multiplying frequencies by costs and dividing the totals by the number of activities in the group), gives for the no difference group a mean cost quotient of 10, and for the significant difference group a mean cost quotient of 5.16. Thus we can conclude that the higher the cost of an activity, the more likely it is to be carried on with no significant diminution through various age groups of daughters. This once again suggests that there must be counterbalancing benefits to this expenditure of time and energy. But also, once again, it is clear that the higher mean cost quotient of the no difference group is driven by shopping, with housework registering a cost quotient equal to two of the activities in the difference part of the table, advice and lending large sums. In both of those cases one can see how the balance of the maternal contribution could shift with age.



Housework may be different simply because women can keep on doing it for their daughters. It is not a major activity. The maintenance of one's immediate environment in a viable state, with cleaning aimed in the first instance at disease control, has little scope for social or restorative aspects. Although it shows a significant difference between two of the daughters' age groups, these are the 19-29 year olds and the 50-59 year olds; the two age groups between register virtually the same percentage, which is in any case low in comparison to other activities. Subjects do not do much housework for their daughters in comparison with other activities, but if they do, they carry on with it until they reach an age where it perhaps becomes too taxing. 'Lending and giving small sums of money' shows its steepest decline over the first three age groups and then levels off, when one might expect the economic circumstances of the mother and daughter dyad to be reversed and cause a sharper fall.

The two most interesting activities are, perhaps, giving advice and shopping. Giving advice (which is not given significantly more to daughters than to sons) starts at the highest level, a score of 100% for daughters in their twenties, and declines the most. And yet giving advice costs very little in time and energy and nothing in resources.

Going shopping, however, (in which the difference between sons and daughters is highly significant), starts at the next highest level, 90% for daughters in their twenties, and declines the least. Without significant differences either between groups in general or between any particular age group, it is a much more complex activity, in which the combination of benefits from its instructional, practical and affiliative aspects may see a shift in the balance between mother and daughter over time.

#### 3.7.4. ANALYSIS OF SHOPPING

What are shopping's principal features?

1. It takes time, energy and resources.
2. The acquisition of food on a frequent, regular basis is an essential requirement of life.

3. The acquisition of other goods related to maintaining subsistence – furniture and furnishings, household goods, clothing etc – is also necessary on a regular though less frequent basis.
4. There is an economic element; it is essential that acquisition of food and goods is managed in accordance with available resources, to secure the best value for money, while meeting the subject's perceived needs.
5. There is a pleasure-giving element in which the novelty of a personal purchase or a gift for another stimulates the brain's pleasure centres, releasing endorphins.
6. There is also a further, restorative element in browsing the kind of emporia in which no effort has been spared to attract the consumer's attention, the element often referred to as 'retail therapy'. Although this kind of shopping may ultimately result in some kind of purchase, it is not necessarily initiated with such a purpose in mind.

There has been a certain amount of literature, of variable academic rigour, on sex differences in shopping, which tends to claim that men and women shop differently and that men do not, on the whole, indulge in restorative browse-shopping at all, but shop with an objective in mind, though they will, of course, consider alternatives before purchase, compare cost and quality, and indeed derive pleasure from acquisitions. A study for Barclaycard, for instance, suggested that because women spend more time on assessing purchases and comparing prices, (they are prepared to spend 100 minutes shopping compared to 72 minutes for men), on average they make a 10% better cost saving (in monetary terms) than men. Other research in the USA found that women's shopping has become more purposeful with pressure of time and is therefore less pleasurable but they still use shopping in order to feel better.

However, the main difference between men's and women's shopping, I would suggest, is that women play the major role in shopping for subsistence necessities, food and household goods; in other words shopping involves a division of labour. Housework too is an activity performed principally by women and here too the variation between daughters' age groups as a whole is insignificant,  $\chi^2 = 6.958$ ;  $df = 3$ ; Cramer's  $\phi = 0.206$ ;  $p = 0.073$ ; the Cramer's  $\phi$  coefficient's closeness to significance can be reasonably ascribed to the significant difference between daughters in their twenties and daughters in their fifties, whose assistance from mothers in their seventies and older must be limited.

Housework is a division of labour activity; it costs time and energy and its benefits are practical. A minority of women help their daughters with housework throughout their active lives. Shopping is a more complicated division of labour activity that costs time, energy and resources, and its benefits are practical, social and psychological. A majority of women go shopping regularly with their daughters throughout their lives, from which one must infer that benefits continue to exceed costs for either party.

One cannot help but compare shopping, in terms of its economic and subsistence function, skills imparted and social aspects, to the female dominated, collective gathering activities of traditional societies. But the suggestion of this study is that going shopping with daughters begins before those daughters have children and carries on throughout a subject's life, unlike other activities carried out with daughters, which show a significant decline over time; therefore this activity is not a consequence of a grandmothering effect. Nor can it be seen in a purely affiliative light, since much more obviously affiliative and social activities (such as visiting relatives or going out socially together) show a steady decline over the years. Shopping's spectrum of continuing benefits to daughters and mothers is presumed to outweigh costs and might thus be assumed to contribute, through the level of investment involved, to maternal fitness, if maternal fitness can be interpreted as an ongoing goal, encompassing a lifelong commitment from the investor.

### 3. 8. DISCUSSION

On a number of affective measures, mothers are as closely tied to sons as to daughters. When these children are adults, in general sons live just as close to mothers as daughters do; mothers keep in regular touch as much with sons as daughters. Adult daughters do not come to stay with mothers more frequently than do sons. Mothers do, though, go to stay more frequently with daughters than with sons, a tendency independent of whether the offspring have children of their own; in other words it does not represent a grandmaternal effect.

Responses on contact and affective ties can be taken to reflect mothers' own attitudes towards their offspring, attitudes that in general make no distinction between sons and daughters. Proximity of residence is clearly a matter of offspring choice, but one that demonstrates no generally discernible difference between sons and daughters. In the area of subjects and offspring staying together it is difficult to pin down a clue as to who is the

primary instigator. There is no significant difference in sons and daughters coming to stay, but do they come to stay of their own volition or when pressed by subjects? Mothers go to stay more often with daughters than sons; with a presumption that these visits must be welcome, this differential could as easily be a daughter-led behaviour as at mother's instigation. It is expected that coming to stay with subject relates to younger adult offspring, while going to stay with children encompasses older cohorts.

The transformation in the interaction between mothers and daughters in adulthood is particularly reflected in the activities that mothers and offspring carry out together. The activity indices with sons and daughters, taking a suite of typical behaviours together, show a greater tendency to carry out activities with daughters than with sons once offspring are adults, whatever their age.

This tendency masks some interesting variations between activities: for instance, apparently practical activities like giving advice and lending or giving sums of money to children are without significant differences between sons and daughters, the greatest even-handedness in investment coming with the provision of tangible resources. It might be argued that resource provision is more of a paternal investment activity and that is why mothers are even-handed, but the following chapter will question this assessment. Going on leisure activities together also shows no offspring sex difference, even when only adult children are considered and regardless of their parental status; it seems to be an affiliative activity that is related to the parity of affective bonds between mothers and offspring; whether it is child or parent who instigates the activity, it is carried out equally with sons and with daughters. It is also an activity carried out by a relatively large proportion of subjects, not a minor occupation, and as an affiliative and social activity, without any apparent practical purpose, serves to contradict the argument that it is social preferences that are the basis of activities that are differentially carried out with daughters. It stands as a control against other activities in which there is a social or affiliative element and aids consideration of what other contributory factors there might be to activities with differentials in the direction of daughters.

Why going on holiday together, which might seem to be a similar activity, *does* show a sex preference (towards daughters) is unclear. Furthermore, although this tendency is affected by daughters' parental status, it is in the direction of childlessness. As suggested earlier,

daughter preference here may be related in part to its greater cost. Other activities which have a broader affiliative and social goal, like visiting friends and relatives, and going shopping, show a strong offspring sex difference towards daughters. The first is to be expected from the known affiliative role of females in maintaining connections within the family, though again, as with holidays, perhaps unexpectedly the differential towards daughters is greatest for daughters without children. The second is interesting not just for the complexity of the analysis of the function of shopping, but particularly as a 'division of labour' activity. In shopping, moreover, the parental status of the offspring has no influence on the level of the activity, one way or the other.

Focussing on daughters, all activities decline over time but shopping and the much less frequent 'division of labour' activity, help with housework, (which also shows a daughter differential but no parental status effect), show the least decline through the years. The high point for all activities with daughters is in their early adult years, leading up to age of women's first birth, which is currently 29 years of age. This suggests a possibly daughter-led maternal investment pattern in which females seek to prepare themselves for appropriate mating, culminating in first birth. This is not a grandmaternal effect in the traditional sense of an expectation of investment in daughters centred round the early years of a number of offspring. On the other hand, the investment through shopping, which may, not unreasonably, be compared to the female subsistence activities of traditional societies, begins at a high level before daughters have any children and continues at a relatively high rate long after daughters' offspring are fully grown, thus also raising a query over its role as maternal investment. What would seem to be key to its continuance at a relatively high level is its functional necessity, tied to its division of labour character, (both characteristics shared by housework), but with the additional elements of pleasure and social contact in the activity, (not shared by housework). It is not, then, the social element that drives the differential towards daughters in shopping but the fact that it is not a male-oriented activity.

## PART I: MATERNAL INVESTMENT IN OFFSPRING

### CHAPTER 4

#### WOMENS' INVESTMENT FROM THEIR PARENTS

##### 4. 1. INTRODUCTION

It was suggested at the beginning of the previous chapter that fathers' behaviour to offspring was of limited relevance to mothers' behaviour, since the costs of maternal investment are seen to be opposed to the costs of continuing reproduction. But fathers' behaviour must have some relevance to mothers' since one might expect maternal and paternal investment in offspring to be complementary, in line with a sexual division of labour in other spheres of life and hypotheses on the development of human social systems entailing prolonged paternal as well as maternal care (Foley, 1989, 1996). One way of testing paternal attitudes would have been to sample a second group consisting of men and of similar size to the female sample. However, given the extra time and effort involved in achieving that, it seemed at least as useful to use the same sample of women to ask about their attitudes to their mothers and fathers.

This does not enlighten us about fathers' attitudes to sons and of course it can be argued that whatever bias there might be in the present sample of women when answering questions about their sons and daughters – (it has an older age skew, for example) – will also be present when answering questions about their mothers and fathers. On the other hand, the benefits of a within subjects experiment, such as data noise reduction and fuller use of the subject's participation, are obtained. It is also the case that one may want to make comparisons between attitudes to sons and daughters on the one hand, and attitudes to mothers and fathers on the other, in which case it is essential to draw the data from the same set of subjects. For instance, responses to questions about subjects' closeness to parents will be directly relevant to an interpretation of responses to questions about offsprings' closeness to subjects or to offsprings' fathers. It may be that variations in subjects' attitudes to parents are not

mirrored by variations in perceived offspring attitudes to subjects and to offsprings' fathers. That will in itself be interesting. On the other hand, the possible disadvantage of the passage of time in recalling attitudes to and activities with parents who may be deceased, in many cases long ago, will in theory be balanced by a more dispassionate assessment than might be made towards subjects' own children.

Because of the age skew of this sample, a large proportion of respondents were recollecting attitudes to and activities with parents who were deceased. Only 20.9% of subjects had a mother still alive and only 15% had a father still alive. Of course, the elderly are likely to have very vivid memories of their parents and their relationships with them; on the other hand one might argue that, in certain respects, relationships between parents and children have altered in the last fifty years, as one might argue that even in contemporary society there are many cultural variations in the nature of parent-offspring interactions.

This is why questions were confined to the affective sphere on the one hand, and the practical and measurable on the other. In making this particular study we are aiming to reveal the evolutionary underpinning of mother-offspring relations that holds good through cultural variations. But, in any case, fundamentally we are seeking to discover differences of attitude and behaviour, depending on the sex of the recipient, which one might expect to co-vary without influence from the more ephemeral differences of culture or age.

#### 4.2. ATTITUDES TO PARENTS

Subjects were asked a set of four questions about their attitudes to their parents which were similar to those questions they were asked about their attitudes to their children, except that they were framed in a slightly different way to take account of the more considered relationship which would be expected to obtain between mature adults, (though of course there was the occasional respondent who had lost a parent when young and was recollecting childhood attitudes).

#### 4.2.1. DATA AND METHODS

The four questions about attitudes to parents were comparative either in form or by implication, asking for either mother, father, both mother and father or neither to be selected at three strength levels: 'agree a lot', 'agree a bit' or 'not sure'.

The four questions sought to discover: 1) whether subject was closer to a) father, b) mother, c) both equally or d) neither; 2) whether subject got on better with a) father, b) mother, c) both equally or d) neither; 3) whether there was a special bond with a) father, b) mother, c) both parents or d) neither; and 4) whether subject had learned a lot about life from a) mother, b) father, c) both parents or d) neither. The answers to the questions on closeness and getting on well were framed comparatively, so that the four possible responses were mutually exclusive; however, because there was some double checking among the responses, if more than one response was checked, the response at the greater strength level was coded, but if a) and b) were selected at equal strength levels then c) was coded. The third question was only comparative by implication and in the light of the assessment of the possibility, described earlier, of special relationships with more than one offspring, it was decided not to select the stronger level response if both mother and father were checked at different response levels but to code them both. The fourth question about learning a lot about life from mother or father in particular, again carried a comparative implication, but if different level responses were recorded for mother and father, then both were coded.

Thereafter, as with attitudes to children, responses to these questions were recoded so that the strength levels of agreement were collapsed together and each question was simply recoded to select one of the four exclusive choices indicated – father, mother, both, neither, and where a double answer had been entered the stronger response was selected.

$X^2$  tests were then performed on each of the four questions, with their four levels of response. There was some slight variability in the numbers of responses to each of the four questions, due to the fact that respondents did not always choose to answer all four questions. But the total number of responses per question was broadly similar, making comparisons between the responses to the questions perfectly valid.

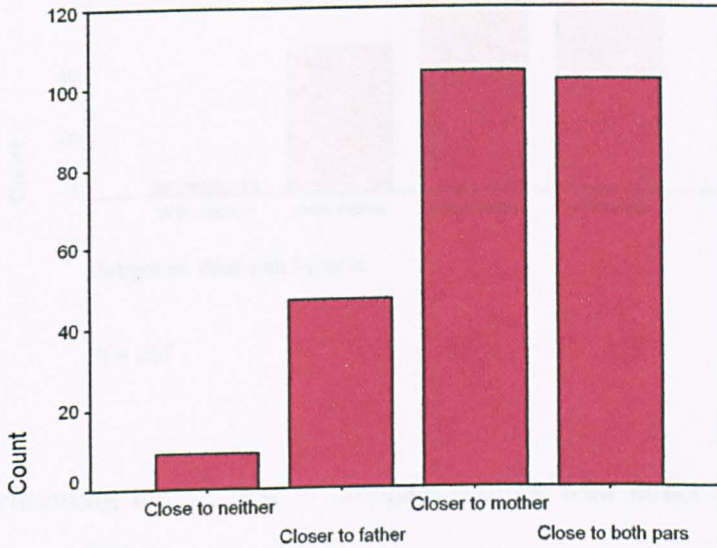


## 4.2.2. RESULTS

### (i) Closeness to Parents

The  $\chi^2$  test show a significant difference between the responses,  $\chi^2 (3) = 96.931$ ;  $p < 0.001$ .

Figure 4.1: Closeness of subject to mother and father



Closeness to Parents

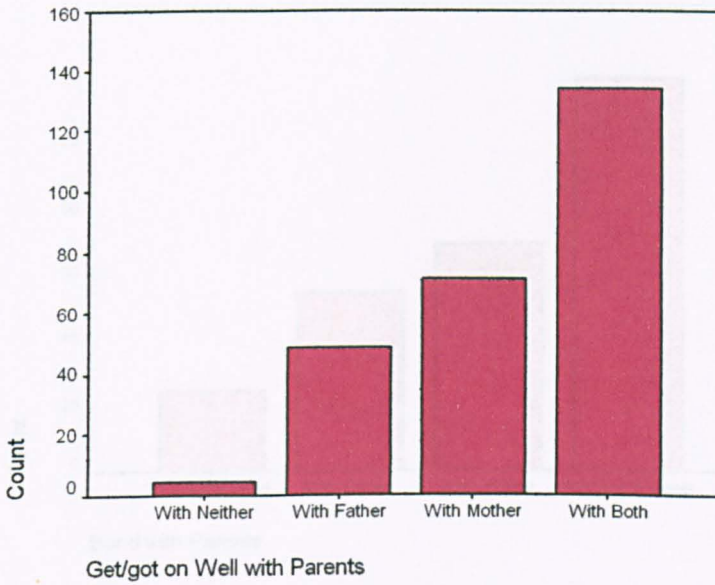
$n = 262$

As with subjects' assessment of their own children's closeness to either themselves (mothers) or to their children's fathers, subjects' closeness to mother is equally as great as subjects' closeness to both parents together. With partitioning of the  $\chi^2$  to compare subjects' closeness to mother and to father, subject is highly significantly more likely to feel closer to mother than to father,  $\chi^2 (1) = 21.517$ ;  $p < 0.001$ .

### (ii) Getting on Well with Parents

Getting on well with parents is a category designed to pin down a relationship with parents that might fall short of closeness. A  $\chi^2$  test shows a significant difference between responses,  $\chi^2 (3) = 137.039$ ;  $p < 0.001$ .

Figure 4. 2: Subject gets on well with mother and father



n = 257

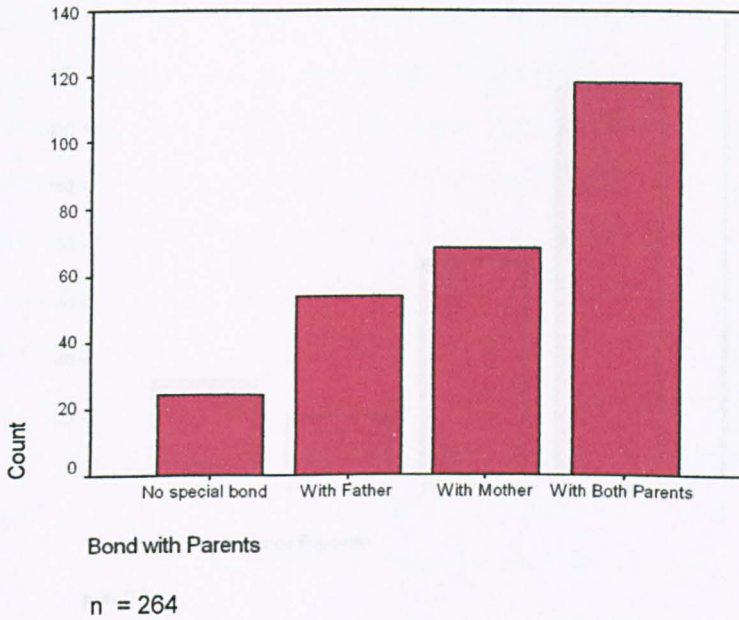
Partitioning the  $\chi^2$ , first to compare mother with father and then mother with both parents, shows:

1. subjects are significantly more likely to get on well with mother than with father,  $\chi^2(1) = 4.445$ ;  $p < 0.05$ ;
2. but subjects are highly significantly more likely to get on well with both their parents than with mother alone,  $\chi^2(1) = 19.361$ ;  $p < 0.001$ .

### (iii) Special Bond with Parents

The question about a special bond with parents is similar to the one asking about subjects' special relationship with their children. The  $\chi^2$  test again shows a highly significant difference between responses,  $\chi^2(3) = 69.939$ ;  $p < 0.001$ .

Figure 4. 3: Subject's special bond with mother and father

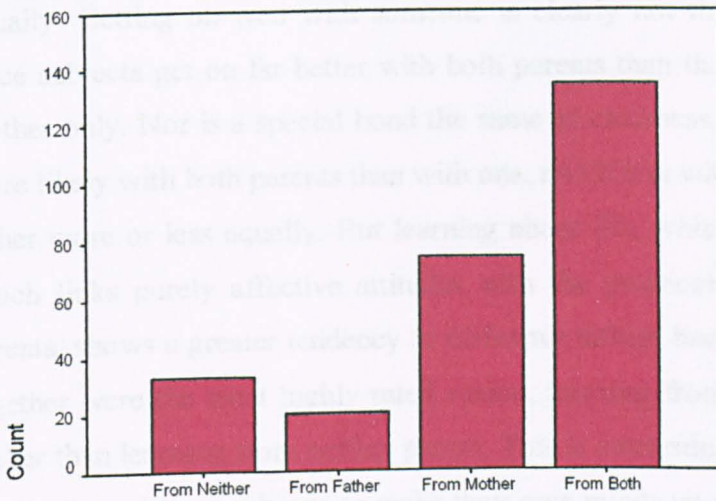


Partitioning the  $\chi^2$  once again shows subjects are far more likely to have a special bond with both parents than either mother or father,  $\chi^2 (1) = 13.441$ ;  $p < 0.001$ , and furthermore, when they do pick out a particular parent for the special bond, it is not significantly more likely to be mother than father.

#### (iv) Learning about Life from Parents

Learning about life from parents is the least affective of this group of questions. Nonetheless the  $\chi^2$  again shows a highly significant difference between responses,  $\chi^2 (3) = 120.931$ ;  $p < 0.001$ .

Figure 4. 4: Amount subject learnt about life from parents



Learnt about Life from Parents

n = 261

Partitioning the  $\chi^2$  shows:

1. subjects overwhelmingly feel they have learnt from both their parents rather than one particular parent,  $\chi^2 (1) = 17.308$ ;  $p < 0.001$ ;
2. but if they do select a parent from whom they have learned more, it is highly significantly more likely to be mother than father,  $\chi^2 (1) = 31.021$ ;  $p < 0.001$ ;
3. In fact, learning about life from father alone is not rated any higher than not learning much about life from either parent.

So there are some clear distinctions discernible in the responses to these four attitudinal questions, perhaps more clearly differentiated than the similar questions asked about attitudes towards and from subjects' offspring. On the one hand, respondents tend to express strongest attitudes towards parents jointly, being unable to differentiate between their feelings towards mother and towards father. On the other hand, where they do make a judgment in which mothers on their own are rated as highly as both parents together it is in closeness, where mothers' rating is virtually equal to the rating for closeness of both parents together. This compares with subjects' assessment that both daughters and sons are closer to mother alone as often as they are equally close to both parents. But just as subjects overwhelmingly claimed

to have a special relationship with all their children, special bonds with parents are mostly felt with both parents together, or else with either mother or father more or less equally. Getting on well with someone is clearly not the same thing as closeness, since subjects get on far better with both parents than the next highest rated option, mother only. Nor is a special bond the same as closeness, since a special bond is far more likely with both parents than with one, and if it is with one, it is either mother or father more or less equally. But learning about life, which is one of those questions which links purely affective attitudes with the practical side of relationships with parents, shows a greater tendency to disfavour fathers because, although both parents together were the most highly rated option, learning from father alone was rated no higher than learning from neither parent. This is interesting because the question, like many others, leaves subjects to make their own minds up about what exactly is meant by its text, in this case learning about life; and the fact that it might not necessarily be a positive experience was no doubt understood by some respondents and certainly articulated by at least one in a note on her questionnaire.

Table 4: 1 Percentage rates of subjects' attitudes to parents

	<b>Both Parents</b>	<b>Mother</b>	<b>Father</b>	<b>Neither</b>	<b>Total %</b>
<b>Closeness</b>	38.93	39.69	17.94	3.44	100
<b>Get on Well</b>	52.14	27.63	18.68	1.55	100
<b>Special Bond</b>	44.70	25.76	20.45	9.09	100
<b>Learnt about Life</b>	51.34	28.35	7.66	12.65	100

Over all, the strength hierarchy of attitudes runs from both parents equally, through mother only, to father only. The paramountcy of these ties with both parents equally (except for mothers' parity in closeness to both parents equally) is highly instructive and compares with the similar importance to subjects of equality of ties with both sons and daughters (except once again for the parity of children's perceived feelings of closeness to both parents compared to mother alone).

### 4.3. CONTACT AND PROXIMITY

As with sons and daughters, contact measurements take us to one remove from reports of emotional attitudes towards parents. With the older generation in particular contact may arise from attitudes such as duty, obligation, anxiety about health and well-being, as well as from simple affective motivations. These factors may also affect (or be affected by) proximity of parents.

#### 4.3.1. DATA AND METHODS

As with sons and daughters all types of contact were given equal weight: visit, letter, telephone, e-mail. The levels of contact were divided into four: at least once a week, at least once a month, at least once a year and less than once a year. Mean contact scores for mothers and fathers were then calculated and a paired samples t-test applied.

For questions about parents' proximity of residence to subjects, six levels of proximity were offered: (1) more than ten hours away; (2) 6-10 hours away; (3) 1-5 hours away; (4) 15 minutes to 1 hour away; (5) less than 15 minutes away; and (6) living in the same house as subject. A paired t-test was then applied to the average proximity of sons and of daughters.

#### 4.3.2. RESULTS

##### **(i) Contact with Parents**

The t-test for contact gives a value of  $t(28) = 2.262$ ;  $p < 0.05$ . Not unexpectedly, when this is separated out into contact with mother and father living together and contact with mother and father living apart, there is no significant difference in contact with mother and father living together. But for mother and father living apart, contact with mother is significantly greater than with father,  $t(6) = 2.705$ ;  $p < 0.05$ .

##### **(ii) Proximity to Parents**

Obviously, since the proximity of parents living together is bound to be equal, it was only necessary to perform a paired t-test for parents living separately, ie not living with a spouse. This t-test shows no significant difference between the mean proximity

of mothers and the mean proximity of fathers. The number of paired mothers and fathers in the t-test is only 8, indicating that most of the mothers and fathers living separately are widowed, since there are 29 mothers living separately and 14 fathers, according to the descriptive statistics. The descriptives, taking account of all those subjects' mothers living separately, indicate a proportionately greater tendency for mothers on their own to live less than 15 minutes away from subject than fathers on their own, (48.3% to 35.7%, including mothers and fathers living with subject).

### **(iii) Proximity of Parents by Subjects' own Parental Status**

One factor which might have some bearing on the proximity of parents' residence to subjects is whether those women are themselves mothers, bringing a possible grandparental effect into play.

In fact, a one-way ANOVA, analysing proximity of parents by subject's parental status, shows there is no significant difference between subjects who do or do not have children, in relation to the proximity of their parents, whether living together or apart. Given that many respondents' children are adult, the ANOVA was run again to exclude all subjects over 45. Once again there are no significant differences in proximity of parents, according to subjects' parental status.

## **4. 4. ACTIVITIES WITH PARENTS**

A very similar set of questions to those put to subjects about their regular activities with their children was put to subjects about their regular activities with their parents, whether those parents were alive or deceased. In this case, however, the subject was, where applicable (ie in four of the categories), the recipient of the proposed activity rather than the agent. In the other four categories behaviour would be of a mutual nature (as with offspring), although the dynamics of the relationship involved in carrying out the particular activity could and probably would be different.

These activities were:

1. receive advice from parents;
2. go shopping with them;
3. go on holiday together;

4. visit friends or relatives;
5. go out on leisure activities;
6. receive help in the house or garden;
7. receive loans or gifts of small sums of money;
8. receive loans or gifts of large sums of money.

The reference to help in the garden in activity 6 was the only difference of substance between the eight activities with offspring and the eight activities with parents, and this was inserted in order to broaden the activity so that fathers' help was as likely as mothers' in that category, all the other categories being considered to be, in principle, unisex.

#### 4.4.1. ACTIVITY INDICES WITH MOTHERS AND FATHERS

Activity indices were computed for activities with mothers and with fathers in the same way that indices were computed for sons and daughters in the previous chapter: the total number of activities carried out regularly with each parent was divided by the maximum potential number of activities to arrive at the activity index, expressed as a percentage.

Thereafter a paired t-test was performed to compare subjects' activity indices with mothers and with fathers. The t-test shows a highly significant difference between activity index with mother and activity index with father,  $t(261) = 11.82$ ;  $p < 0.001$ .

##### **(i) Effect of Age of Subject**

The age of the subject is likely to have an effect on her activity index with parents for the reasons previously discussed in relation to attitudinal questions, both from some decay of memory with advanced age, possible cultural differences between different age cohorts, or a combination of both.

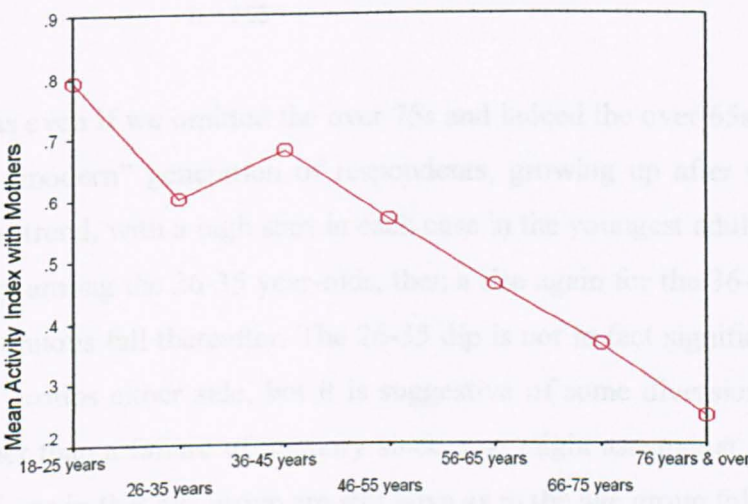
One-way ANOVAs were performed on activity indices for mothers and for fathers in order to test the differences in responses between all subject age groups to each parent separately. Thereafter a two-factor mixed ANOVA was performed on activity indices



with parents, with sex of parent as the within subjects variable and age group of subject as the between subjects variable.

The one-way ANOVAs found a significant difference between groups for activity indices with both mother,  $F(6,256) = 9.200; p < 0.001$ , and father,  $F(6,256) = 6.964; p < 0.001$ . Looking at Tukey's *post hoc* multiple comparisons, over-75 year-olds record significantly different activity indices from every other age group for mothers but not for fathers. But looking at the graphs makes it clear that the over-75s are following a downward trend in (necessarily, recollected) activities with both mothers and fathers from the high point of the 36-45 age group.

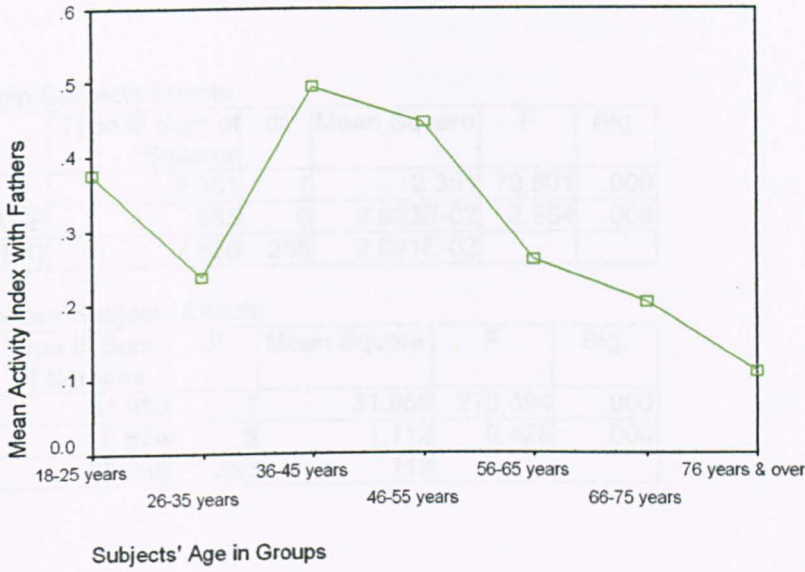
Figure 4. 5: Subjects' activity indices with mothers according to age group of subject



Subjects' Age in Groups

n = 263

Figure 4. 6: Subjects' activity indices with fathers according to age group of subject



n = 263

Thus even if we omitted the over 75s and indeed the over 65s, to confine ourselves to the “modern” generation of respondents, growing up after the War, there is still a clear trend, with a high start in each case in the youngest adult age group, followed by a dip among the 26-35 year-olds, then a rise again for the 36-45 year-olds, and then a continuous fall thereafter. The 26-35 dip is not in fact significantly different from the age groups either side, but it is suggestive of some diversion of interests or energy, rather than a failure of memory since, one might assume, at least as many parents of subjects in that age group are still alive as in the age group following.

The mixed ANOVA on parental activity indices demonstrates that, as well as a main effect for the sex of parents, with the activity index with mother being highly significantly greater than that with fathers, and a main effect for age, with the activity index for parents in general being highly significantly related to the age of the respondent, there is also an interaction between sex of parents and age, which, it is clear from the graph, is the much higher divergence in the first two age groups between indices with mother and with father. The younger a woman is, the less likely she is to carry out a lot of activities with her father, compared to activities with her mother.

Table 4.2: Mixed ANOVA of activity indices with parents by sex of parents and subjects' age groups

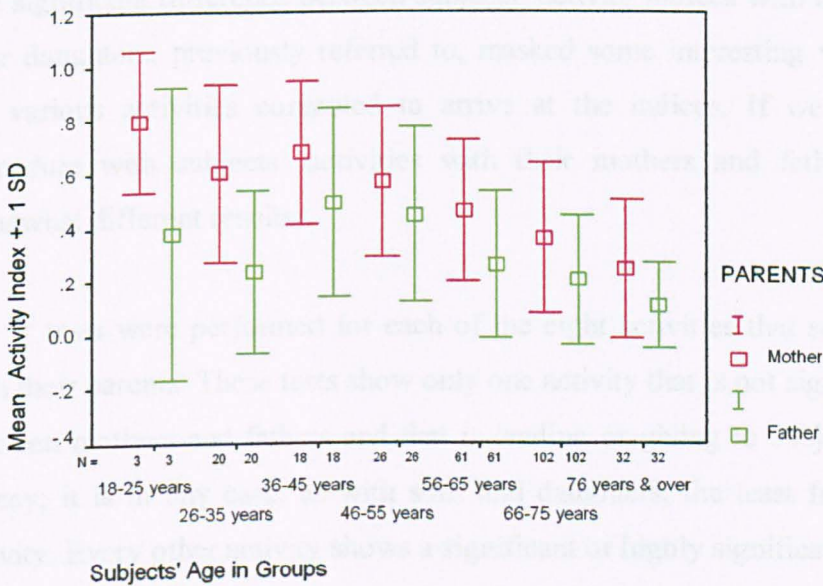
Tests of Within-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
PARSEX	2.351	1	2.351	78.601	.000
PARSEX * AGE	.535	6	8.923E-02	2.984	.008
Error(PARSEX)	7.626	255	2.991E-02		

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	31.959	1	31.959	270.884	.000
AGE	6.674	6	1.112	9.429	.000
Error	30.085	255	.118		

Figure 4. 7: Activity Indices with parents according to sex of parents and subjects' age groups



n = 524 (262 mothers; 262 fathers)

The difference between mother's and father's activity index is more or less the same from subjects' third age group, 36-45 years old, onwards. For the first two age groups, 18-25 and 26-35 years old, the difference between mother's and father's activity index is approximately double that for the other age groups. We should rightly be wary of the size of our youngest group, but on the other hand, its difference is

consistent with that of the next group in age, which supports a hypothesis that it is the early years of adulthood in which greatest investment is differentially obtained from mothers by offspring – the mirror of the greater investment put into younger age groups by mothers in subjects' activity indices with sons and daughters. It also remains clear that it is not the cohort at the peak of their child-bearing and early rearing years who seek/receive the maximum investment from their mothers but the cohort one age group younger, who are likely to be childfree. And the cohort that follows next after the first in amount of maternal investment received is not the second but the third age group, in which subjects' offspring are growing up. The average age for the children of subjects in age group 2 (26-35 years old) is just under 6 years of age. The average age for the children of subjects in age group 3 (36-45 years old) is just under 12 years of age.

#### 4.4.2. INDIVIDUAL ACTIVITIES WITH PARENTS

The significant difference between subjects' activity indices with their sons and with their daughters, previously referred to, masked some interesting variations between the various activities computed to arrive at the indices. If we follow the same procedure with subjects' activities with their mothers and fathers, we arrive at somewhat different results.

2x2  $\chi^2$  tests were performed for each of the eight activities that subjects carried out with their parents. These tests show only one activity that is not significantly different between mothers and fathers and that is lending or giving to subjects large sums of money; it is in any case, as with sons and daughters, the least frequently recorded activity. Every other activity shows a significant or highly significant association with whether parent is mother or father, in each case towards mothers, with only lending or giving small sums of money registering a lower significance than  $p < 0.01$ .

Table 4. 3: 2x2  $\chi^2$  statistics: Frequency (expressed as a percentage) of individual activities carried out with parents (n = 526; df = 1)

Activity	Mother %	Father %	$\chi^2$	$\phi$	Sig (2-tailed)
Advice	72.24	46.01	37.453	0.267	0.000
Shopping	64.26	12.93	146.202	0.527	0.000
Holidays	40.30	29.28	7.048	0.116	0.008
Visits	53.99	29.66	32.004	0.247	0.000
Leisure	39.54	26.24	10.551	0.142	0.001
House/Garden	35.74	24.33	8.142	0.124	0.004
Small Sums	33.08	23.95	5.372	0.101	0.020
Large Sums	11.03	11.03	0.000	0.000	1.000

#### (i) Shopping with Parents

Once again the highest percentage difference in the frequency of activities conducted with mother and with father is in shopping, with 64% of subjects regularly shopping with mother compared to 13% shopping with father. This activity is not the activity most frequently carried out with mothers but presents the largest percentage difference between mothers and fathers because of the very low level of shopping with fathers, the lowest level of any activity with father except receiving large sums, which is equally as low from mothers as from fathers.

#### (ii) Advice from Parents

Advice, however, differs from the picture obtaining between mothers and their sons and daughters, where the difference in advice dispensed to sons and to daughters was not significant. Here there is a large difference, with 72% (the highest frequency activity with mothers) being given advice by mother as opposed to 46% by father.

#### (iii) Social Activities with Parents

Of the three activities which could be grouped under the heading of social activities, going on holiday, visiting friends and relatives and going out on leisure activities, visiting friends and relatives registers the largest  $\chi^2$  value, reflecting the large percentage difference between going with mother to visit relatives and friends (54%)

and going with father (30%), a social activity that one might have expected to be carried out to a large extent jointly with mothers and fathers, since subjects might have been expected to have as much interest in maintaining links with fathers' kin as mothers' (with a small discount for paternity uncertainty).

Of course these visits may also have another function, in addition to women's role in maintaining social (especially kinship) networks, and tie in with mother's pre-eminence as the imparter of lessons about life (whether delivered consciously or unconsciously).

The significant differential between mothers and fathers in leisure activities is in contrast to the lack of significant difference between subjects' sons and daughters and perhaps indicates a generational difference, though clearly what female subjects do with their offspring of both sexes is not strictly comparable with what their parents of both sexes do/did with them.

#### **(iv) Housework and Gardening**

Perhaps because of the introduction of gardening, help with house and garden from mother and father rates more highly when the subject is receiving it than when she is giving it to sons and daughters, though the help is still received significantly more from mothers than from fathers.

#### **(v) Loans and Gifts**

Of activities showing a significantly greater tendency to be carried out with mothers than with fathers, only the loaning or giving of small sums of money by mother and father has a lower significance than  $p < 0.01$ . In the case of large sums, however, few subjects borrow and receive money, and do so absolutely equally from mother and father. This might signify that both mother and father are regarded as the owners and givers of large sums, even if it is one particular parent who actually hands the money over. On the other hand, loans and gifts of large sums are also made equally, by a similarly low number of subjects, to sons and daughters.

One might conclude further, looking at both the differences and the similarities between activities with offspring and activities with parents, that while it is possible

that subjects' fathers are differentially giving advice to their sons as opposed to their daughters and we are unaware of it because we have not sampled any male subjects, since our (female) subjects themselves are as likely to give advice to their sons as to their daughters, it is more likely that mothers are the principal advice-givers in the family. Shopping, on the other hand, maintains its peculiar, large sex difference and the balance of mutuality between subjects and mothers remains to be delineated, as it does between subjects and daughters.

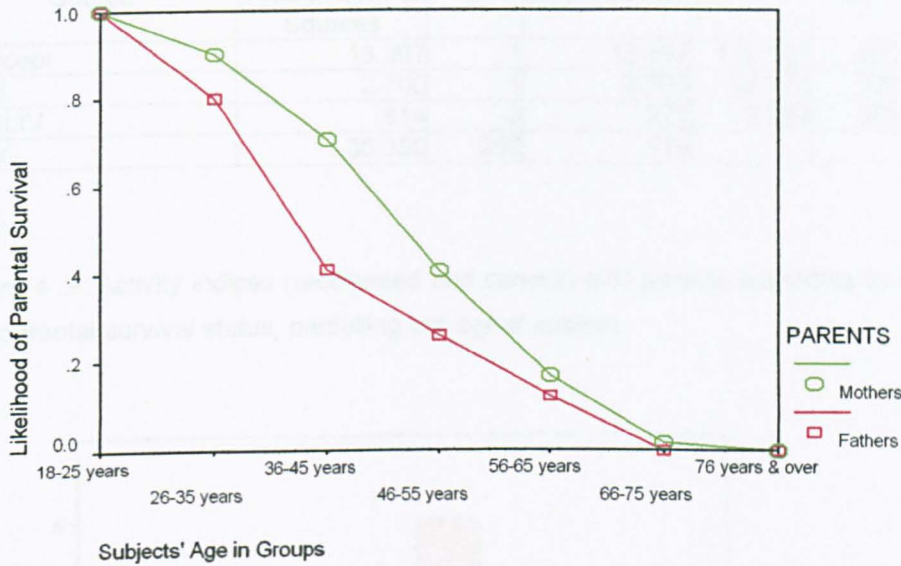
#### **(vi) Effect of Parents being Alive or Dead**

Of course, subjects' scores on the chosen activities may well be influenced by whether parents are alive or dead, even if it is not merely a matter of fading memory or fathers tending to die earlier than mothers. Perhaps, for instance, more activities are carried out with parents who are widowed than with parents who are not.

Looking first at the likelihood of either parent being alive for each of the seven age groups of subjects, in the first age group (18-25 years old), both parents are alive in all cases (which are only 3 in number); in the seventh age group (over 75 years old) both parents are dead in all cases. For the five age groups between there is an increasing probability of mother being alive rather than father up to a maximum in the third age group (36-45 years old), declining thereafter back to parity. But even when the difference is at its greatest it falls short of significance; in a  $2 \times 2$   $\chi^2$  test ( $n = 34$ ):  $\chi^2 = 2.982$ ;  $df = 1$ ;  $\phi = 0.296$ ;  $p = 0.084$ .

It is clear from the descriptives illustrated in the graph that, in this sample, in which there are, admittedly, very few subjects in the youngest age group, parents diverge from a certainty that both parents will be alive in the youngest subject age group to a certainty that both will be dead in the oldest subject age group, through an always greater probability that mother will be alive than father, reaching the widest difference -- 71% to 41% probability -- when subjects are in the 36-45 year-old age group.

Figure 4.8: Probability of parents being alive according to sex of parent and subject's age



n = 546 (273 mothers; 273 fathers)

Next, a mixed ANOVA was carried out on the activity indices of parents with the sex of parents as the within subjects factor and parental survival status as the between subjects factor, (with four mutually exclusive levels to the factor – neither parent alive, father alive-mother dead, mother alive-father dead and both alive). But because survival of parents is likely to co-vary with subjects' age group, the age group of subjects was entered as a covariate.

In this ANOVA, there is a main effect for sex of parents, but no main effect for parental survival; instead it is age group of subject that shows a highly significant main effect. The interaction between sex of parents and parental survival is also significant.

Table 4. 4: Mixed ANOVA of activity indices with parents, by sex of parent and parental survival status, with age of subject as a covariate

Tests of Within-Subjects Effects

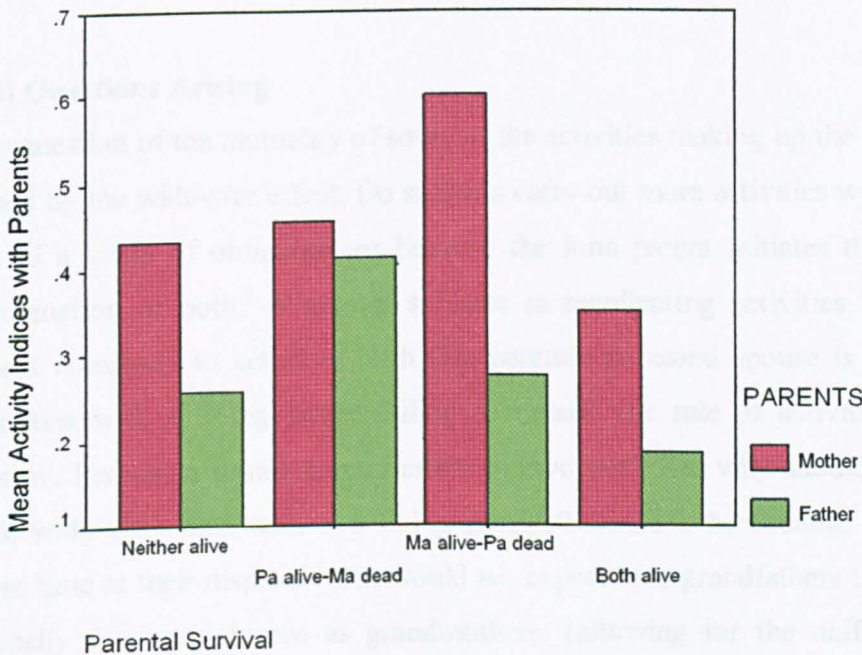
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
SEXPAR	.640	1	.640	21.658	.000
SEXPAR * AGE	.106	1	.106	3.581	.060
SEXPAR * PARLIV	.276	3	9.195E-02	3.109	.027
Error(SEXPAR)	7.570	256	2.957E-02		



Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	13.367	1	13.367	112.751	.000
AGE	2.700	1	2.700	22.776	.000
PARLIV	.814	3	.271	2.289	.079
Error	30.350	256	.119		

Figure 4. 9: Activity indices (recollected and current) with parents according to sex of parent and parental survival status, partialling out age of subject



n = 522 (261 mothers; 261 fathers)

Partiallying out age of subject, the greatest mean percentage of activities with both mother and with father occur when the other parent is deceased – a clear widow/er effect. And the interaction between mothers’ and fathers’ indices sees the recollection of activities performed with deceased mothers rate as highly as those carried out with living fathers. But, in fact, if the 2<sup>nd</sup> and 3<sup>rd</sup> points on the fathers’ graph are reversed, so that we are comparing mother dead with father dead and mother alive with father alive, then the trends of both lines are similar – the indices are at their highest for each parent when that parent is the one surviving parent (mother or father) and about the same level with both parents deceased or with one dead parent (mother or father) –

separated, of course, by the clear difference between the levels of activity with mother and with father – while indices with both parents alive are depressed slightly below those with one parent dead or neither parent alive.

What one can take from all this is that the clear and consistent difference between activities with mothers and activities with fathers obtains whatever the survival status of the parent; the effect of parental survival status is uniform as between fathers and mothers; there is clearly a widow/er effect for both fathers and mothers. But apart from that effect, the level of reported activities with both parents alive is no greater than when subject is recollecting activities with one or even two parents dead.

#### **(vii) Questions Arising**

The question of the mutuality of some of the activities making up the activity index is raised by the widow/er effect. Do subjects carry out more activities with a lone parent out of a sense of obligation or because the lone parent initiates the activity, or a combination of both? A greater salience in recollecting activities with one living parent compared to activities with that parent's deceased spouse is contradicted by activities with a living father failing to exceed the rate of activities with a dead mother. Perhaps a grandparental effect is involved? But why should this be greater with widow/ers than with two living parents? Could it be because widow/ers have more time at their disposal? But would we expect lone grandfathers to be involved to virtually the same degree as grandmothers, (allowing for the uniform differential between activities with mothers and activities with fathers, at whatever survival level, described earlier)? Is there anything more involved than simply a greater tendency for widow/ers to rely on affiliative and social contact with children together with a greater tendency of children to look after widowed parents?

#### **(viii) Grandparental Effect**

One can start by looking more basically for a grandparental effect on parents' activities with subject by ascertaining whether the parental activity indices are affected by whether subject has children or not. And since it was age of respondent and not survival status of parents that proved significant in comparing mothers' and fathers' activity indices according to parental survival and subject age, it was decided to include age of subject but not parental survival status as a covariate.

A mixed ANOVA was performed on parental activity indices, with sex of parents as the within subjects variable and subject's own parental status as the between subjects variable; subjects' age group was entered as a covariate.

This ANOVA shows a highly significant main effect for sex of parents but no main effect for parental status (whether subject does or does not have children) and no interaction between sex of parents and subjects' parental status. There is also a highly significant main effect for subjects' age and an interaction between sex of parent and age of subject.

Table 4. 5: Mixed ANOVA: Activity indices with parents, according to sex of parent and parental status of subject, with age of subject as a covariate

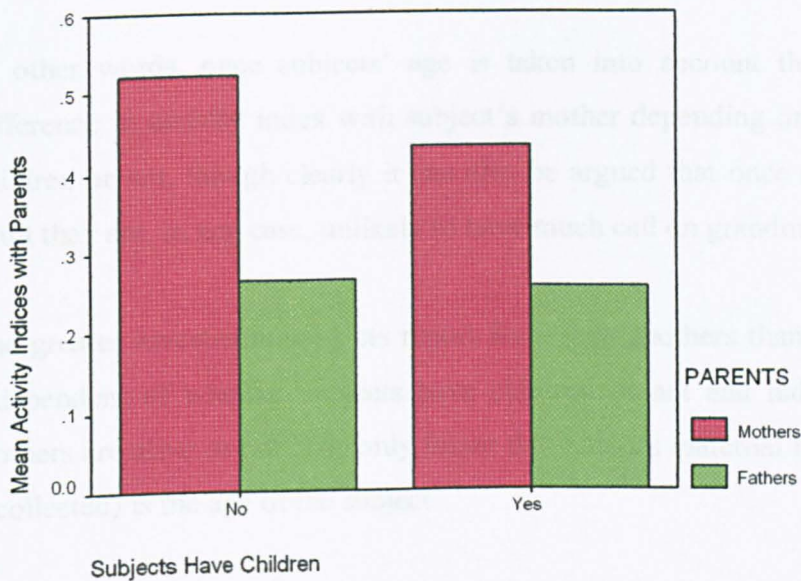
Tests of Within-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
PARSEX	1.213	1	1.213	40.141	.000
PARSEX * AGE	.234	1	.234	7.741	.006
PARSEX * CHILDREN	5.062E-02	1	5.062E-02	1.675	.197
Error(PARSEX)	7.827	259	3.022E-02		

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	17.861	1	17.861	146.350	.000
AGE	4.680	1	4.680	38.346	.000
CHILDREN	8.334E-02	1	8.334E-02	.683	.409
Error	31.609	259	.122		

Figure 4.10: Activity indices with parents' depending on sex of subject's parent and subject's own parental status, partialling out age of subjects



n = 524 (262 mothers; 262 fathers)

It would appear from the graph that the lack of significant difference in the activity indices with parents as a whole, between subjects who do and subjects who do not have children, might be led by the virtual identity of fathers' scores.

### (ix) Grandmaternal Effect

Perhaps, in case the lack of a grandfather effect acts to mask a possible grandmother effect, we should look simply for a grandmother effect rather than a joint grandparental effect in relation to activity indices with parents when subjects do or do not have children.

A one-way ANOVA was performed with activity index with mother as the dependent variable and parental status of subject as the independent variable.

This shows a significant difference between activity index with mother when subject has children and when subject does not have children,  $F(1,261) = 5.624$ ;  $p < 0.05$ , and the direction of the difference is that subject carries out more activities with her mother when she does not have children than when she does.

However, once age of subjects is controlled for in an ANOVA as a covariate, there is no longer a significant difference in maternal activity indices in relation to subjects' parental status:  $F(1,260) = 1.719$ ;  $p = 0.191$ .

In other words, once subjects' age is taken into account there is no significant difference in activity index with subject's mother depending on whether subject has children or not, though clearly it can also be argued that once subjects' children are adult they are, in any case, unlikely to have much call on grandmaternal investment.

The greater investment subjects report from their mothers than from their fathers is independent of whether subjects have children or not and independent of whether mothers are alive or not. The only factor that reduces maternal investment (current or recollected) is the age of the subject

#### 4. 5. PARENTAL SUPPORT WHEN HAVING CHILDREN

Having established that there is no grandparental effect evident in subjects' activity indices with mothers any more than with fathers, although there is a highly significant difference between investment in subjects by mothers and investment by fathers, we can pass on to an area where questions more directly relevant to grandparenting were posed.

They are included in this chapter on subjects' relationships with their mothers and fathers, rather than in the grandparenting chapter because they are questions about the subject's own experience of becoming a mother, rather than the subject's role in relation to her sons' and daughters' offspring.

##### 4.5.1. DATA AND METHODS

Subjects were asked about the level of parental support around the time of the birth of their children. One question was attitudinal, involving a judgment about the value of parental support, the other was behavioural, requiring an assessment of its frequency. In each case support was rated on a scale from 4 (highest) down to 0 (parent deceased) for both mother and father. In the case of practical support, because possible answers were not mutually exclusive and therefore more than one answer

could be given, an additional score of 5 was coded where the choices for 4 (dropped in often) and 3 (came to stay) were both checked. The choice coded 2 (kept in touch), did not bring an increased score if checked with a higher-rated response, since it was taken to be subsumed within replies coded 3 and 4.

Paired t-tests were performed both to compare the strength of support from mothers and fathers around the time of subjects' bearing children and to compare the practical availability of mothers and fathers. For each variable deceased parents were omitted, as although they clearly would not be able to contribute, they could not exercise any choice in the matter.

#### 4.5.2. RESULTS

Predictably, in a paired t-test, the value of support from mother around the time of giving birth to children is rated highly significantly more important than that of father,  $t(125) = 5.263$ ;  $p < 0.001$ . One might have expected that the physical aspect of keeping in touch would be less discrepant for fathers -- perhaps something that parents might do together -- but it is not so; contact with parents when having children is again highly significantly more frequent with mother than with father,  $t(139) = 4.005$ ;  $p < 0.001$ .

The frequency tables show how the average scores break down in both importance and nature of support and contact from mother and father.

Table 4. 6: Importance of support of living parents when subjects having children

Condition	Mother-Freq	Mother %	Father Freq	Father %
Estranged	17	8.1	12	8.8
Not important	28	13.4	25	18.4
Quite important	56	26.8	54	39.7
Very important	108	51.7	45	33.1
Total	209	100.0	136	100.0

Table 4. 7: Level of contact with living parents when subjects having children

Condition	Mother Freq	Mother %	Father Freq	Father %
Not involved	9	4.3	15	9.7
Kept in touch	38	18.4	38	24.5
Came to stay	44	21.3	26	16.8
Dropped in often	100	48.3	70	45.1
Dropped in & stayed, or lived in same house	16	7.7	6	3.9
Total	207	100.0	155	100.0

Conflating levels of importance of support, 78.5% of respondents found mothers' support very important or quite important compared to 72.8% for fathers'; 77.3% of mothers dropped in often or came to stay (or both) compared to 65.8% of fathers. However, mothers' support was more likely to be very important while fathers' support was more likely to be quite important; and in terms of contact mothers were twice as likely as fathers to make contact at the highest level.

Re-introducing deceased parents, (more fathers than mothers, in accordance with demographics previously referred to), makes the differences in importance and level of support even clearer.

Table 4. 8: Importance of support of parents (including deceased) when subjects having children

Condition	Mother-Freq	Mother %	Father Freq	Father %
Deceased	27	11.4	42	23.6
Estranged	17	7.2	12	6.7
Not important	28	11.9	25	14.0
Quite important	56	23.7	54	30.3
Very important	108	45.8	45	25.3
Total	236	100.0	178	100.0

Table 4. 9: Level of contact with parents (including deceased) when subjects having children

Condition	Mother Freq	Mother %	Father Freq	Father %
Deceased	27	11.5	42	21.3
Not involved	9	3.8	15	7.6
Kept in touch	38	16.2	38	19.3
Came to stay	44	18.8	26	13.2
Dropped in often	100	42.7	70	35.5
Dropped in & stayed, or lived in same house	16	6.8	6	3.0
Total	234	100.0	197	100.0

69.5% of respondents found mothers' support very important or quite important compared to 55.6% for fathers'; 68.3% of mothers dropped in often or came to stay (or both) compared to 51.7% of fathers.

If we compare the numbers of responses for fathers and mothers, even though every foreseeable eventuality was covered, 15.8% fewer responses were actually made for fathers than for mothers in 'nature of contact' and 24.6% fewer in 'importance of support'. We cannot, though, impute 'not important' or 'not involved' scores to bring parity of response between mothers and fathers, since paternal non-response might mean that fathers mirrored mothers' levels rather than that they were not worth reporting. But even if one ignores the lower representation of fathers in the figures by reason of fewer responses, being dead is a relevant factor which should be taken into account in assessing the parental roles at daughters' childbearing.

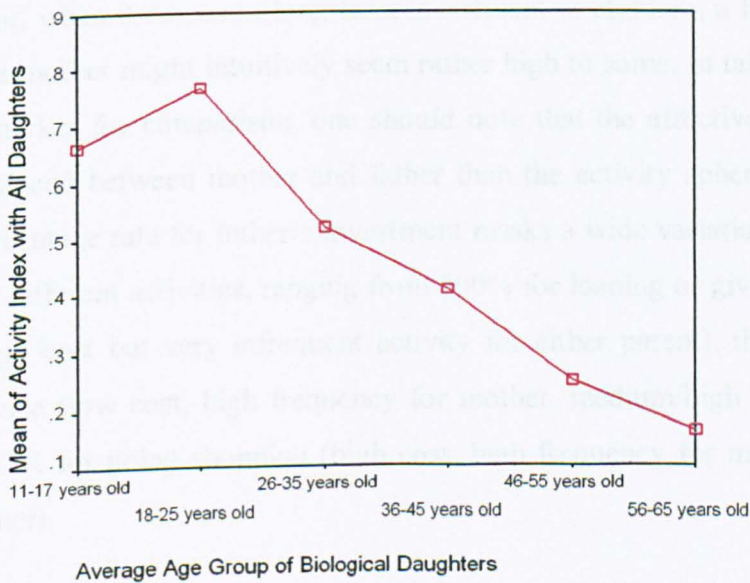
The maternal investment period in offspring is argued in chapter 3 to culminate in daughter's first birth and a different effect is to be expected from the death of one parent compared to the other, as shown in research referred to earlier. As it happens, even excluding deceased parents gives a highly significant difference in the relative contributions of mothers and fathers to daughters' childbirth, but it is the second set of percentages (*tables 4. 8 & 4. 9*), that present an even stronger picture of the relative roles and importance of mother as opposed to father, giving us some idea of the levels of involvement of each of them, derived from data about what is arguably the most memorable experience of any woman's life, likely to suffer very little from any memory decay arising from age.

The figures for importance and quality of support in childbirth at the very least do not undermine and probably even emphasise (because if anything recent memories of childbirth will be the most vivid) the drop in the activity index with parents for the 26-35 year old age group of subjects. Perhaps that age group is just too busy to find as much time for activities with mother and father as the age group before and the age group after. But that possibility does seem to run counter to the assumed predictions of the grandmother hypothesis, that subjects in the age group most likely to see the birth and first few years of life of children would be those calling on maximum investment from mothers.



Of course it is necessary to separate the different perceptions of the generations depending on their role. Women between 26 and 35 report lower (though not significantly so) activity indices with their parents than the two age groups either side. But how does that compare with the subjects' own activity index with offspring in those age groups? The tests in the previous chapter divided offspring into decadal age groups. To make a valid comparison it is necessary to regroup offspring into age groups similar to subjects'. This simply confirms the statistics presented in the previous chapter: subjects' highest activity index is with 18-25 year old daughters. In fact, grouped in this way, according to Tukey *post hoc* comparisons, this peak is significantly different from all the other daughter age groups. The 26-35 year old age group, on the other hand, is simply part of a linear downward trend. Thus the investment variations between daughter age groups are similar, certainly for the first two adult age groups, whether subjects in those age groups are reporting investment from their middle-aged mothers or middle-age subjects are reporting investment in their daughters in those age groups. This similarity suggests that whether a mother or a daughter is the instigator of the investment is irrelevant to the subject's perception of it.

Figure 4. 11: Activity index with daughters according to daughters' age groups



n = 169

Returning to the perinatal investment figures, it is instructive to compare these percentages with those for the activities with mother and father, used to compute

activity indices with them. As we saw from the  $\chi^2$  test statistics (*Table 4.3*), only receiving advice from mothers rates more highly than perinatal investment, at 72%, with going shopping coming close at 64%, and only receiving advice from fathers at 46% comes anywhere near the perinatal support figures for fathers. One can make a further comparison between parents' childbirth support and general parental investment activities by computing fathers' average for a specific activity and dividing it by mothers' average to reach a rating for fathers expressed as a percentage of the rating for mothers. Sum the individual activity ratings and divide by the number of activities and you reach an activity rating for fathers relative to mothers of 64.8%. (This compares to a fathers' activity index rating against mothers' of only 58.2%.)

Thus, by these measures, paternal investment in female offspring is below two thirds of maternal investment. We don't know, of course, what a father's value is in relation to the upbringing of a son, but if we speculate based on the only data we have on sons' attitudes to parents in this survey and that is in perceived closeness to mother and father, taking the total responses for close to both and closer to father (=76) and dividing by the total responses for close to both and closer to mother (=113), we reach a figure of 67.3 %, not much different.

That, when it comes to long-term investment in children, a father is worth two thirds of a mother might intuitively seem rather high to some. In taking closeness of sons as a marker for comparison, one should note that the affective sphere is more closely balanced between mother and father than the activity sphere. And indeed, the total percentage rate for father's investment masks a wide variation in the percentage rates for different activities, ranging from 100% for loaning or giving large sums of money (high cost but very infrequent activity for either parent), through 63.9% for giving advice (low cost, high frequency for mother, medium/high frequency for father,) to 20.3% for going shopping (high cost, high frequency for mother, low frequency for father).

What is needed is a cost quotient analysis for activities with father and mother, comparable to the one done for activities with sons and daughters in the previous chapter. As before, the percentage rates of the individual activities with parents (laid

out in *table 4.3*) were assigned four levels: 10-25% - Low; 26-40% - Medium; 41-55% Medium/High; and 56-70+% - High. Corresponding costs were assessed at four levels similarly.

Table 4. 10: Cost/benefit analysis of subjects' activities with father and with mother

Activity	Freq-Mother*	Freq-Father*	Nature/Benefit	Cost	Type**
Advice	High	Med/High	Instructional	Low	TE
Shopping	High	Low	Instructional/ Practical/ Affiliative	High	TER
Holidays	Medium	Med	Affiliative/ Social	Med/High	TER
Friends/ Relatives	Med/High	Med	Affiliative/ Social	Medium	TE
Leisure	Medium	Med	Affiliative/ Social	Medium	TER
House/ Garden	Medium	Low	Instructional/ Practical	High	TE
Small Money	Medium	Low	Practical	Low	R
Large Money	Low	Low	Practical	High	R

\* Percentage rate among subjects

\*\* Cost type:  
T = Time  
E = Energy  
R = Resources

Translating high, medium/high, medium and low into 4, 3, 2 and 1, and multiplying frequency (derived from activity percentage score) by estimated cost, once again supplies cost quotients for each activity and an average cost quotient for mothers and for fathers.

Table 4. 11: Comparison of cost quotients of activities with mothers and fathers

Activity	Freq-Mother	Freq-Father	Cost	Quot-Mother	Quot-Father
Advice	4	3	1	4	3
Shopping	4	1	4	16	4
Holidays	2	2	3	6	6
Visits	3	2	2	6	4
Leisure	2	2	2	4	4
House/Gdn	2	1	4	8	4
Sml Money	2	1	1	2	1
Lge Money	1	1	4	4	4
MEAN COST QUOTIENT				6.25	3.75

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Measured in this way, the cost of father’s investment in offspring (or at least in daughters) falls to 60%.

One objection that may be offered is that with a sample relatively old in years, subjects’ recollection of their fathers’ investment relates to a period before the “new man” made his appearance, the involved modern father, taking his turn at all levels of childcare and domestic duty, and harks back to less involved fathers. On the other hand, the older age cohorts of fathers come from a period when the marital bond was more stable, and separation and divorce very much less common, ensuring the presence of a father in the family home in most cases. Furthermore, the present study is not concerned with the essential nurture, care and upbringing of young children, with which a higher proportion of fathers than in the past may indeed involve themselves, but whose level of contribution may be questionable. A central strand of the main hypothesis of this study is that offspring go on requiring substantial and costly parental investment long past their altricial stage, in fact until they are fully grown and developed, a period that can last twenty years and beyond.

It was suggested earlier that the level of paternal investment might be irrelevant to maternal because fathers might be making other types of parental investment and what matters to mothers is the cost of their own investment. One candidate for

fathers' investment activity, for instance, might be the playing of games with and taking to sporting activities of (especially) sons; it would take a further study to delineate and test these and other possibilities.

It looks likely, however, that there is no great pool of investment activities equivalent to mothers' that fathers are carrying out with their offspring (especially sons), for this reason: the provision of resources by fathers in support of the family as a whole is a given and is not to be underestimated; but if we look at additional personal resource provision, subjects receive large sums of money equally as often from their mothers as from their fathers (just as they dispense them equally to sons and daughters). It might be argued that (especially in this study's age cohorts) all or most resources emanate originally from fathers. But in terms of immediate, direct investment, fathers do not exceed mothers in their (infrequent) dispensing of cash.

In all other areas there is a clear differential between mothers and fathers which may point to an overall balance in favour of mothers, even when typically masculine investment activities are factored in. For instance, surely it would be fathers who would be more likely to tell their sons the facts of life? In fact, this study's advice cost quotient of fathers (75% of mothers') and the advice percentage rate for fathers (63.9% of mothers'), are figures that sit comfortably with results from a recent survey of which parent was most responsible (if consulted) for giving sex education advice to both sons and daughters between the ages of 11 and 14; 66% of sons and daughters asked their mothers for advice and 34% their fathers. If a significant proportion of boys looking for parental sex education seek guidance from their mothers rather than their fathers, (and from the figures it must be at least 32% of the boys) one can assume that other kinds of advice follow at least a similar proportion. For example, it has been reported in a study by Miriam David that teenagers (especially girls but also boys) predominantly seek guidance from mothers rather than fathers about further education choices (David, 2003).

If we start from the cost quotient figure of 60% as the lowest possible paternal to maternal ratio of investment in daughters and allow it to rise, either in the light of unknown levels of paternal investment in sons, or indeed, in relation to daughters, make allowances for the contribution of general resources by fathers, we might settle

on a rough 'two thirds rule' for the investment of fathers compared to mothers and thus their relative importance to offspring. At a  $\frac{2}{3}$  ratio, then, fathers turn out to be pretty important to offspring's long-term development and well-being. This suggests further thoughts about what maternal strategies might be employed in the absence, for whatever reason, of fathers.

#### 4. 6. DISCUSSION

In order to have some measure by which to evaluate their investment in their offspring, similar questions to those posed about their children were put to subjects on their relationships with their parents. Affectively, they are found to be as strongly tied to father as to mother in terms of getting on well and special bonds, though they are equally as close to mothers as to both parents together (as they are to daughters as much as to both sons and daughters together). Nor is there any difference in proximity of residence, (where parents live apart) even when the subjects' children are still dependent. There is, though, a difference in rates of contact, with subjects being much more often in contact with their mothers than their fathers when their mothers and fathers live apart.

The activities that subjects carry out (or recollect carrying out) with their parents also show a divergence between mothers and fathers. This is not a function of the likelihood that more mothers are alive than fathers, (although there is such a differential), since even where mother is dead and father alive, no more activities are reported carried out with father than were with mother. The highest level of activity index with mother, as well as the biggest gap difference between mothers and fathers is in the 18-25 year-old age group of respondents, supporting the argument that general mother/daughter investment may be a daughter-led phenomenon that peaks prior to daughters' experience of first birth. As with the activity index as a whole, so with all the individual activities there is a highly significant differential, except for help with money, where the provision of large sums to subjects is recorded as being made equally by mothers and fathers. Once again, (as with sons and daughters), the least costly investment behaviour, the giving of advice, is the most frequently carried out, taking both sexes together; and the behaviour with the biggest sex differential is the 'division of labour' activity, shopping. The high level of advice received from

mothers echoes the responses for learning about life, in which, although subjects are significantly more likely to learn from both parents, if one parent is preferred it is significantly more likely to be mother. The differential in investment behaviours reported between mothers and fathers is independent of whether subjects have children or not and independent of whether mothers are alive or not. Only the age of the subject affects the reported level of maternal investment.

One investment area where a differential is both expected and recorded between mothers and fathers is when subject is actually having a baby. Both the grandmother hypothesis and the daughter-led maternal investment hypothesis, explored in the previous chapter, would predict a high level of maternal investment at this time. The 69% of women who receive substantial emotional or practical support from their mothers around this time, (78% of mothers actually alive), compares with the 72% who receive (or have received in the past) advice from their mothers, and the 64% who go (or have gone) shopping with their mothers. The calculation of 54% perinatal support from fathers (69% of living fathers) exceeds that of every activity with fathers, advice at 46% coming closest. The strength of support at childbirth is sharpened by the fact that parents had to be alive at the time to score on these measures, whereas their scores on other behavioural measures could be recollected after death. Given the greater likelihood of fathers than mothers being deceased at daughter's childbirth, the ratio of fathers' to mothers' perinatal support of 78% is well in excess of fathers' general activity rating of 65% of mothers' and cost quotient rating of 60% of mothers'.

In aggregating with perinatal support the other various elements in parental investment and factoring in their costs as part of the evaluation, one may suggest, in this modern, post-industrial society, an approximate  $\frac{2}{3}$  ratio for the value of a father's contribution to children's upbringing compared to a mother's. The absence of that paternal support has implications for maternal investment strategies, as will emerge in the next chapter.

# PART I: MATERNAL INVESTMENT IN OFFSPRING

## CHAPTER 5

### STEP-PARENTING

#### 5. 1. INTRODUCTION

If the influence and investment of mothers, compared to fathers' not insubstantial contribution, is of prime importance in the successful rearing of offspring to the point where they are in a position to mate and produce their own offspring, what is the effect of the removal of the mother (or father), either wholly or in part, from the rearing of offspring? Hill and Hurtado found that maternal death led to a mortality rate of 100% for Ache infants in the first year of life during the time when they still lived in the forest. After the first year, mother's death increased the age-specific mortality rate of offspring fivefold, (while father's death increased it threefold). The presence or absence of grandparents, aunts, uncles and adult siblings seemed to have little effect on child survival (Hill & Hurtado, 1996). Sear and Mace found similar effects of maternal mortality on child survival in agricultural villages of the Gambia: almost certain death if mother died during the first year of infant's life; probabilities of death during infancy 5-8 times greater, (though there was no influence on child mortality from father's death). Maternal grandmothers, on the other hand, improved the survival of their grandchildren and paternal grandmothers increased the fertility rates of their daughters-in-law. The survival of offspring may be a key marker of a woman's fitness in traditional populations still practising natural fertility. However, particularly where modern medical advances have substantially reduced infant mortality, other factors may contribute to fitness outcomes: the presence of a non-reproductive grandmother influenced children's height in the Gambia (Sear & Mace, 2000, 2003; Sear *et al*, 2004); a longitudinal study of stress, measured by children's cortisol levels in Dominica, found children living with a stepfather and half-siblings or with other distant relatives showed elevated cortisol levels, compared with children living in nuclear families or with grandparents or single mothers, supported by other kin (Flinn & England, 1995).



In modern, post-industrial societies, far more investment factors than those measured by stature or stress are likely to contribute to offsprings' ability to compete with rivals, leading to longer term fitness differentials.

There has been much debate across many disciplines on the effect of various types of allomothering on the well-being of children. In the field of anthropology, the grandmaternal role has received most attention, (Hawkes *et al*, 1989, 1997, 1998, 2003) but as more of a 'helpers at the nest' function, adding valuable support to the mother's investment, with obvious inclusive fitness benefits and when the helper's own reproductive status is not an issue. Developmental psychologists have looked at the effect on children of separating them from their mothers in order to be looked after on a part-time basis by childcarers of different types, such as nannies, childminders or day nurseries. Jay Belsky, for instance, working from an American national study, the NICHD Study of Early Child Care, has drawn attention to the importance of both the quality and quantity of pre-school infant childcare, in relation to the cognitive, emotional and social development of young children: the more responsive and stimulating the caregivers in a child's first three years, the more socially competent and cognitively developed the child will be at four and a half years of age; but the greater the amount of childcare in the first four and a half years, the more aggressive and disobedient the child will be in the first year of school (Alhussen *et al*, 2002, 2003, 2004; Belsky *et al*, 2001, 2002). Sociologists have considered the effect of adoption on the long-term development of the adopted child. David Howe (Howe, 1998, 2001; Howe & Feast, 2000) found that children placed as babies, especially under the age of one year, were most likely to feel positive about the experience of being adopted and older children the least. But even when placed between the ages of 1 and 2 years, there was a significant diminution in positive feelings. However, the younger the age at adoption, the greater the likelihood that the adopted child would seek out its birth parents. Twice as many women as men seek out their parents, predominantly their mothers. The age at which women seek out their mothers does not vary greatly from the age at which they are sought first by their mothers, 29.8 years for the former, 29.3 years for the latter. For an evolutionist, especially one holding to the importance of daughter's first birth for maternal strategies, this chimes strikingly with the mean age of first birth for women in the UK, which in 2000 was 29.1 years. This age is following a rising trend and suggests that

those who sought their mothers in the recent past did so after the birth of their first or subsequent child.

Various chapters of this work concentrate on inferences that can be drawn from suitable data, about the behaviour of children and grandchildren as a whole or the behaviour of children and grandchildren, excluding step-kin; (the British Social Attitudes Survey 1998, from which data were drawn for the grandparenting chapters, and the Family Expenditure Survey 2000-2001, from which data in this chapter are drawn, do not distinguish between adopted and biological children.) The numbers of stepchildren and step-grandchildren were too low to make fine-grained inferences with any power in either the BSAS or the survey conducted by myself for the present work. The FES obtained data from twice as many households as the BSAS, while the scope of the latter survey was further reduced to specific sub-samples for the grandparenting sub-survey. One of the reasons for using the FES was to have sufficient cases available so as to be able to make some inferences about differences of behaviour towards biological (including adopted) children and towards stepchildren. It would have been useful to be able to separate out adopted children also, but insofar as any behavioural difference towards an adopted child might be expected to be no more favourable from an evolutionary point of view than towards a biological child, and possibly less, the significance of any difference between behaviour towards biological (including adopted) children and behaviour towards stepchildren ought, if anything, to be strengthened, though the numbers of adopted children are likely to be too few to have any significant effect on the sample of children as a whole.

The reason for separating out stepchildren to discover if there are distinctions to be noted in behaviour towards them is that, from an evolutionary perspective, we would expect lower investment in family members who do not contribute to the fitness of the subject, either directly or indirectly, than in those who do so contribute. Martin Daly and Margo Wilson have spent more than twenty years drawing attention to the pathological extreme of the spectrum in relation to discriminatory behaviour towards stepchildren by stepfathers (Daly & Wilson, 1980, 1985, 1988, 1991, 1994, 2001). As they have discovered, the excess risk of child abuse and murder of stepchildren is cross-cultural and perhaps universal. However, they do point out that this does not

represent the whole picture: human males do not routinely dispose of their predecessors' young, as do lions and some monkeys. In human societies, stepchildren are commonly tolerated, cared for, and even loved (Daly & Wilson, 1999). We must, therefore, look for more subtle forms of behavioural discrimination to ascertain whether biological offspring are recipients of preferential parental investment. As far back as 1988, Mark Flinn demonstrated that in a village in Trinidad fathers interacted more frequently and less agonistically with genetic offspring than they did with step-offspring. He also found that, contrary to the predictions of attachment theory, the longer the father was co-resident with the step-offspring, the lower the rates of normal interaction and the higher the rates of agonistic interaction (Flinn, 1988a). Frank Marlowe has shown more recently, in a study of the parenting effort of Hadza men, that fathers played with and nurtured (held, carried, fed or pacified) their biological children significantly more than their stepchildren. Fathers with at least one stepchild, even though their household might also contain biological children of their own, also brought back significantly less food in the form of meat to the household than did fathers with biological children only. This finding, Marlowe claims, runs counter to the Hawkes hypothesis that hunting success is a mating strategy rather than a family provisioning strategy, though Marlowe did confirm that the best hunters had the most biological children at home (Marlowe, 1999). His position is essentially an inversion of the Hawkes hypothesis, since he is claiming that it is a larger number of biological children in the household that motivates greater resource provision. He concludes that contrary to the view that male care is mating effort only, it is at least in part parenting effort. Furthermore, direct care is probably a more reliable measure of a man's parenting effort than resource acquisition, which may reflect ability as much as motivation; even resource acquisition, though, may reflect men's parenting effort to some extent.

Though Daly and Wilson have termed discriminatory behaviour on the part of step-parents the "Cinderella effect", the thrust of their work and of the other studies referred to so far is the behaviour of *men* towards their biological and step-offspring. Yet Cinderella's problem was a wicked stepmother. Keith Zvoch surveyed over 14,000 12<sup>th</sup> grade students across the USA about their educational attainment levels and also questioned their parents on the level of the financial support planned for the students' future education (Zvoch, 1999). Zvoch acknowledges the bias arising from

the self-selection of the parent who filled in the parental questionnaire, (directed at the parent with the most knowledge of the child's current situation), the respondents being 78.4% the mother, 16.5% the father, 1.0% the stepmother and 0.6% the stepfather. Because of the relatively small number of step-parents completing the survey, sample size restrictions did not allow for examining distinctions between step-families in which the child's genetic parent completed the survey and those in which the step-parent completed the survey. Thus, because the bias was towards the inclusion of step-families among the cases where a biological parent completed the survey, the magnitude of the effect discovered was not great. Nonetheless there was an effect in the direction of lower investment in the future education of step- as opposed to biological children. From the direct questioning of the students it emerged also that significantly fewer stepchildren than biological children were planning to continue their education after high school. The step-parent sub-sample was not broken down into stepmothers and stepfathers for these analyses, but given that the sub-sample contained appreciably more stepmothers than stepfathers, the indication would seem to be that any shortfall in paternal parental investment directed towards stepchildren is mirrored by a corresponding differential in maternal parental investment in stepchildren. Given that the proportion of households containing a stepmother is lower than that containing a stepfather, (due to the tendency of care and control, if not custody, of children to reside predominantly with mothers), the higher proportion of stepmothers completing the questionnaire in Zvoch's survey is indicative of a gate-keeping role for mothers in relation to parental investment beyond the predictable nurturing spheres of healthcare and food provision.

Two studies which examine the effect on children of stepmothering in these specific nurturing spheres were initiated by a Princeton economist, Anne Case. In the earlier study, 'How Hungry is the Selfish Gene?' (Case *et al*, 2000), Case and colleagues used the US Panel Study of Income Dynamics, in which, over a period of seventeen years (1968-1985), 59,000 children were sampled in every type of family situation, including biological, adoptive, step- and foster relationships with either or both parents. Case and colleagues suggested that the reduction in successful outcomes over a broad array of measures for children raised by only one of their parents might extend to those children raised in two-parent families in which one biological parent was not present. Previous studies showed that children in step-families fared less well

educationally; girls from step-families left home and became sexually active earlier; children from step-families had poorer mental health than children from intact families. Boys and girls were similarly disadvantaged, though girls seemed to react more negatively to stepfathers in some cases. These differences were not attributable to differences in income across family types, since step- and original two-parent families had very similar levels of income. Possible explanations were that stepchildren might have been psychologically scarred by their biological parents' separation or divorce or step-parents might invest less because from an economic perspective they might expect less of a return in later life; complementary to the latter explanation Case and colleagues considered the evolutionary hypothesis that parents will pursue fitness by investing preferentially in their own genetic kin. Of course, the psychological argument does not invalidate the evolutionary explanation; it merely expands the grounds on which it pays in fitness terms to have two biological parents. If differential investment were principally economic, however, one would expect to see a difference between investment in families containing adopted, step- or foster children, in accordance with the parents' anticipated future returns of money or time (Case *et al.* 2000).

After controlling for age, education, household income and race, Case and colleagues found that, for whatever reason, children living apart from their biological mothers lived in households where systematically less was spent on food. (Note that household food expenditure data were only available at the household level; it was thus not possible to say if individual children were being discriminated against within the household.) On average, households with a stepmother were larger than households with a biological mother (4.55 to 4.12 members), but stepmothers worked more hours than biological mothers and thus the total income in stepmother households, (in contrast with a lower average income in stepfather households) was higher than in biological mother households. If, however, the number of children in the household was held constant then home food expenditure in stepmother households was decreased by 5% of the average food budget. Furthermore, the hypothesis could not be rejected that the effect was the same whether the non-biological child was an adoptive, step- or foster child. Strikingly, Case and colleagues found no robust pattern for non-biological children of male householders. Replacing a biological child with an adopted child led to an insignificant increase in spending on food, replacing a

biological child with a stepchild led to an insignificant decrease in spending on food. Only replacement with a foster child led to a *significant* decrease in food expenditure, where the non-biological parent was male. (Nor, in the case of either non-biological parent, were non-biological children spending more on food away from home.) The conclusion was, then, that fathers discriminated only against their foster children, whereas mothers discriminated against all kinds of non-biological children. A *caveat* must be entered here, though, in relation to the gate-keeping role of mothers referred to earlier. For this sample, the mother could be deemed to be the main organiser of the household economy and therefore in a better position to assess precise expenditure on food than the father, even though he might be titularly the head of the household. A corollary of this economic gate-keeping is that the father's stepchild is the mother's biological child and thus she, as the home economist, ensures that her own child is not discriminated against, even if stepfather's inclination might be to do so. Conversely, a father is unable to offer the same protection to his own biological child, when its stepmother is discriminating against it. In relation to adoptive children, one must assume that, since father is not the home economist, he is simply ignorant of the differential investment being practised by mother (father's assessment of expenditure in an adoptive household was actually higher, though not significantly so). This may indeed, also be the explanation for his perception of insignificantly decreased expenditure in his household when he has a stepchild. Only with foster children do parents' assessments coincide, not least, one suspects, because of the structured financial element involved in the relationship with foster children.

Case and colleagues point out, in relation to food expenditure, that more does not necessarily mean better; it might be possible to spend less to better effect, if sugars and fats were omitted, for instance. This seems to me to be a debateable view, for two reasons: firstly the drive to favour biological offspring would be unlikely to be under full conscious control, in other words it might simply be grounded in a general rule, "spend more on own offspring"; and secondly, it might just as easily be the case that extra expenditure was directed to more costly, nutritious items, rather than empty calories; fresh fruit and vegetables, for instance, are much more expensive than the tinned varieties. Since no breakdown of food items was available in the PSID data, Case turned to the 1995 South African Income and Expenditure Survey, a large data set consisting of 20,695 households providing complete household income

information. Data were broken down into four sub-sets, White, Asian, Coloured and African, and analyses were confined to the African and Coloured sub-sets only in order to obtain a reasonably homogeneous sample. Case and colleagues found that overall spending on food would increase by 2% if a biological child aged 0-5 were to replace a non-biological child in the same age group. In terms of particular food items, although expenditure increased in all food groups, the greater increases were in dairy products, fruit and nuts, and the lesser increases in jams and sugars, and vegetables. The data also showed that when young children lived with their biological mothers, the household spent significantly less on tobacco and alcohol and more on children's clothing and footwear. For children from 6 to 12 years of age the presence of the child's biological mother was also positively and significantly correlated with expenditure on education. One factor peculiar to the culture of the sample was that biological mothers might be present in a household without being the head of it (or the head's spouse). Not unexpectedly, Case and colleagues found that it was not the mother's presence, but her control over resources, that led to greater spending on food for her biological children. Where she was not the head of the house or the head's spouse, resource allocation was not significantly different from what it was in households where the biological mother was not present at all. Thus they conclude that spending on biological children is an active response of the child's mother and also that this response is directed towards younger children – (teenage children were found not to affect resource allocation).

Having drawn attention to the possibility that the cost of food might not correlate with its nutritional value, (though the South African data support the argument that it does), Case made a further study (Case & Paxson, 2001) of differential health investment by stepmothers. The Child Health Supplement of the US 1988 National Health Interview Survey provided socio-economic and health data about 17,110 children, one per household sampled. Confining most of their analyses to 1-16 year olds left them with a sample of 10,541 children. In essence what they found was that health investment (trips to the doctor, trips to the dentist) was made largely by biological mothers of children. Thus, if a child lived with a stepmother but had a biological mother living elsewhere, it would be the biological mother who made the trips, and to a level not significantly different from biological mothers who lived with their children. However, when the birth mother was not alive the stepmother still

made a reduced health investment in the child, compared with a biological mother. If, however, the mother had birth children of her own in the family, then the stepchild would benefit from common goods, such as family membership of a health care centre or a reduced incidence of smoking in the home. Interestingly, these reductions in investment were not found in adoptive or foster families, where in both cases the factor of outside supervision may play a role. The mother is assumed to be the parent who principally takes health care decisions for offspring, but it turns out that stepfathers too make a lower investment in stepchildren's health than do birth fathers. These children were less likely to make routine visits to the doctor, regularly wear seatbelts or have health insurance, though the first two measures showed even lower levels when reported by stepmothers. Thus the birth mother in a stepfather/biological mother dyad is unable to maintain the level of health investment she would make in a biological mother/biological father dyad. Looking at investment from the child's point of view, birth children living with step-siblings have health investments that are not significantly different from birth siblings without step-siblings. If, on the other hand, a child lives with a birth father and a stepmother, its health investment is no better than if it lived with its birth father alone, whereas a child living with a birth mother alone receives greater health investment than if it lived with a birth mother and stepfather. This contradicts the notion that a family needs a mother figure if the birth mother is not available, or indeed a father figure if the birth father is not available. Stepmothers do not augment the reduced health investment in children of single biological fathers; while stepfathers actually diminish the level of health investment made by single biological mothers.

Thus in a range of measures affecting the welfare of children, in education, nutrition and health, step-parenting brings a diminution in parental investment in offspring. Food provision is one element of investment that Case thought carried some ambiguity, though her South African data seemed to confirm an expenditure/nutrition correlation. In order to add further evidence from a post-industrial society, somewhat different from the American model and very much different from the South African Coloured and African sample, but able to attend to the same kind of detail as the latter in relation to food types, it was decided to perform for the present study some analyses, based on the Family Expenditure Survey carried out in Great Britain from 2000-2001.



## 5. 2. FAMILY EXPENDITURE SURVEY

### 5.2.1. DATA AND METHODS

The Family Expenditure Survey 2000-2001 sample was drawn randomly from the Postcode Address File for Great Britain, but excluding offshore islands. Out of 10,406 households approached, 6,115 co-operated fully in the survey in 2000-2001. Each individual in the household aged 16 years or over was asked to keep a daily diary record of expenditure for two weeks. Children aged between 7 and 15 also kept simplified diaries. The definition of a household used by the survey was: one person or a group of people who have the accommodation as their only or main residence and (for a group) share the living accommodation or share meals together or have common housekeeping. The group definitions obviously allow for the inclusion of multi-adult households in which none of the members are related to each other, either by blood or marriage. The composition of each household was recorded, giving each member's relationship to the head of the household. The head of the household was defined as the person, or the husband of the person who: a) owns the household accommodation, or b) is legally responsible for the rent of the accommodation, or c) has the household accommodation as an emolument or perquisite, or d) has the household accommodation by virtue of some relationship to the owner who is not a member of the household. When two members of different sex have equal claim the male is taken as head of the household. When two members of the same sex have equal claim, the elder is taken as head of the household. This somewhat sexist system has now been replaced by a household reference person, as defined in a) to d), but if there are joint householders it will be the person with the higher income. The household reference person must always be a householder, whereas under the system obtaining up to and including the 2000-2001 survey, the head of any household containing a husband was always the husband, even if he was not a householder himself. Of course this does not mean that there were not female heads of household in the 2000-2001 sample, for instance, widows, other categories of single women, female siblings, women living together in a group etc. It was also the case that there were female heads of household, when the woman was financially responsible for the accommodation, but her male partner was not married to her but a cohabitee.

The cohabitation factor has implications for a study of step-parenting in that one must decide whether to treat the children of one partner as stepchildren of the other partner, if the couple are unmarried. Some non-biological children resident with cohabittees have been reported in the survey as stepchildren, others have been reported as 'other non-relatives'. Given the fluidity of relationships and serial nature of many partnerships today, omitting such 'other non-relatives' would rule out a sizeable proportion of relevant data. Though it might be argued that investment in such step-offspring is bound to be affected by the transitory nature of many such relationships, examining behaviour in the light of the reality of current relationships is integral to the point of a study of contemporary post-industrial society. In any case, 40% of *biological* offspring in the UK are currently being born to parents who are not married to each other. In order to make it easier to compare relationships within the household, where a female cohabitee was the head of the household, the data were transformed so that the male partner became the head of the household, relationships of biological children were appropriately recoded in relation to the new head and relationships to either partner of children that were coded as 'other non-relative' were recoded as stepson or stepdaughter.

Questions about household expenditure covered the full range of potential cost areas, from mortgages, rents, insurance and financial services, through cars, transport and holidays, to household goods, clothing and personal items, health, education, leisure activities, food, and alcohol and tobacco. Expenditure diaries for food and other types of frequent expenditure were kept over a period of two weeks. Food expenditure, through the diaries, was broken down into detailed categories, enabling the discrimination of nutritive staples in order to assess their contribution to the household's diet as a whole. It was not possible to distinguish the individual diets of household members since household expenditure was totalled for each household. It was possible, though, to calculate the per capita expenditure on all foods, on nutritionally beneficial foods, and to express the latter as a percentage of the former. Among the foods that were omitted from the list of nutritious foods were: biscuits, cakes, pastries and puddings, tinned meat and meat pies, sugar, jams, jellies, sweets and chocolates, tea, coffee and carbonated drinks. While it might be argued that some of the exclusions have some nutritional value, it should be noted that the list of

nutritious foods errs on the side of including some foodstuffs of limited nutritional value, for instance, certain processed foods including breakfast cereals. The “nutritious” list is principally made up, though, of cereals, dairy products, meats, fish, fresh and frozen vegetables, pulses, fresh and dried fruit, juice and mineral water, ready prepared dishes, soup and ice cream. Sandwiches, snacks, meals eaten away from home and take-away meals eaten at home were excluded; baby food was included. 6637 households produced food expenditure data relating to 15,925 household members.

Household income data were assembled from aggregating the incomes of every relevant household member to reach a gross household income and included every kind of income from salaries, pensions, wages and state benefits to profits from businesses and investment dividends. Where necessary, incomes were calculated over a twelve-month period; savings withdrawals, capital realised from the sale of assets, educational grants, loans and loan repayments were excluded.

Because the amount of data generated by the survey was so great, it was broken down by researchers into a large number of separate data sets. Analyses for the present study were based on a personal data set in which each individual represented a separate case and the relationship of each individual to every other individual in a household was recorded. Other data from data sets on gross income and food expenditure, recorded at the household level, were then imported into this data set in order to perform analyses at the individual level. Some descriptive statistics were obtained from the data across all levels of relationship, but for inferential tests the data were filtered to include only biological (including adopted) children and stepchildren.

## 5.2.2. RESULTS

### **(i) Mean Food Spending**

Looking first at figures at the household level (6637 households, including 1904 one-person households and 2312 two-person households): mean gross income per household was £460.74 per week per household, and mean expenditure on food was £60.73 per week per household, which included £31.02 per week spent on healthier

foods, as previously defined. It is instructive to look here at the range for gross income and food expenditure to see how comparatively economically inflexible the latter is in relation to the former.

Table 5.1: Descriptive Statistics: Weekly gross income and weekly food expenditure in £ sterling

	N	Minimum	Maximum	Mean	Std. Deviation
Gross current income per h'hold	6637	.00	11053.30	460.74	471.36
Total Weekly Food Exp. per h'hold	6637	.00	336.97	60.73	39.33
Nutritious Food Exp. per h'hold	6637	.00	155.22	31.02	20.23
Per capita Food Expenditure	15925	.00	216.82	25.31	13.51

Where households consisted of two or more individuals, per capita food expenditure was analysed for individual household members, depending on their relationship firstly to the head of the household and secondly on their relationship to the partner (or co-resident) of the head of the household. There were 9288 heads of household (principally but not exclusively male) who had at least one other household member in some kind of relationship to them. There were 4555 partners or co-residents of heads of household (principally but not exclusively female) who had a further relationship to at least one other member of the household beyond their relationship to the head of the household. All these possible relationships are listed in the following table. The list of mean per capita food expenditures is given in two columns. The figures listed in the HoH column are the mean per capita food spends in households containing a member in the relationship to the head of household described. The figures in the Partner column are the mean per capita food spends in households containing a member in the relationship to the head of household's partner or co-resident described.

Table 5. 2: Average per capita weekly food spend in £ sterling for each individual in relation to the head of the household and to the partner (co-resident) of the head of the household

Relationship of Household Member	To HoH Mean £ per cap	N	Std Dev	To Partner Mean £ per cap	N	Std Dev
Spouse	27.07	3370	13.12	19.50	11	10.17
Cohabitee	27.52	550	15.28	24.73	6	8.07
Son/daughter (incl adopted)	<b>21.55</b>	4558	10.41	<b>22.33</b>	3730	10.25
Step-son/daughter	<b>19.82</b>	306	10.08	<b>17.94</b>	54	8.58
Foster child	<b>16.02</b>	10	11.46	<b>17.63</b>	9	10.89
Son-in-law/daughter-in-law	21.15	20	8.45	22.98	13	7.50
Parent/guardian	23.51	51	10.64	27.43	28	12.31
Step-parent	23.90	2	3.13			
Parent-in-law	26.15	28	10.73	24.24	16	9.24
Brother/sister (incl adopted)	25.64	58	13.62	16.74	468	9.19
Step-brother/sister	21.12	1		13.70	11	9.35
Brother-in-law/sister-in-law	18.58	14	8.76	18.93	18	7.56
Grandchild	20.16	61	9.05	21.41	49	9.76
Grandparent	14.37	1		18.55	4	7.60
Other relative	20.34	33	14.20	16.46	32	10.55
Other non-relative	26.58	225	13.54	25.23	106	11.74
Total	23.99	9288	12.20	21.71	4555	10.34

The reason that the sex of head of household is not exclusively male and that of co-resident not exclusively female in the above list is because the list covers a variety of household relationships, some of which do not encompass partnership or kinship. The full range of relationships has been included for comparative purposes. However, in the three rows with food spending figures in bold type, the relationships are with male heads of household in the HoH column and with female partners (and spouses) of male heads of household in the Partner column. These three rows are extracted to focus on the relationships at issue.

Table 5. 3. Average per capita food spend in £ sterling for each household in which there are respectively, in HoH column: solely biological children of male HoH, stepchildren of the HoH, foster children of the HoH; in Partner column: solely biological children of female Partner, stepchildren of Partner, foster children of Partner.

<b>Relationship of Household Member</b>	<b>To HoH Mean £ per cap</b>	<b>N</b>	<b>Std Dev</b>	<b>To Partner Mean £ per cap</b>	<b>N</b>	<b>Std Dev</b>
Son/daughter (incl adopted)	<b>21.55</b>	4558	10.41	<b>22.33</b>	3730	10.25
Step-son/daughter	<b>19.82</b>	306	10.08	<b>17.94</b>	54	8.58
Foster child	<b>16.02</b>	10	11.46	<b>17.63</b>	9	10.89

These three rows show the gradations from biological (including adopted), through step- to foster children for either sex parent. Numbers of foster children are small and show per capita food spending either lower than or no greater than that expended on stepchildren. We can therefore concentrate on the apparent differential between biological and step-offspring, as we proceed to apply inferential statistics and take account of possible confounding variables. We have also excluded single parents from the inferential analyses, in order to be able to compare the two types of step/biological dyad with the biological/biological dyad.

First of all, it is worth comparing the paternal and maternal rates of food spending on biological as opposed to step-offspring, without controlling for the obvious confounds, for this reason: although it may be the case that family size is greater or per capita income is lower in step-families compared to wholly biological families, these are the actual circumstances in which stepchildren find themselves and partialling out statistically the factors that lead to their inferior access to resources is to remove the source of the disadvantages which may lead them to a less successful series of life events in the long run. Although there is clearly a difference between circumstantial disadvantages on the one hand and systematic discrimination, which may be unconscious, on the other, the long-term fitness effects may be the same.

One way ANOVAs, comparing per capita food spending in households where the parents had stepchildren as well as biological children, with households in which the parents had only biological children, show a highly significant difference for both stepfather and stepmother families,  $F(1, 3695) = 19.516$ ;  $p < 0.001$ , in the case of families where the father was the step-parent, and  $F(1, 3695) = 10.212$ ;  $p = 0.001$ , in the case of families where the mother was the step-parent. In both situations, stepmother present and stepfather present, per capita spending on food is lower than when biological children alone comprise the family offspring.

Factorial ANOVAs were then performed to compare the per capita food spending of paternal and maternal step-families with their wholly biological counterparts, but introducing as co-variables, per capita income and family size within the household, as being the two most likely confounding variables. In the case of stepfather families, per capita income and number of individuals per family are both highly significant co-variables,  $F(1, 3693) = 524.826$ ;  $p < 0.001$ , for per capita income, and  $F(1, 3693) = 182.522$ ;  $p < 0.001$  for family size; but even controlling for these confounds, the difference in per capita food spending between biological and stepfather families is still significant,  $F(1, 3693) = 7.712$ ;  $p = 0.006$ .

In the case of stepmother families, however, once per capita income and household family size, both highly significant covariates, are partialled out, there is no longer a significant difference in per capita food spending between biological and stepmother families. It is a matter of some surprise, comparing these findings with the American ones, where the greater bias came from stepmothers, to find here the only significant bias coming from stepfathers. The relatively small size of the stepmothers' sample (only 54 stepchildren of stepmothers compared to 306 stepchildren of stepfathers) may have contributed to the variation in findings.

One other possible explanation may lie in a change in spending habits since the period in which data were collected for the Case *et al* study (1968-85), with men taking more of a role in family expenditure on food. However, Case and Paxson's study on health provision, using data from 1988, supports the view of the mother as gate-keeper in relation to health in a more recent period, and one would not expect, from evidence in

the previous two chapters, that women's predominant role in shopping, including food-shopping, has been substantially eroded.

### (ii) Nutritional Food Spending

On the basis of the Case and colleagues' South African study, a further factor was introduced into analyses, the nutritional value of the food purchased. As previously described, a wide scope was applied to the definition of nutritious food, in order not to be over-prescriptive.

#### Prediction 1

The prediction is made that stepmothers will be less likely than biological mothers to favour spending on more nutritious food items for offspring.

A stepwise multiple regression was performed with weekly per capita spending on nutritious food as the dependent variable and relationship (step- or biological) to father, to mother, weekly per capita income and household family size as the independent variables. In Pearson correlations the percentage of food expenditure spent on nutritious food is correlated significantly with per capita income,  $r = -0.100$ ;  $n = 3691$ ;  $p$  (1-tailed)  $< 0.001$ . In the regression models there is some additive power from family size in addition to income but both relationship variables are excluded.

Table 5. 4: Regression Coefficients for weekly per capita percentage spending on nutritious food taking into account weekly per capita income and family size

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	53.194	.338		157.158	.000	
	Per capita income	-9.088E-03	.001	-.100	-6.074	.000	.010
2	(Constant)	55.797	1.029		54.244	.000	
	Per capita income	-1.022E-02	.002	-.112	-6.579	.000	
	Cases per h'hold	-.547	.204	-.046	-2.680	.007	.012

Thus only two factors affect the proportion of food expenditure families make on nutritious food, both negatively: in other words, the greater the percentage of



nutritious food in the food spend, the lower the income as well as the smaller the family.

The prediction is not upheld.

Prediction 2

A prediction is also made in relation to weekly per capita food spending differentials, that the percentage spent on nutritious food will be a contributory factor to a variation in household spending on food, in addition to the other significant factors -- weekly per capita income and household family size.

A further stepwise multiple regression was performed with per capita spending on food as the dependent variable and relationship to father and to mother, per capita income, family size and percentage spent on nutritious food as the independent variables. Weekly per capita food spending was highly significantly correlated with per capita income and family size,  $p$  (1-tailed) < 0.001. The models for the regression coefficients show the following results.

Table 5. 5: Regression Coefficients for weekly per capita food spending, taking into account weekly per capita income, family size, percentage of nutritious food purchased and relationships to father and mother

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
		B	Std. Error				
1	(Constant)	17.986	.223		80.606	.000	
	Per capita income	2.668E-02	.001	.407	27.046	.000	.165
2	(Constant)	26.561	.662		40.117	.000	
	Per capita income	2.294E-02	.001	.350	22.929	.000	
	Cases per h'hold	-1.801	.131	-.209	-13.715	.000	.206
3	(Constant)	33.850	.869		38.935	.000	
	Per capita income	2.160E-02	.001	.329	21.922	.000	
	Cases per h'hold	-1.873	.129	-.217	-14.546	.000	
	% Nutritious Food	-.131	.010	-.182	-12.585	.000	.239
4	(Constant)	38.796	1.858		20.876	.000	
	Per capita income	2.150E-02	.001	.328	21.837	.000	
	Cases per h'hold	-1.850	.129	-.215	-14.359	.000	
	% Nutritious food	-.131	.010	-.183	-12.640	.000	
	Relationship to father	-1.625	.540	-.043	-3.010	.003	.241

Relationship to father is included in model 4 but relationship to mother is excluded from any of the models. This regression analysis again shows that while, as expected, the relationship between per capita food spending and per capita income is positive – the higher the income, the greater the spending on food; the relationship with family size is negative – the smaller the family in the household, the greater the per capita spending on food; the relationship with fathers is negative – the lower the likelihood of fathers’ stepchildren in a family, the greater the per capita spending on food; but finally, the higher the spending on food over all, the lower the percentage expenditure on nutritious food.

Since the prediction did not specify the direction of the effect of spending on nutritious food, the prediction is upheld.

This finding on the nutritious food percentage seems to suggest that families of whatever income level seek to procure the essential dietary nutrients in the first instance, and only with an excess of disposable income can high cost/low nutritive value foods and drinks be added to the shopping list. This tends to confirm my earlier suggestion, when reviewing the Case *et al* food study, that any differential in investment between wholly biological families and step-families will be in accordance with a broad rule that ‘expenditure equals investment’ rather than a more narrow discrimination of the form the expenditure takes. This finding seems to contradict Case and colleagues’ South African study, though in fact there are some anomalous juxtapositions in her findings since, while the greater increases in spending in wholly biological compared to step-families were in dairy products, fruit and nuts, the lesser increases were in jams, sugars and vegetables, the latter commodity being a nutritious food, *par excellence*. One other factor emerges from the South African study, though, that we have not yet applied to our current data, and that is the age of the offspring. Case and colleagues found that the biological mother’s response to food spending was directed towards younger children, up to the age of 12 years, while teenage children did not affect resource allocation.

### **(iii) Age of Offspring**

In the present study, although the mean age of children and stepchildren is 11 years of age, 15% of the sample, living at home with parents, are adults over the age of 18 years.

Prediction 3

The age of offspring will be a further factor affecting per capita food expenditure, in addition to per capita income, cases per household, and relationship with mother and father.

Performing multiple stepwise regression on per capita food expenditure, adding the age of the child to the other independent variables for weekly per capita income, household family size and relationships to mothers and fathers, produced these correlations. Weekly per capita food spend correlates highly significantly with per capita income, family size and age of child ( $p < 0.001$  (1-tailed)). Regression coefficients are as follows.

Table 5. 6: Regression Coefficients for weekly per capita food spend taking into account weekly per capita income, age of child, size of family and relationships to mother and father

Model		Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.	r <sup>2</sup>
		B	Std. Error				
1	(Constant)	17.984	.223		80.671	.000	
	Per capita income	2.671E-02	.001	.407	27.096	.000	.166
2	(Constant)	14.893	.298		49.985	.000	
	Per capita income	2.534E-02	.001	.386	26.371	.000	
3	Age of child	.296	.020	.221	15.091	.000	.214
	(Constant)	23.164	.681		34.004	.000	
	Per capita income	2.184E-02	.001	.333	22.413	.000	
	Age of child	.285	.019	.213	14.852	.000	
4	Cases per h'hold	-1.713	.128	-.199	-13.428	.000	.251
	(Constant)	29.816	1.744		17.099	.000	
	Per capita income	2.168E-02	.001	.331	22.290	.000	
	Age of child	.292	.019	.218	15.183	.000	
5	Cases per h'hold	-1.679	.128	-.195	-13.166	.000	
	Relationship to father	-2.224	.537	-.059	-4.142	.000	.254
	(Constant)	36.953	4.031		9.166	.000	
	Per capita income	2.169E-02	.001	.331	22.308	.000	
	Age of child	.293	.019	.219	15.266	.000	
	Cases per h'hold	-1.647	.129	-.191	-12.812	.000	
	Relationship to father	-2.241	.537	-.060	-4.175	.000	
	Relationship to mother	-2.405	1.225	-.028	-1.963	.050	.255

As before, the relationship between weekly per capita food spend and weekly per capita income is positive, while the relationships between food spend and family size is negative; the higher the food spend, the greater the age of the children of the family, but the less likely there are to be step-children in the family, both families with stepfathers and with stepmothers.

Since the direction of the age effect was not predicted, the prediction of an effect from age of offspring is upheld.

This positive relationship with age is not unexpected given the increasing amounts of food eaten by children as they get older. Whereas the first four independent variables make a highly significant contribution to the model, the contribution of the relationship to mother is merely significant, but it is there, once the age of children has been taken into account. Nonetheless, the operation of an offspring age effect is the opposite of that obtaining in the South African sample. One must acknowledge that the very different cultural, social and economic set-up, obtaining among the African and Coloured populations of South Africa, leads to diametrically opposite results in terms of the effect of age of offspring on discriminatory food expenditure by step-parents.

### 5. 3. DISCUSSION

Thus, there are perhaps some question marks over these findings in relation to food spending, certainly when possible confounds are taken into account; but, taken together with other findings on health and education, and putting the confounding factors into perspective, there do seem to be indications that discriminations are made in favour of biological children in relation to step-children by parents of both sexes. And the fact that the effect seems to be stronger for stepfathers in this sample underlines the contention of Case and colleagues that a single mother does worse for her offspring by taking a partner than by maintaining her single parent status, while a single father makes no improvement to his offspring's well-being by taking a partner.

Whatever the balance between the effect of step-parents on offspring or the consequences of single parents managing without assistance from step-parents, the findings on step-parenting in general offer support, I would claim, to the hypothesis

formulated in the previous chapter that the paramountcy of mothers is complemented, at least in modern, post-industrial societies, by the substantial importance of fathers. This may explain the drive of single mothers to replace departed biological fathers with surrogates; but, as this and other studies demonstrate, that may be a damaging strategy for the welfare of offspring. An alternative strategy for support for the single mother is available and may be more reliable -- her own mother.

## PART II: GRANDMATERNAL INVESTMENT

### CHAPTER 6

#### BRITISH SOCIAL ATTITUDES SURVEY ON GRANDPARENTING

##### 6. 1. INTRODUCTION

Whereas grandparenting and in particular grandmothering has received a great deal of attention from evolutionary anthropologists and psychologists in the past 15 years (Hawkes et al, 1989, 1997, 1998, 2003, Euler & Weitzel 1996, and others), social scientists had tended to marginalise grandparents in their concentration on the nuclear family, its character, function and problems, certainly within the UK. When policy-makers confronted the increasing instability of the nuclear family and decided to incorporate grandparents into family policy planning in Britain, they needed a baseline study. This was carried out by researchers from the Institute of Community Studies, who included a set of questions on grandparenting in the 1998 British Social Attitudes (BSA) survey, a large-scale survey which samples annually a range of attitudes encompassing the political, social and personal, from a substantial cross-section of the population. The data and preliminary conclusions appeared in *British Social Attitudes: 16<sup>th</sup> Report*, 1999, with an essay by Geoff Dench, Jim Ogg and Katarina Thomson on the Role of Grandparents. From this survey emerged a more detailed study, *Grandparenting in Britain: a Baseline Study* (Dench & Ogg, 2002), which gives the most systematic and thorough picture of grandparenting in Britain carried out to date.

The BSA database is used for my own analysis of grandmothering in chapter 7. However, the Dench and Ogg study, even though undertaken from a sociological perspective, is of interest and relevance, not only because of the mass of valuable data acquired, but also because of the evolutionary direction in which many of Dench and Ogg's conclusions lead. This chapter, therefore, not only describes the methodology of the BSAS grandparenting survey but also reviews in some detail the study findings, insofar as they bear on issues of significance to this thesis.

Dench and Ogg begin by referring back to earlier studies that emphasised the importance of kinship ties in Britain. For instance Young and Willmott's classic *Family and Kinship in East London*, which focussed on the relationship between mothers and their own mothers, who frequently lived nearby.

“And so it goes on – the daughter's labours are in a hundred little ways shared with the older woman whose days of child-bearing (but not of child-rearing) are over. (Young & Willmott, 1957)

Other family studies showed that family support systems depended upon shared neighbourhood rather than co-residence, since there has not been a British tradition for grandparents to live as part of an extended family household. Peter Townsend in *The Family Life of Old People* also placed grandparents at the centre of family life, with nearly three out of five old people seeing members of two succeeding generations of their family every day.

“We found old people getting a great deal of help...from their female relatives, particularly their daughters, living in neighbouring streets. The remarkable thing was how often this help was reciprocated – through provision of midday meals, care of grandchildren and other services. The major function of the grandparent is perhaps the most important fact to emerge from this book.” (Townsend, 1957)

From the 1960s onwards, with universal state pensions and an apparently growing resistance among some women to caring for elderly relatives, the role of grandparents faded in public perceptions. But Dench herself discovered that old people themselves, especially women, discussed their own preoccupations in terms of their families. Far from seeing themselves as individual passive recipients of state care, they saw themselves as actively involved in the support of family networks (Dench, 1997).

The context, therefore, in which the BSA survey was carried out was one in which social change seemed to be bringing grandparenting back into prominence, particularly in the eyes of policy-makers, but on the other hand the nature of family ties was changing with the growth and fluidity of temporary or serial relationships.

## 6. 2. DATA AND METHODS

The British Social Attitudes Survey was conducted by *the National Centre for Social Research* and funded by charitable trusts, with several modules supported by various government departments and agencies. The survey was designed to yield a representative sample of the population in Britain aged 18+. A sample of addresses was drawn from the Postcode Address File; if the address contained more than one dwelling unit, one was selected at random, (using a Kish grid and random numbers); if more than one adult lived in the unit, one was selected using the same random method as for addresses. Weighting corrected for the greater likelihood of the selection of people living in small households.

Of the 6,000 issued addresses, 5,323 were traceable, residential and occupied, and of these 3,146 supplied productive interviews, (conducted in the respondent's home, using a laptop computer). Fieldwork was carried out between April and August 1998.

All respondents in the BSA sample were asked to say which categories of lineal relatives they had alive: those with a grandchild were put into a grandparents sub-sample; those with a grandparent were placed in an adult grandchild sub-sample; those without either grandchildren or grandparents but with a dependent child who had a grandparent living, were put in a linking parent sub-sample, to report on the relationship between child and grandparent.

Of the 3,146 respondents, 933 were listed as grandparents, 584 as adult grandchildren and 674 as linking parents (sometimes referred to as samples A, B and C. In addition to the main survey, young people between 11 and 17 years of age were also surveyed, of whom 88% had a grandparent alive and therefore made up a sub-sample of teenage grandchildren (sample D), numbering 474.

In order to analyse grandparental relationships as fully and reliably as they could, the researchers decided to concentrate on the behaviour of sub-sample members towards one relevant family member only. Thus each grandparent would be asked about ties with one grandchild only, each grandchild about one grandparent and each linking parent about one grandchild-grandparent pair. They also decided that the best way of



making a selection from which valid and reliable conclusions could be drawn was to pick some pairs of relatives at random, so that the data generated would be representative, and other pairs on a 'most contact' basis to give a fuller set of findings on the most active and intensive relationships. Thus, sub-sample members were assigned to one of two streams on the basis of their serial numbers. For even-numbered respondents, a relevant family member was selected at random (by appropriate random selection methods); the respondents with odd serial numbers were asked to select the relevant family member with whom they had more contact than others. However, since about one quarter of odd number grandparents had only one grandchild, they were indistinguishable from the random grandchild sample and so were included with them. Also some odd number grandparents were unable to make any distinction between one grandchild and another, since contact with all grandchildren was equal. These subjects too were included in the even number stream and a random selection made.

For the original BSA grandparenting chapter (BSA, 1999), analysis was confined to the random groups. For *Grandparenting in Britain*, 'most contact' data were used where it was desired to make a contrast with random figures. On most variables, Dench and Ogg found both random and 'most contact' groups produced similar profiles and so combined them on occasions. However, they do note that in 'matrilineal' pairings, where grandchild and grandparent were linked through a female parent, there was more frequent contact. As a result, all of the 'most contact' sub-sets contain higher proportions of matrilineal kin pairs than do random groups. Thus estimations about the general population were drawn from the random data sets only, with pooled data used occasionally for more detailed analyses. For the purposes of this thesis the making of comparisons between 'most contact' and random pairings is crucial, as will be explained later.

Each group, once identified from a list of all lineal relatives alive, answered a series of questions about their attitudes to and relationships with the selected relative.

Group A (all with a grandchild) answered 85 questions about a random or 'most contact' grandchild on frequency of contact, nature of activities together, help with money, advice on upbringing and attitudes to grandparenting.

Group B (all with a grandparent) answered 60 questions about contact, activities together, help with money and attitudes to grandparents.

Group C (all without grandchildren/grandparents, but with children with grandparents) answered 46 questions about contact between subject's child and its grandparent, activities together, practical help to the grandparent and help to the child with money.

Group D (teenage grandchildren, 11-17 years old) answered 15 questions on contact with and attitudes to a grandparent.

Weightings were made by the survey researchers to correct for the different methods of selection used for the two sample streams (random and most contact) in each group and for the fact that not all units in the survey had the same probability of selection. Statistical tests used in the body of the survey were Pearson's  $\chi^2$  to test associations in columns and rows of crosstabulations. Base figures in the tables are for *unweighted* sub-samples but weights are applied to all tabulated figures unless otherwise stated. Because each group had its own peculiar characteristics relating to probability of selection, it was not possible to make inferential statistical comparisons between the sub-samples. However Dench and Ogg do make non-inferential comparisons, presenting data from different groups alongside each other in many of the tables.

### 6. 3. RESULTS

#### 6.3.1. SUMMARY

91% of grandparents agreed that grandparenting was a very rewarding part of their lives. 74% claimed to have put themselves out to help look after grandchildren but only 7% cut down or gave up work to do so. This latter figure sits against a demographic background in which, because the mean age of first birth in the 1960s and 1970s was lower than in earlier as well as later cohorts, the age at which more than half the British population were grandparents at the survey date was 54 years.

##### **(i) Contact and Closeness**

Looking at questions of contact and closeness, Dench and Ogg found that grandparents made the highest assessments, adult grandchildren the lowest, with linking parents coming somewhere between. The point is made that the adult

grandchildren were reporting contact and closeness with an older subset of grandparents than the group of grandparents as a whole. Nonetheless, the authors found that the differences in feelings of closeness were consistent even when grandparents with adult grandchildren only were considered. Linking parents, perforce reporting attitudes and behaviours at second hand, might not be aware of all contacts between grandchild and grandparent, or the level of their feelings towards each other. Nonetheless the authors suggest that linking parents' responses in relation to contact were remarkably consistent with those of grandparents. Their midway assessment of emotional ties, on the other hand, might be influenced by their own feelings. One might suggest that they also offer the nearest to an objective view of the grandparent-grandchild relationship extractable from the survey. Furthermore, although one would naturally expect percentages to be higher for contact and closeness in the case of the 'most contact' stream compared to the random stream, this differential ran through virtually all the other areas of attitude and behaviour.

#### **(ii) Childcare and Other Activities**

In terms of activities such as shopping, leisure, family visits and holidays, carried out between grandparents and grandchildren, there was again the same variation between generations. With childcare questions, (covering babysitting, taking to and from school and care of grandchild when sick), the levels of responses of grandparents and linking parents were close, but still with an overall perception by grandparents that they carried out somewhat more childcare than their sons and daughters thought they did, (or were prepared to own they did). Interestingly, with respect to financial help to non-adult grandchildren, grandparents and linking parents were in virtual agreement on levels. Other kinds of practical assistance given to grandparents by adult grandchildren (about which grandparents were not questioned), such as help with shopping, house or garden work, transportation or care when ill, showed again a high level of agreement between the assessments of the adult grandchildren and the linking parents, except, oddly, for transportation, in which linking parents' estimation was only one third that of the adult grandchildren, both in the random and 'most contact' streams.

### **(iii) Marital Breakdown of Linking Parents**

Finally, Dench and Ogg made an analysis of the effect of parental marital breakdown on the relationship between grandchild and grandparent, a factor of considerable interest when we come to consider the role of the maternal grandparents, and in particular the grandmother, in relation to daughter and daughter's offspring. One noticeable difference in levels of response, compared to areas of questioning referred to so far, is that fewer linking parents reported a child staying with or increasing contact with a grandparent at the time of the parental split than did adult grandchildren or grandparents themselves, a discrepancy perhaps connected to the differing age of parents in the three sub-samples, (with grandparents responding about parents across a wide age range, adult grandchildren responding about parents of older parental age and linking parents themselves being of younger parental age). Or perhaps there is a suggestion of less recourse to grandparental support at marriage breakdown for the younger generation of parents.

It is when differentiation is made between the sexes of parents and of grandparents that some of the most interesting conclusions can be drawn about grandparenting.

### **6. 3. 2. MATRILINEAGE**

#### **(i) Grandparental Hierarchy**

Dench and Ogg suggest that with the weakening of marriage and affinal ties in recent decades, the matrilineal principle has become more overt. Perhaps so, but evolutionary theorists might contend that fundamentally it has never been away. The BSA survey shows that where parents are not together, grandparents on the mother's side take an even greater part in helping with children; while paternal grandparents may have little or no contact with grandchildren after a separation. But these extreme circumstances are just the furthest ends of a spectrum which sees differences in relationships between maternal and paternal grandparents, even when no parental separation has occurred, and further distinctions between grandmothers and grandfathers.

Euler and Weitzel carried out a more limited study in which 1,857 adults rated the grandparental solicitude they received in childhood. The German word *kümmern* was used, which carries a behavioural as well as cognitive-emotional meaning, and which

the authors rendered in English as either “care(giving)” or “solicitude”. They expected, in line with a model based on the evolutionary concepts of differential male and female reproductive strategies and paternity confidence, an ordered discriminative pattern of grandparental caregiving. This was confirmed, based on 603 complete cases (in which all four biological grandparents had been alive till the respondent reached the age of 7 years). The maternal grandmother was found to be the most caring, followed by the maternal grandfather, the paternal grandmother, then the paternal grandfather. Preferential grandparental solicitude was not influenced by residential distance, grandparent age or availability of other grandparents (Euler & Weitzel, 1996).

Other markers of investment, such as feelings of closeness, also showed a discriminatory sex difference in Russell and Wells’s study, in which both male and female students reported feeling closer to their mothers than to their fathers and closer to their maternal than to their paternal grandmothers, a finding the authors proposed supported a certainty of paternity discounting in relation to parental and grandparental relationships (Russell & Wells, 1987).

### **(ii) Grandparental Separation**

Euler and Weitzel’s grandparental hierarchy also supported a certainty of paternity hypothesis, or at least did not contradict it. But a further factor they identified apparently supports their hypothesis of differential parental investment as expressed through differential grandparental investment: reproductive effort is not restricted to procreation but includes caregiving, which extends to grandchildren; and in fact the number of grandchildren is a better measure of reproductive success than the number of children. That the caregiving of the maternal grandfather is to a large extent given as a result of his partnership with the maternal grandmother is demonstrated by the change in the solicitude hierarchy when grandparents were separated or divorced. While separated maternal grandmothers obtained the same solicitude ratings as non-separated maternal grandmothers, separated maternal grandfathers fell well behind separated paternal grandmothers, whose own ratings also fell, while separated paternal grandfathers fell even further behind. Interestingly, there was no difference in the ratings for widowed as against non-widowed grandparents, indicating some level of reciprocity in the solicitude.

Euler and Weitzel suppose that grandparental caregiving marks a new stage in sex-specific reproductive strategies.

“The new strategy, however, does not *merely* [my italics] imply a revival of parental care behaviours. Instead, the new task is to support one’s own child in his or her reproductive effort...We view grandparental solicitude as a differentiated sub-set of parental effort and not merely an undifferentiated extension of parental effort.” (Euler & Wietzel, 1996)

One must agree that grandparental status marks the onset of a new life stage. But how much that new status involves an extension of parental effort, compared to a discrete kind of grandparental investment, is an issue that is masked by the interchangeable use of “solicitude” and “care(giving)” by these authors. It is an issue which the much more detailed study of Dench and Ogg does manage to tease apart through questions that are able to distinguish between solicitude and caregiving. Euler and Weitzel believe that the relegation of the paternal grandmother to third place in the grandparental hierarchy confounds prevalent gender stereotypes, but then admit, on the basis of what happens to the hierarchy when grandparents are divorced or separated, that the engagement of grandfathers seems heavily influenced by their partnership. Both maternal and paternal grandfathers tend to go along with their spouses’ wishes for contact with grandchildren. Only the pre-eminence of the maternal grandmother remains unaffected by changes in marital status, not only when that takes place in the grandparental generation, but also, as will become clear from the Dench and Ogg study, when it happens in the intermediate, parental generation. Indeed, the latter study demonstrates an even greater role for maternal grandmothers after partnership breakdown in the parental generation. In the Euler and Weitzel study granddaughters give somewhat higher solicitude ratings than grandsons. The authors assume this is a difference in the perception of the receivers rather than a difference in the givers, because of a tendency for women to avow greater intimacy than men in all their relations. This tendency is supposedly demonstrated by Rossi and Rossi’s (1990) findings that mothers give higher intimacy ratings towards sons and daughters than fathers do, and that daughters give higher ratings towards mothers and fathers than sons do. A greater intimacy admitted by women, however, would not rule out the possibility that grandmothers, maternal or paternal, with grandfathers on their coat-

tails, are more solicitous towards granddaughters than grandsons, a possibility we will explore further through the BSA data in chapter 7.

### (iii) Parental Separation

Whereas Euler and Weitzel look at the effect on solicitude/caregiving of a breakdown in the grandparental relationship, Dench and Ogg look at the effects of a breakdown in the linking parents' relationship on the attitudes and behaviour of grandparents towards their grandchildren and find some striking polarisations.

Table 6.1: Grandparenting behaviour and attitudes by line of descent and parental relationship

	Link to GC	through d'ter	Link to GC	through son
% of GPs who	Parents together	Parents apart	Parents together	Parents apart
Strongly agree their GCs are rewarding*	67	62	68	31
Agree want life free of family duties*	39	34	27	46
Live within 15 mins of GC**	32	45	37	27
Strongly agree have put themselves out*	26	45	18	15
Visit relatives & friends at least monthly***	13	28	13	5
Feel very close to GC**	73	79	66	35
Agreed on almost all aspects of GC's upbringing**	42	34	33	12
Have had some say in decisions re GC under 16****	34	66	23	0
<i>Base* (Grandparents with 1 GC only)</i>	58	28	32	*
<i>Base **</i>	298	85	244	45
<i>Base***</i>	306	92	253	56
<i>Base****</i>	202	63	176	33

Note: Group A, bold figures,  $p < 0.05$

[Reproduced from *Grandparenting in Britain*, Dench & Ogg, 2002]

If paternal line relationships have been under-represented in the survey, then this can be addressed in part by separating out random and 'most contact' streams, since 'most contact' cases ought to reflect lineage choices made by the respondents, whereas

random cases will reflect the differential consequences of breakdown. Thus Dench and Ogg looked at the various parental separation rates for each group of respondents by lineage and method of selection.

Table 6. 2: Parental separation rates by lineage

% where GCs' parents not together	Matrilineal		Patrilineal	
	Random	Most Contact	Random	Most Contact
Respondent: - Adult GC	29	23	23	22
Grandparent	23	<b>33</b>	18	<b>16</b>
Linking Parent	<b>22</b>	<b>21</b>	5	<b>4</b>
<i>Base - GC</i>	302	240	187	148
<i>GP</i>	398	221	309	127
<i>LP</i>	292	183	166	117

Note: Group A; Group B; Group C; bold figures,  $p < 0.05$

[Reproduced from *Grandparenting in Britain*, Dench & Ogg, 2002]

From the table it is clear that adult grandchildren make choices about which grandparents to see regardless of their parents' marital situation. What is more interesting is that among grandparent respondents, whereas random and 'most contact' separation rates are similar for patrilineal grandparents, for matrilineal there is a higher rate of parental separation for 'most contact' than for random grandchildren, and the matrilineal grandparents show double the rate of separation for 'most contact' grandchildren, compared to patrilineal grandparents. Also interesting is the comparison of linking parent responses, in which no difference is reported between 'most contact' and random streams by either lineage, but there is a clear association between lineage and contact in favour of matrilineage.

#### (iv) Contact by Lineage and Parental Separation

But to sort out differences properly, Dench and Ogg point out that it is necessary to look at the sex of the grandparents themselves. And here we are able to make comparisons similar to those of Euler and Weitzel, except over a wider range of attitudes and behaviour, between maternal grandmothers, maternal grandfathers, paternal grandmothers and paternal grandfathers. For instance, in the matter of basic contact:



Table 6. 3: Contacts by lineage: grandparent sample

	Parents' relation	Link by	Daughter	Link by	Son
% Grandparents who report: -		MGM	MGF	PGM	PGF
No contact with GC in last 2 years	Tog	0	4	0	3
	Apt	4	11	10	35
Sees GC several times a week	Tog	30	31	34	24
	Apt	54	32	14	12
Phones GC several times a week	Tog	27	18	24	12
	Apt	35	18	10	6
<i>Base</i>	<i>Tog</i>	174	115	147	93
<i>Base</i>	<i>Apt</i>	49	36	31	*

Note: Group A, bold figures,  $p < 0.05$  [Reproduced from *Grandparenting in Britain*, Dench & Ogg, *op. cit.*]

Euler and Weitzel set out a grandparental hierarchy, drawn from the grandchildren's point of view, that ran MGM, MGF, PGM then PGF overall, but MGM, PGM, MGF then PGF, if grandparents were separated or divorced. Here we have the separation, where it exists, taking place in the linking parents' generation and the contact reported from the grandparents' point of view. Dench and Ogg observe that where parents are together, the main response differences tend to lie between grandmothers and grandfathers. Where parents are apart, on the other hand, differences between lines of descent lead to a lineage gradient in which maternal grandmothers are the most active and in touch and paternal grandfathers, the least.

When linking parents are the respondents, there is an even stronger lineage gradient, which the authors claim provides a clue as to the role of linking parents as gatekeepers regulating grandparental access.

Table 6. 4: Contacts by lineage: linking parent sample

	Parents' relation	Link by	Daughter	Link by	Son
% Parents who report: -		MGM	MGF	PGM	PGF
No GC contact with GP in last 2 years	Tog	3	11	3	5
	Apt	13	10	17	-
GC sees GP several times a week	Tog	27	23	15	18
	Apt	38	27	9	-
GC speaks on phone with GP several times a week	Tog	16	11	5	3
	Apt	38	18	8	-
Base	Tog	130	76	85	50
Base	Apt	36	*	24	*

Note: Group C, bold figures,  $p < 0.05$

[Reproduced from *Grandparenting in Britain*, Dench & Ogg, *op.cit.*]

### (v) Activities by Lineage and Parental Separation

Looking at some activities that grandparents might carry out with their grandchildren, there are further divergences where linking parents are together and where they are apart. Where parents are together there is not a great difference between grandparents but where they are apart a strong lineage effect emerges.

Table 6. 5: Shared activity by lineage (grandparent respondents)

	Parents' relation	Link by	Daughter	Link by	Son
% Grandparents who: -		MGM	MGF	PGM	PGF
Often have GC stay without parents	Tog	15	17	15	11
	Apt	32	36	22	18
Visit friends/relatives with GC at Least monthly	Tog	14	11	16	11
	Apt	43	14	10	0
Give/receive present with GC at Least monthly	Tog	46	42	43	38
	Apt	61	37	20	12
Go on holiday with GC with parents Every year	Tog	16	24	21	8
	Apt	25	21	0	6
Base	Tog	174	115	147	93
Base	Apt	49	36	31	*

Note: Group A, bold figure,  $p < 0.05$

[Reproduced from *Grandparenting in Britain*, Dench & Ogg, *op. cit.*]

### 6.3.3. AGE OF GRANDCHILD

A further important strand in Dench and Ogg is the analysis of grandparenting according to the age of the grandchild. Their general finding is that there is a tendency for grandparental interest and activity to decline as grandchildren move through the age groupings.

“The most involved period is immediately after grandchildren are born, and especially for first grandchildren. The participation of grandparents is perhaps most valuable here, as this is a critical stage in their *parenting* role – that is in helping their children to become successful parents themselves.”

(Dench & Ogg, 2002)

Their findings on the attitudes and behaviour relating to different age groups of grandchildren are presented by comparing responses from grandparents and responses from linking parents, although, as previously discussed, they are not making any statistical comparisons between the two samples.

It is evident that activities and childcare can only be carried out if grandparents live a reasonable distance from grandchildren, and there is an interesting divergence between grandparents’ perception and that of linking parents. For grandparents there is a highly significant association between travelling time and grandchild’s age group, while for linking parents there is no significant association.

Table 6. 6: Grandchild age by proximity

	Respondent is Grandparent			Respondent is Link parent		
	<i>Travelling time between GP and GC</i>			<i>Travelling time between GP and GC</i>		
GC age	15 min	15 min-1 hr	1 hr+	15 min	15 min-1 hr	1 hr+
0-4	45	32	23	30	36	34
5-8	37	35	28	41	30	29
9-12	36	25	39	33	34	33
13-19	31	37	33	40	34	26
20+	19	36	45	49	26	26

Base                      216                      238                      218                      166                      145                      127

Note: Group A,  $p < 0.001$ ; Group C, NS in row percentages

[Reproduced from Dench & Ogg, *op.cit.*]

From the grandparents' perspective, the trend is that the younger the child, the closer is the proximity; and the reverse of that is also evident: the older the child, the greater is the distance, most clearly evident in the youngest and oldest groups of grandchildren. On the other hand, it is hard to pick out a pattern from the linking parents' responses, though it is clear that they report no difference in proximity for the pre-school grandchildren and seem to show an opposite trend for the oldest group of grandchildren to that reported by grandparents, a group that, as reported by linking parents, is still, it will be recalled, resident with the parents.

Although the youngest age group is described as the one with which grandparents are most involved, in fact it is when grandchildren are at junior school age that, not unexpectedly, activity levels with them peak. When grandchildren become teenagers, frequency of interaction with grandparents reduces considerably, apart from a significant rise in both cash and advice flowing from grandmother.

Table 6. 7: Changes in grandparental support with grandchild age

	Age of		Grand child			
	GC 0-4		GC 5-12		GC 13-19	
% where GP has in past year	GM	GF	GM	GF	GM	GF
Helped GC direct with money	15	14	39	38	54	32
Helped GC parents with money	36	31	33	32	21	11
Given GC advice	n/a	n/a	40	32	54	27
<i>Base</i>	111	93	137	95	74	49

Note: Group A,  $p < 0.05$  (associations within sex for age)

[Reproduced from Dench & Ogg, op cit]

Dench and Ogg make a further comparison to show the effect of numbers of grandchildren on selected grandparenting factors.

Table 6. 8: Grandparenting style by numbers of grandchildren

% of Grandparents who:-	Number of Grandchildren		
	One	Two to Four	Five or more
See selected GC several times a week	46	27	20
Live within 15 mins of GC	45	29	29
Feel very close to GC	79	67	59
Play games, watch TV weekly or more	21	12	9
Go shopping at least monthly	14	7	5
Go to park weekly or more	10	5	2

Base

132

362

222

Note: Group A,  $p < 0.001$

[Reproduced from *Grandparenting in Britain*, Dench & Ogg, *op. cit.*]

It is likely that the greater the number of grandchildren, the older the average age of the grandparent will be. But, given that 54 years is the average age of first grandparenting in the survey, when most grandparents will still be in employment, it is a debateable point whether the fall in measures of grandparental investment, as numbers of grandchildren rise, is a function of the higher demand on grandparents' time and energy budgets, or whether there is some other factor at work in relation to the first grandchild.

#### 6.3 4. INVOLVEMENT IN UPBRINGING

Whether the part grandparents play in periodical caregiving and carrying out various activities with grandchildren amounts to a quasi-parental function is one of the main questions at issue in analysing the role of grandparents.

##### (i) Childcare

Dench and Ogg agree that the only way to get a clear picture of grandparenting styles is to divide the grandparents by lineage as well as sex. Firstly, they point out that where parents are together, there is little difference between grandparents according to lineage, though there is by sex. However, when we come to dealing with the care of children whose parents are not together, strong differences do emerge, with rates of childcare increasing for maternal grandparents, especially grandmothers.

Table 6. 9: Childcare by lineage: grandparent responses

% GPs who do:-	Parental Relation	MGM	MGF	PGM	PGF
Day care several times a month	Tog	<b>38</b>	<b>27</b>	39	24
	Apt	<b>70</b>	<b>44</b>	17	-
Evening care several times a month	Tog	<b>22</b>	<b>21</b>	29	18
	Apt	<b>61</b>	<b>44</b>	9	-
Take to school at least every month	Tog	21	48	21	13
	Apt	22	28	0	-
Nurse sick grandchild in year	Tog	21	16	17	11
	Apt	35	22	9	-
	<i>Tog</i>	97	73	84	64
<i>Base</i>	<i>Apt</i>	29	23	17	•

Note: Group A, bold figures,  $p < 0.05$

[Adapted from *Grandparenting in Britain*, Dench & Ogg, 2002]

Does this mean, Dench and Ogg ask, that without parental breakdown there would be equal lineage involvement? They suggest:

“Several aspects of the survey data point to important differences in the quality and style of maternal and paternal contributions to childrearing. It is no accident that where parenting relationships do break down, it is the maternal line which then becomes much more active.” (Dench & Ogg, 2002)

### (ii) Agreement and ‘Say’

The key evidence for this comes from answers to the questions on ‘agreement’ (an attitude) and ‘say’ (a behavioural measure). Notable is not just the increase in the maternal grandmothers’ ‘say’ when parents split up, but the disappearance of paternal grandmothers’ ‘say’, reflecting the change in opportunities for contact when the gate-keeping parent tends to be the separated mother.

Table 6. 10: Involvement by lineage: grandparent responses

% GPs who:-	Parental Relation	MGM	MGF	PGM	PGF
Agree almost always	Tog	43	41	39	26
	Apt	31	40	17	0
Agree mostly	Tog	39	39	27	48
	Apt	40	36	28	36
Disagree	Tog	8	7	6	11
	Apt	17	4	17	27
Not discussed	Tog	11	14	28	15
	Apt	11	20	39	36
Big or some say	Tog	40	24	26	19
	Apt	64	48	0	8
	Tog	174	110	146	90
Base	Apt	46	33	27	*

Note: Group A, bold figures,  $p < 0.05$ ; \* = base < 20

[Reproduced from Dench & Ogg, *op cit.*]

The accuracy of grandmaternal estimations of 'agreement' and 'say' is supported by linking parents' estimations, (though these fail to find significant associations and deal only with 'together' parents). Virtually the same percentage of linking parents reckon that maternal grandmothers are almost always or mostly in agreement on matters of upbringing as do maternal grandmothers themselves (83% to 82%, when parents are living together). Likewise, with paternal grandmothers, 67% are reckoned by linking parents to be always or mostly in agreement compared to 66% who say they are, (again with parents together). However, linking parents underestimate grandfathers' agreement (compared to grandfathers' own estimations) for both lineages, suggesting that grandpaternal views are perhaps not made known as clearly as grandmaternal. And in 'say' there is a clear divergence in the perceptions of the two generations, at least as far as they are represented by the samples in hand, with parents' estimates for all four grandparents noticeably in excess of grandparents' own estimations. Perhaps, as Dench and Ogg have suggested elsewhere, grandparents are self-censoring somewhat in order not to be seen as interfering; conversely the parental estimate could be based on a perception that grandparents interfere too much.

Table 6.11: Involvement by lineage: linking parent responses

% Link parents who:-	MGM	MGF	PGM	PGF
Agree almost always	30	37	23	32
Agree mostly	53	31	44	44
Disagree	5	14	15	10
Not discussed	13	14	15	10
Big or some say	56	44	38	41
<i>Base</i>	126	69	83	48

Note: Group C, NS. Figures for where parents are *together only*. [Adapted from Dench & Ogg, *op. cit.*]

### (iii) Advice to Grandchildren

Dench and Ogg look for further differentiation between the lineage styles of grandparenting by analysing rates of advice given to grandchildren. This is not something that is restricted to young grandchildren, as childcare is, but is still closely bound up with issues of upbringing. The table has excluded data for adult grandchildren whose parents are not together, since the number of cases is not large enough to make proper allowance for relative recentness in domestic splits.

Table 6. 12: Advice by lineage

GP respondents	Parental Relation	MGM	MGF	PGM	PGF
Advice given often	Tog	<b>10</b>	3	11	2
	Apt	<b>25</b>	18	6	-
Advice given ever	Tog	<b>37</b>	<b>25</b>	38	22
	Apt	<b>66</b>	<b>63</b>	19	-
<i>Base</i>	<i>Tog</i>	137	74	112	63
	<i>Apt</i>	36	23	23	*
<b>GC respondents</b>					
Advice received often	Tog	6	16	7	5
Advice received ever	Tog	51	49	35	43
<i>Base</i>	<i>Tog</i>	145	50	90	26

Note: Group A, bold figures,  $p < 0.05$ ; Group B, NS, 'Parents together' only

[Reproduced from Dench & Ogg, *op. cit.*]



It is clear that from the grandparental point of view, when parents are together, just as with childcare, grandmothers of either lineage are the predominant dispensers of advice; but when parents are apart, the maternal line predominates over the paternal, with maternal grandmothers and maternal grandfathers giving more advice than paternal grandmothers, (and paternal grandfathers dwindling to zero). And in some ways advice is a better indicator of active grandparenting than contact or care; while some of grandfathers' childcare, for instance, can be a function of sitting in the same room as grandmothers, advice is a more distinct activity. It is not clear, though, why the responses of grandchildren give a less clear-cut result, other than that the giver will be clear about giving advice, the recipient less so; it may be that grandfathers are more didactic or grandmothers more subtle, or both.

#### **(iv) Provision of Resources**

One might expect less ambiguity in the giving of money by grandparents, either to parents or direct to grandchildren. Once again only those grandchildren whose parents are together are included, with the addition of linking parents, together only.

Table 6. 13: Financial help by lineage

%GP respondents who:-	Parental Relation	MGM	MGF	PGM	PGF
Give money to parent often	Tog	10	3	5	6
	Apt	11	12	0	27
Ever give money to parent	Tog	24	23	25	27
	Apt	35	39	10	27
Give money to GC often	Tog	15	11	19	10
	Apt	14	12	5	27
Ever give money to GC	Tog	24	27	36	24
	Apt	31	21	29	31
<i>Base</i>	<i>Tog</i>	<i>174</i>	<i>110</i>	<i>146</i>	<i>90</i>
	<i>Apt</i>	<i>46</i>	<i>33</i>	<i>27</i>	<i>*</i>
<b>% GC respondents who:-</b>					
Receive money from GP often	Tog	2	5	0	0
	Tog	42	38	28	24
<i>Base</i>	<i>Tog</i>	<i>145</i>	<i>50</i>	<i>90</i>	<i>26</i>
<b>% Link parents who report GPs who:-</b>					
Give money to parent often	Tog	4	3	3	2
Ever give money to parent	Tog	20	14	21	14
Give money to GC often	Tog	7	7	9	12
Ever give money to GC	Tog	19	14	25	46
<i>Base</i>	<i>Tog</i>	<i>130</i>	<i>76</i>	<i>85</i>	<i>50</i>

Note: Group A, NS; Group B, NS; Group C, bold figures,  $p < 0.01$ . Groups B & C, 'Parents together' only.

[Reproduced from Dench & Ogg, *op. cit.*]

This table shows that there is not a significant sex or lineage effect for the provision of resources as far as grandparents or grandchildren are concerned. There is, however, from the perspective of linking parents, a significant lineage and sex effect in the direction of the paternal grandfather. The suggestion by Dench and Ogg is that this finding chimes with conventional divisions of labour, with the paternal line, and in particular the paternal grandfather, being seen to offer more resources than direct care. The financial support from paternal grandfathers when parents are apart, reported in the grandparental sub-sample, though not a significant association, is consistent with the linking parent findings and raises the question of whether patrilineal grandpaternal support in the form of resources is an important addition to paternal support, in the

same way that matrilineal grandmaternal support in the form of childcare, social activities, advice-giving and more, is assumed to be vital investment by maternal grandmothers in their offspring or their offsprings' offspring. Furthermore, is it possible that paternal grandmothers contribute to the paternal grandfathers' role as resource support in the same way that maternal grandfathers seem to contribute to the maternal grandmothers' caregiving role?

One general characteristic about the sub-samples that seems to emerge from the survey is that grandchildren make the fewest distinctions between grandparents either by lineage or sex; linking parents are somewhere in the middle, sometimes making distinctions, as with resources, sometimes not, as in underestimating the effects of separation on grandparental contact, compared to grandparents; and grandparents make the most distinctions. Dench and Ogg have suggested that the best approximation to the truth lies in the middle, linking parents' way. But I would suggest that there is no logical reason to make that assumption: parents are just as likely as grandparents to be operating some conscious or unconscious bias; and therefore, in further exploring the survey data to illuminate grandparenting in Britain today, I propose to concentrate on the direct experiences of grandparents as reflected in their own responses.

## PART II: GRANDMATERNAL INVESTMENT

### CHAPTER 7

#### GRANDMOTHERING

##### 7. 1. INTRODUCTION

The Dench and Ogg findings in relation to matrilineage, which were outlined in the previous chapter, are extensive and thorough. But having identified a tendency for a matrilineal connection to those grandchildren selected as ones with whom grandparents have most contact, and the effect that separation of parents has on strengthening the matrilineal connection, the majority of their tables that use the distinction between randomly selected and ‘most contact’ grandchildren do so in relation to the separation of parents. This, however, is an extreme circumstance and there is much to be gathered in other situations from the distinction between those grandchildren selected as the grandchild with whom the grandparent has the most contact and those grandchildren selected at random. As stated in the previous chapter, estimations about the general population were drawn by Dench and Ogg from the random data sets, with data pooled from random and ‘most contact’ sets used occasionally for more detailed analyses. In fact, because of the inclusion of single grandchildren in the random stream, a subset which may have its own peculiar characteristics and which one would expect to overlap in some respects with the ‘most contact’ stream, any differences that are found between ‘most contact’ and random streams are given greater force. What further conclusions about possible differential treatment of offsprings’ offspring, with particular reference to the behaviour of grandmothers, can be drawn from the BSAS grandparenting database?

##### 7. 2. DATA AND METHODS

###### 7.2.1. THE SAMPLE

The sub-sample of grandparents in the 1998 British Social Attitudes Survey, which we are using for analysis in this chapter, was assigned to two streams on the basis of

their serial numbers. For one stream a grandchild was selected at random, while for the other stream respondents were asked to select a grandchild with whom they had more contact. Grandparents who had only one grandchild were assigned to the random stream, as also were those who could not make a distinction between one grandchild and another. In addition we can establish some more demographic facts about the BSAS sample of grandparents.

930 grandparents gave their ages, with a range from 37 to 97+ years of age. The mean median and mode were all 66 years. Of these 930, 357 were men and 573 were women. Both the grandfathers' and the grandmothers' age range ran from 37 to 97+ years of age. The mean, median and mode were all 66 years for men; for women the mean was 66, the median 67 and the mode 55. Their selected grandchildren (either 'most contact' or random) were in turn aged from under 1 year to 58 years of age, with a mean of 12, a median of 10 and a mode of 1. Three quarters of the grandchildren, indeed, were 18 years or under.

In the grandparental sample, there are 930 grandchildren to whom a relationship is assigned in response to a question about relationship and sex of grandchild:

Table 7.1: Relationship and sex of grandchild

	Frequency	Percent	Cumulative Percent
Granddaughter	441	47.4	47.4
Grandson	451	48.5	95.9
Step-granddaughter	20	2.2	98.1
Step-grandson	18	1.9	100.0
Total	930	100.0	

These are described, in response to a further question about how the grandchild is related, as follows:

Table 7.2: Child through whom grandchild is related

	Frequency	Percent	Cumulative Percent
Daughter's child	507	54.5	54.5
Son's child	371	39.9	94.4
Daughter's step-child	6	.6	95.1
Son's step-child	9	1.0	96.0
Step-daughter's child	24	2.6	98.6
Step-son's child	13	1.4	100.0
Total	930	100.0	

There is an evident discrepancy in the constituent figures between the variable delineating 'biological (including adopted) grandchildren' (892 excluding step-grandchildren) and the variable delineating 'biological (including adopted) children of biological (including adopted) sons and daughters' (878 excluding step-grandchildren). Since the variables are both describing all types of grandchildren in two different ways, they ought to correspond in their division between step-grandchildren and non-step-grandchildren. Thus it is clear that some children have been included as grandchildren who are in reality some kind of step-grandchild, perhaps because of a confusion in some grandparents' minds about a difference between children's stepchildren and stepchildren's children.

Breaking the sample down, firstly, in the stream consisting of randomly selected and 'only' grandchildren, to whom a relationship has been assigned, there are 712 grandchildren:

Table 7.3: Relationship and sex of randomly selected or only grandchild

	Frequency	Percent	Cumulative Percent
Granddaughter	326	45.8	45.8
Grandson	355	49.9	95.6
Step-granddaughter	15	2.1	97.8
Step-grandson	16	2.2	100.0
Total	712	100.0	

These are related to respondents thus:

Table 7.4: Child through whom randomly selected grandchild is related

	Frequency	Percent	Cumulative Percent
Daughter's child	377	52.9	52.9
Son's child	291	40.9	93.8
Daughter's step-child	6	.8	94.7
Son's step-child	8	1.1	95.8
Step-daughter's child	18	2.5	98.3
Step-son's child	12	1.7	100.0
Total	712	100.0	

Once again there is a discrepancy in the correspondence of figures between the two tables: 681 non-step-grandchildren in the former table; 669 in the latter.

Secondly, in the 'most contact' stream, (which includes a variable for grandchildren with whom grandparents had 'more contact' than any other grandchild and a variable

for those who had to be pressed to pick a grandchild with whom they had ‘a little more contact’), there are 218 grandchildren:

Table 7.5: Relationship and sex of ‘most contact’ selected grandchild

	Frequency	Valid Percent	Cumulative Percent
Granddaughter	115	52.8	52.8
Grandson	96	44.0	96.8
Step-granddaughter	5	2.3	99.1
Step-grandson	2	.9	100.0
Total	218	100.0	

And these grandchildren are related to respondents thus:

Table 7.6: Child through whom ‘most contact’ selected grandchild is related

	Frequency	Valid Percent	Cumulative Percent
Daughter's child	130	59.6	59.6
Son's child	80	36.7	96.3
Son's step-child	1	.5	96.8
Step-daughter's child	6	2.8	99.5
Step-son's child	1	.5	100.0
Total	218	100.0	

There is only a small discrepancy in the figures breakdown here, (211 non-step-grandchildren to 210 non-stepchildren of sons and daughters).

One of the striking points that is evident from the foregoing data is that whereas the total numbers of grandsons and granddaughters are more or less equal, there is a greater number of daughters’ children than sons’ children. Although the 23% difference between sons’ children and daughters’ children in the ‘most contact’ stream might suggest a preference for the children of daughters, the 12% difference in the same direction in the ‘random’ stream would suggest that what is being reflected overall is the greater variability in male reproductive success, given that the survey is a snapshot in time in which more males than females will still have lifetime reproduction to complete.

Numbers of step-grandchildren are small and could be aggregated with biological (and adopted) grandchildren for analysis. However, in order to eliminate the discrepancies arising from the categorisation confusion between the two variables, ‘relationship and sex of grandchild’ and ‘sex of child through whom grandchild is

related', it was decided to exclude step-grandchildren of various kinds in order to reach the most conservative calculation of biological (including adopted) grandchildren. If we perform a  $\chi^2$  goodness-of-fit test, from which all stepchildren and step-grandchildren are excluded to produce the maximum number of grandchildren who are definitely biological (including adopted) grandchildren, we arrive at a total of 877 selected grandchildren. While it is clear that the difference in the numbers of granddaughters (431) to grandsons (446) is insignificant, the reproductive bias already referred to means that the difference in numbers between daughters' children (506) and sons' children (371) is highly significant,  $\chi^2 = 20.781$ ;  $df = 1$ ;  $p < 0.001$ . This discrepancy might have consequences for some further statistical tests, though it is debateable how much the greater availability of children of one sex of offspring increases the likelihood that a grandparent would have more contact with the offspring of a child of that sex.

If, for instance, we look at the 'most contact' grandchildren, (excluding step-grandchildren), 210 in all, there is no significant difference in the choice between grandson and granddaughter, but there is a significant difference in whose child is chosen, in favour of daughter's child,  $\chi^2 = 11.905$ ;  $df = 1$ ;  $p = 0.001$ . This seems to be only what we would expect, except that, when we split the responses into those made by grandmothers and those made by grandfathers, there is an interesting divergence. Taking grandmothers first: the expected significant difference is present for daughters' children,  $\chi^2 = 8.942$ ;  $df = 1$ ;  $p < 0.005$ ; but there is also a significant difference in the selection of granddaughters over grandsons,  $\chi^2 = 6.139$ ;  $df = 1$ ;  $p < 0.05$ . For grandfathers, on the other hand, there is no significant difference in the sex of grandchild chosen, nor in the sex of the child who is parent of the grandchild. If the greater availability of daughters' children in the sample were leading to a greater tendency for them to be picked out as 'most contact' grandchildren, one would expect this effect to be evident in grandfathers' as well as grandmothers' selection.

If we proceed further to test the association between sex of grandchild and sex of the parent of the child, in a 2x2 contingency table, crosstabulations show no significant association ( $\chi^2 = 0.643$ ;  $df = 1$ ;  $\phi = 0.055$ ;  $p = 0.422$ ); in other words, there is no special tendency to pick as 'most contact' grandchildren daughters' daughters or sons' sons, or indeed vice versa. If the respondents are broken down into grandmothers and



grandfathers, the results are the same: again no significant association in the crosstabulations.

If we introduce randomly chosen grandchildren and crosstabulate 'most contact' and random grandchildren with whether grandchild is son's or daughter's offspring, there is still no significant association. Once again, neither grandparents taken together nor grandfathers and grandmothers on their own are seen to be significantly more likely to choose as 'most contact' grandchild the grandchild who is the offspring of one sex of child rather than the other.

### 7.2.2. CODING

However, what this extensive BSA data set particularly calls out for is finer grained analyses based on questions with scaled replies, given that many of the attitudinal and behavioural questions were framed with 6 levels of response. In order to refine focus, as has been previously indicated, these more detailed analyses will be confined to the grandparents sub-sample alone.

The attitudinal and behavioural questions put to grandparents encompassed closeness, frequency of contact and proximity of residence (both of these asked only of those not resident with selected grandchild), carrying out leisure and social activities together (but without the presence of parents), providing resources and carrying out various forms of childcare (again in the absence of the parents). (See *Appendix C.*)

First of all the grandparental data from the BSA survey were transformed to reverse the original score order so that, for instance, on a scale of 6, 6 represented the highest level of frequency of a behaviour or intensity of an attitude and 1 the lowest. Questions of contact and proximity offered responses at 8 levels of frequency and distance respectively; activity and care questions offered 6 levels of frequency; closeness had 4 strength levels, and resources and advice, 3 frequency levels. As previously mentioned, the 'most contact' stream consisted of those respondents with odd serial numbers who picked out a grandchild with whom they had more contact plus those odd number respondents who had to be pressed to pick out a grandchild with whom they had a little more contact.

Before bringing in matrilineage, where, according to Dench and Ogg, it would be expected that there is greater contact when grandparents are linked to grandchildren through a daughter, the objective is to see what, if any, differences there might be between grandfathers and grandmothers in their attitudes and behaviour towards their grandchildren.

Factorial ANOVAs were performed for a cross-section of dependent behavioural variables, with the sex of the grandparent as one factor and the method of selection, with three levels, (more contact, a little more contact and random), as the other factor. Also, at this stage, analyses were carried out including in the sample the various kinds of step-grandchildren. It should be noted that all tabulated questions relating to closeness and activities were asked only of those grandparents who had had contact with their selected grandchild within the previous two years, 96.24% of the total. (Of the 35 grandchildren not contacted within the previous 2 years, the proportion of step-children was high, 20% compared to their 5.6% in the total sample, but their numbers were too few to draw any useful conclusions from.)

### 7.3. RESULTS

#### 7.3.1. GRANDPARENTAL ATTITUDES AND ACTIVITIES

Factorial analysis of a selection of grandparental attitudes and activities, with three methods of grandchild selection, produced the following results:

Table 7. 7: Factorial ANOVAs of grandparental attitudes, behaviour and activities with grandchildren according to sex of grandparent and selection method of grandchild (more contact, little more contact or random)

<b>Dependent Variable</b>	<b>Independent Variables</b>	<b>df</b>	<b>N</b>	<b>F</b>	<b>Sig</b>
Closeness	Grctype (Selection of Grandchild)	2	772	11.225	0.000
	Rsex (Sex of respondent)	1		1.017	NS
	Interaction between Grctype & Rsex	2		0.674	NS
Seeing	Grctype	2	758	18.791	0.000
	Rsex	1		0.915	NS
	Grctype* Rsex	2		1.525	NS

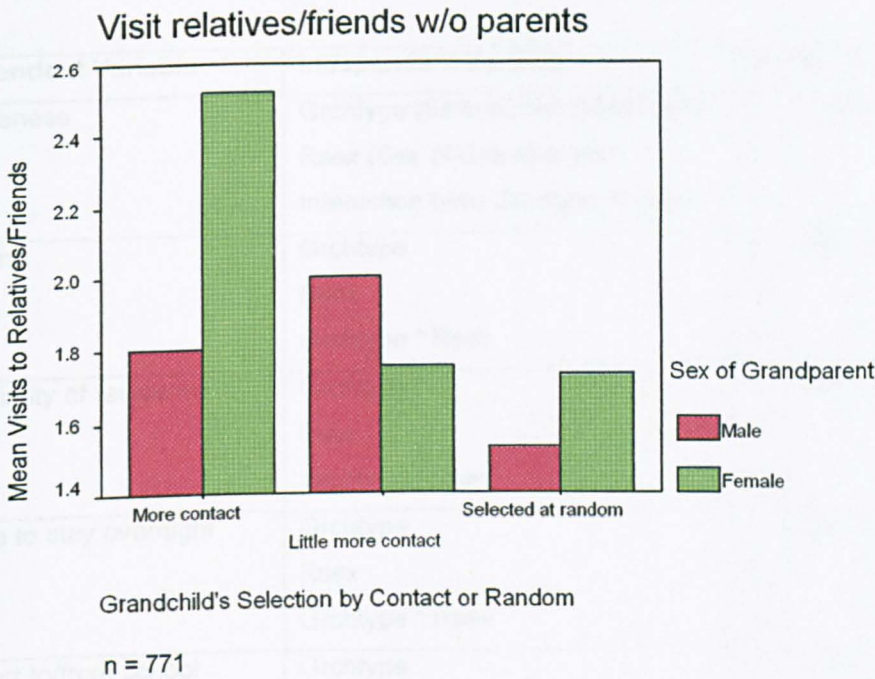
Dependent Variable	Independent Variables	df	N	F	Sig
Proximity of residence	Grctype	2	756	10.473	0.000
	Rsex	1		0.969	NS
	Grctype* Rsex	2		0.412	NS
Escort to/from school grandchild <=12	Grctype	2	437	7.223	0.001
	Rsex	1		0.098	NS
	Grctype* Rsex	2		1.620	NS
Have to stay overnight	Grctype	2	758	3.296	0.038
	Rsex	1		0.161	NS
	Grctype* Rsex	2		0.726	NS
Play indoor games	Grctype	2	771	4.577	0.033
	Rsex	1		6.457	0.002
	Grctype* Rsex	2		1.976	NS
Visit relatives or friends	Grctype	2	771	10.195	0.000
	Rsex	1		1.808	NS
	Grctype* Rsex	2		3.210	0.041
Shopping, cinema and other outings	Grctype	2	772	7.089	0.001
	Rsex	1		2.917	NS
	Grctype* Rsex	2		4.509	0.011
Help parents with money for grandchild	Grctype	2	254	0.100	NS
	Rsex	1		1.872	NS
	Grctype* Rsex	2		2.782	NS
Give advice to grandchild >=4	Grctype	2	261	1.780	NS
	Rsex	1		0.864	NS
	Grctype* Rsex	2		0.675	NS

The general conclusion that can be drawn from this list is that in some situations, like seeing and proximity, greater contact occurs almost by definition, offering highly significant effects; in some activities, like visiting relatives or going on outings, there is not only a highly significant effect for contact but also a significant interaction with sex of grandparent, in other words a tendency for one grandparent (the grandmother) to favour the more contact grandchild; while in other activities, like giving money to parents or advice to grandchildren, there are no significant differences at all.

However, looking at a number of the means plots of the various behaviours where there is no significant difference between grandfathers and grandmothers, there are several where, while the grandmothers' score is the higher in the 'more contact'

group, the grandfathers' is the higher in the 'little more contact' group. Take, for instance the graph for visiting friends or relatives, in which there is a significant interaction between the sex of grandparent and how the grandchild was selected.

Figure 7.1: Comparison between grandchild selection methods according to sex of grandparent for visiting relatives or friends without parents



This variation suggests either a difference in the perception of contact as between grandfathers and grandmothers or a difference in the quality of contact. The latter interpretation would support the hypothesis that the investment of the grandfather, in some cases at least, is an accessory to the investment of the grandmother. In which case, it is useful to show these delineations in levels of contact for analyses comparing the respective roles of grandparents.

If, on the other hand, grandfathers are simply a little more tentative in assessing the level of contact they have with grandchildren, it would be apposite to analyse investment activities, employing only two levels of grandchild selection, random and 'most contact', the latter aggregating 'more contact and 'a little more contact', as was done by Dench and Ogg for their analyses. As well as the behavioural variables it would also seem appropriate to re-analyse the rest of the variables in table 7. 7.

Thus a further set of factorial ANOVAs were performed on measures of attitude, situation and behaviour with the selection factor now having two levels, 'most contact' (aggregating 'more contact' and 'a little more contact') and random. The following results were obtained:

Table 7. 8: Factorial ANOVAs of grandparental attitudes and activities with grandchildren according to sex of grandparent and selection method of grandchild (most contact or random)

Dependent Variable	Independent Variable	df	N	F	Sig
Closeness	Grctype (Selection of Grandchild)	1	772	21.421	0.000
	Rsex (Sex of Grandparent)	1		1.397	NS
	Interaction betw Grctype & Rsex	1		1.182	NS
Seeing	Grctype	1	758	35.736	0.000
	Rsex	1		0.024	NS
	Grctype * Rsex	1		0.287	NS
Proximity of residence	Grctype	1	756	20.529	0.000
	Rsex	1		1.117	NS
	Grctype * Rsex	1		0.324	NS
Have to stay overnight	Grctype	1	758	5.021	0.025
	Rsex	1		0.003	NS
	Grctype * Rsex	1		0.257	NS
Escort to/from school (12 years or under)	Grctype	1	437	13.131	0.000
	Rsex	1		2.485	NS
	Grctype*Rsex	1		0.738	NS
Visit relatives or friends	Grctype	1	771	16.631	0.000
	Rsex	1		9.859	0.002
	Grctype*Rsex	1		1.747	NS
Indoor games and activities	Grctype	1	771	12.677	0.000
	Rsex	1		6.055	0.014
	Grctype*Rsex	1		3.783	0.052
Shopping, cinema and other outings	Grctype	1	772	13.138	0.000
	Rsex	1		9.130	0.003
	Grctype*Rsex	1		6.701	0.010
Giving advice to children (4 years and over)	Grctype	1	261	1.393	NS
	Rsex	1		2.447	NS
	Grctype*Rsex	1		1.114	NS
Help grandchild's parents with money	Grctype	1	254	0.189	NS
	Rsex	1		0.027	NS
	Grctype*Rsex	1		0.001	NS

Looking at the two tables, while aggregating the 'more' and 'little more contact' levels into a 'most contact' level was designed to even out the variation in grandmothers' and grandfathers' assessment of contact, it has also served to push up the levels of F ratios, making much more clear-cut the effect, where it exists, for method of grandchild selection. The three variables that imply 'most contact' almost by definition, 'closeness', 'seeing' and 'proximity' already had significances of  $p = 0.000$ , the highest this version of SPSS can offer. The significance of the grandchild selection effect in 'stay overnight' has increased marginally and in 'escort to or from school' has also increased. Then come three social and leisure activity variables, each of which showed more than one significant effect in the first table (*table 7.7*). The aggregation of contact levels for 'visiting relatives' raises the F ratio for selection method, eliminates the interaction but introduces a significant sex effect; with 'indoor games' the selection method effect is again enhanced, but the sex effect reduced (though still significant) and an almost significant interaction appears; and with 'shopping and other outings' the selection method effect is greater and a significant sex effect appears. Finally, 'giving advice' and 'helping grandchild's parents with money' remain without any significant differences for any of the factors.

The responses analysed in these tables represent a number of different types of circumstance, attitude and behaviour. The first three variables dealt with in the tables are virtually inseparably tied in with contact and, while not examples of direct investment themselves, may be necessary precursors or correlates of investment behaviours. The remainder of the variables comprise a selection of investment behaviours of various kinds. The variations in the results of the analyses of all these variables suggest that there may be a trade-off between types of investment requiring time and effort and types of investment incurring different sorts of cost, for instance the provision of resources to grandchildren. It seems also to be the case that activity investment is a grandmaternally led process, while resource and advice investment show no apparent sex difference between grandmothers and grandfathers. The precursory variables also show no significant differences between grandmothers and grandfathers. Thus it would seem appropriate at this point to attempt to tease out any possible differences there might be between grandfathers and grandmothers.

## 7.4. GRANDMOTHERS COMPARED TO GRANDFATHERS

If there is an overall difference in grandparental behaviour between grandmothers and grandfathers, is this further influenced by the parentage of the grandchild? A series of factorial ANOVAs, with the grandparents' behaviour as the dependent variable, and the grandchild selection method ('most contact' or random) as one factor and the parentage of the grandchild as the other factor, and with the results for grandmothers and grandfathers analysed separately, enables us to make the comparison. This is also the occasion, if we are looking for an effect difference between the children of sons and the children of daughters, to confine ourselves to biological offspring of the grandparental group.

### 7.4.1. CONTACT-RELATED VARIABLES

We should commence with the precursory or correlated variables, which seem virtually inseparable from contact: closeness, seeing and proximity of residence. Certainly, in proximity of residence, there should be no differences between grandmothers and grandfathers (bearing in mind that grandparents resident with grandchildren are excluded from this variable).

A series of factorial ANOVAs was performed for both grandfathers and grandmothers, with closeness, seeing and proximity of residence as the dependent variables, and sex of grandchild's parent and selection method of grandchild as the independent variables.

Table 7.9: Factorial ANOVAs of grandparental closeness and contact with selected grandchild according to selection method of grandchild (most contact or random) and sex of grandchild's parent

Depend Variable	Independ Variable	Grandparent	Df	N	F	Sig
<u>Closeness</u>	Grctype	Grandmother	1	457	4.406	0.036
	Grchpare		1		24.479	0.000
	Grctype*Grchpare		1		0.274	NS
	Grctype	Grandfather	1	275	11.032	0.001
	Grchpare		1		0.047	NS
	Grctype*Grchpare		1		0.523	NS

Depend Variable	Independ Variable	Grandparent	Df	N	F	Sig
<u>Seeing</u>	Grctype	Grandmother	1	446	22.759	0.000
	Grchpare		1		14.837	0.000
	Grctype*Grchpare		1		1.204	NS
	Grctype	Grandfather	1	272	12.492	0.000
	Grchpare		1		1.831	NS
	Grctype*Grchpare		1		0.412	NS
<u>Proximity</u>	Grctype	Grandmother	1	444	16.735	NS
	Grchpare		1		0.952	0.000
	Grctype*Grchpare		1		0.961	NS
	Grctype	Grandfather	1	272	5.764	0.017
	Grchpare		1		0.220	NS
	Grctype*Grchpare		1		3.444	0.065

Quite clearly, whereas in table 7. 8. there was no difference between grandfathers and grandmothers in relation to their feelings of closeness, frequency of seeing and proximity of residence to their selected grandchild, with the significant factor for both grandparents being the level of contact with the grandchild, when lineage is introduced it makes a difference whether the grandchild is the child of the grandparent's son or the grandparent's daughter. Lineage is significant for grandmothers (highly so), but not at all for grandfathers. Thus we can say that grandmothers report feeling closer to daughters' children, seeing them more often and living nearer to them than to sons' children. But grandfathers report none of these things. Of course, we have to take into account the fact that these sub-samples of grandmothers and grandfathers are unconnected to each other. It may be that whereas grandfathers tend to lean towards partners' perceptions, as was suggested earlier, the grandmothers' sub-sample is biased by containing more widows, who might live closer to daughters than sons, though we would still need to explain why.

Re-analysis of the data to exclude married, living as married, separated or divorced respondents, that is to leave only widowed subjects, did remove a greater percentage of grandfathers from the sub-samples than grandmothers: 56.3% of the grandmothers were widowed, but only 23.3% of the grandfathers.



Table 7.10: Factorial ANOVAs of widowed grandparents' closeness and contact with selected grandchild according to selection method of grandchild (most contact or random) and sex of grandchild's parent

Depend Var	Independ Variable	Widowed G'parent	Df	N	F	Sig
<u>Closeness</u>	Grctype	Grandmother	1	250	2.708	NS
	Grchpare		1		15.276	0.000
	Grctype*Grchpare		1		0.550	NS
	Grctype	Grandfather	1	64	11.716	0.001
	Grchpare		1		0.460	NS
	Grctype*Grchpare		1		3.342	0.073
<u>Seeing</u>	Grctype	Grandmother	1	245	13.294	0.000
	Grchpare		1		13.294	0.000
	Grctype*Grchpare		1		1.859	NS
	Grctype	Grandfather	1	63	1.777	NS
	Grchpare		1		0.165	NS
	Grctype*Grchpare		1		0.215	NS
<u>Proximity</u>	Grctype	Grandmother	1	244	9.822	0.002
	Grchpare		1		2.583	NS
	Grctype*Grchpare		1		1.155	NS
	Grctype	Grandfather	1	63	0.485	NS
	Grchpare		1		0.013	NS
	Grctype*Grchpare		1		0.919	NS

Widowed grandmothers still highly significantly favour the children of daughters in relation to feelings of closeness and frequency of seeing them, but not in proximity of residence. Thus we can conclude that widowhood does not lead grandmothers to live significantly nearer their daughters than their sons. For widowed grandfathers, no factor is significant in relation to seeing and proximity, while only grandchild's selection method is significant for closeness, (and there the preference is for children of *sons*, though the interaction is short of significance). For grandfathers as a whole (*table 7. 9*) only grandchild selection method is significant in each variable, though there is almost a significant interaction between selection method and sex of grandchild's parent in proximity, which again suggests greater proximity for non-widowed grandfathers, just as for non-widowed grandmothers. If we look at the variables one by one, for widowed grandparents:

### **(i) Closeness**

For widowed grandmothers it does not matter whether the grandchild is most contact or random, closeness is still highly significantly greater to the children of daughters. For widowed grandfathers, as before, it is the level of contact that matters, but where the level is 'most contact' it is the children of sons who are preferred (compared to a preference for children of daughters in the random stream).

### **(ii) Seeing**

This is the variable most likely to be inextricable from contact levels, (though a question on telephoning offers another means of contact). And indeed widowed grandmothers remain much more likely to see most contact grandchildren and much more likely to see the children of daughters. Yet for widowed grandfathers there are no such preferences, not even the greater likelihood of seeing 'most contact' grandchildren, shown in table 7.9.

### **(iii) Proximity**

Widowed grandmothers have greater contact with children who live nearer but do not necessarily live nearer the children of daughters. Widowed grandfathers again show no preferences, not even for living nearer 'most contact' grandchildren, as was shown in table 7.9.

There remains one other obvious potential confound in relation to proximity and that is the age of the grandchild. Adult grandchildren do not generally live with their parents. Some of them may live a greater distance from grandparents than grandparents' own children. However, since 74.2% of grandchildren are aged 18 years or under, we should not expect non-resident adult grandchildren to make a substantial difference to the analyses.

As a precaution, though, we might make the prediction that, taking grandchild age into account, there will be no difference in proximity to grandmothers of daughters' offspring compared to sons' offspring.

A stepwise multiple regression was performed on all grandmothers, with proximity of residence as the dependent variable and selection method of grandchild, sex of grandchild's parent and age of grandchild as the factors to be added in. Grandchild selection method was coded 0 for random and 1 for most contact; sex of grandchild's parent was coded 0 for son's child, 1 for daughter's child; age of grandchild was age in years. The regression shows a highly significant correlation between distance of residence of grandchild and age of grandchild.

Table 7.11: Regression Coefficients: Dependent Variable – proximity of grandchildren to grandmother according to selection method of grandchild, sex of grandchild's parent and age of grandchild (n = 443)

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	r <sup>2</sup>
1	(Constant)	5.875	.110		53.547	.000	
	Grandchild - Most Contact/ Random	.881	.202	.204	4.365	.000	.041
2	(Constant)	6.292	.163		38.513	.000	
	Grandchild - Most Contact/ Random	.879	.199	.203	4.410	.000	
	Age of grandchild	-3.004E-02	.009	-.157	-3.415	.001	.066

The model shows that whether grandchildren are 'most contact' or random is the strongest predictor of proximity of residence of grandchildren, but also, the lower the age, the shorter the distance from grandchild the subject lives. Whether the grandchild's parent is the grandmother's daughter or son is excluded from the model. The prediction is, therefore, upheld.

Overall then, for feeling close or seeing often, grandmothers favour daughters' children, grandfathers do not. Grandfathers do not live nearer daughters' children than sons'; nor do widowed grandmothers, nor indeed grandmothers in general, but the younger the grandchild, the closer grandmother lives.

#### 7.4.2. INVESTMENT BEHAVIOURS

Given these distinctions between grandmothers and grandfathers, supporting a matrilineal agenda for proximity for grandmothers in certain circumstances and no

such agenda for grandfathers, we can now proceed to compare the rest of the behaviours that were analysed in table 7. 8. by grandchild selection method and sex of grandparent, this time by grandchild selection method and sex of grandchild's parent. Since we are expecting a matrilineal effect for grandmothers but not for grandfathers, we will table factorial ANOVA results for grandmothers with just the significances of grandfathers' results laid alongside for comparison.

Table 7. 12: Factorial ANOVAs of grandmaternal behaviour according to selection method of grandchild (most contact or random) and sex of grandchild's parent, with grandpaternal significance added for comparison

Dependent variable	Independent variable	df	N	F	Sig	GF sig
Have to stay overnight	Grchtype (selection method)	1	446	2.883	NS	NS
	Grchpare (sex of parent)	1		19.008	0.000	NS
	Grchtype* Grchpare	1		2.688	NS	NS
Escort to/from school (12 years or under)	Grchtype	1	246	5.523	0.020	NS
	Grchpare	1		8.070	0.005	NS
	Grchtype* Grchpare	1		1.852	NS	NS
Shopping and outings	Grchtype	1	457	17.573	0.000	NS
	Grchpare	1		28.616	0.000	NS
	Grchtype* Grchpare	1		7.305	0.007	NS
Indoor games and Activities	Grchtype	1	457	15.042	0.000	NS
	Grchpare	1		13.763	0.000	NS
	Grchtype* Grchpare	1		1.787	NS	NS
Visit relatives or friends	Grchtype	1	456	11.203	0.001	0.022
	Grchpare	1		18.917	0.000	NS
	Grchtype* Grchpare	1		6.767	0.010	NS
Advice to grandchild 4 years or over	Grchtype	1	174	0.014	NS	NS
	Grchpare	1		11.672	0.001	NS
	Grchtype* Grchpare	1		10.262	0.002	NS
Help grandchild's parent with money	Grchtype	1	149	1.769	NS	NS
	Grchpare	1		15.092	0.000	NS
	Grchtype* Grchpare	1		6.564	0.011	NS

In the case of every activity looked at here, grandmothers' behaviour towards the children of daughters is highly significantly different from behaviour towards the children of sons. Significant interactions show the same pattern -- of a preference for

daughters' children in the 'most contact' stream. On the other hand, the only significant difference in grandfathers' behaviours is in relation to visiting friends or relatives, where significantly more visits are carried out with 'most contact' grandchildren; although there is an insignificant tendency for these 'most contact' grandchildren to be the children of sons, there is no significant difference in relation to whether grandchildren are children of sons or daughters in this or any other activity. This is particularly remarkable, as we might have expected some kind of grandpaternal differential in relation to resources. Of course this might not mean that grandfathers do not take the lead in the provision of resources to grandchildren's parents, only that they do it indiscriminately. However, it is also the case that their mean frequency scores for provision of resources are lower than grandmothers', so if grandfathers are notable resource providers they would have to be demonstrating this in the volume of resources provided, a possibility that is not tested in the survey. Advice, which showed no significant differences between the sexes of grandparents or the grandchild selection methods, once analysed for grandfathers and grandmothers separately, shows the grandmothers' highly significant preference for giving advice to daughters' children and that preference highly significantly exercised in the 'most contact' stream rather than the random stream.

### **(i) Questions Arising**

There are two questions arising from this comparison between grandfathers and grandmothers:

1. Why do grandmothers and not grandfathers invest more heavily in some offsprings' children than others?
2. Why are those offspring the children of daughters rather than sons?

The response must involve certainty of paternity in both cases. The maternal grandmother has certainty in her matriline; the grandfather, because he suffers from uncertainty of paternity, must certainly suffer from uncertainty of grandpaternity as well. Of course, one might predict that grandfathers might show a marginal preference for daughters' children over sons, in that uncertain grandpaternity towards daughters' offspring is merely a function of the grandfather's own uncertainty of paternity; but with his son's offspring, his own coefficient of paternity uncertainty is multiplied by his son's. The fact that this table (*table 7.12.*) does not show such a difference might

be explained by the fact that such activities are more likely to be carried out by grandmothers than grandfathers. One might also infer from the lack of different treatment reported by grandfathers towards 'most contact' and random grandchildren that contact with grandchildren is grandmaternally led.

### 7.4.3. CONTACT AND LINEAGE

This leads us to consider, in the case of grandmothers, a possible correlation between the parentage of a grandchild and the grandchild's selection method ('most contact' or random). It is not unexpected that grandmothers carry out more activities with 'most contact' grandchildren, (though it is not necessarily true by definition, since grandfathers do not do it). Can we then predict that those 'most contact' grandchildren with whom grandmothers carry out more activities will also be predominantly the children of daughters?

#### (i) Grandmaternal Care Index

It might be useful to approach this question by combining sets of activities of a similar nature to arrive at a more systematic picture of grandmaternal behaviour. For example we can aggregate and derive a mean from the set of care activities relating to 12 year-olds and under, the four variables which cover day-time babysitting, evening babysitting, escorting to or from school, and looking after a grandchild when sick, each variable having 6 levels of response, ranging from 6 - once a week at least, to 1 - not in the past year.

A factorial ANOVA with care index as the dependent variable and grandchild's method of selection and sex of grandchild's parent as the independent variables, gives a significant difference for grandchild selection method,  $F(1,242) = 5.771$ ;  $p < 0.05$ , and a highly significant difference for sex of grandchild's parent,  $F(1,242) = 17.746$ ;  $p < 0.001$ , but no interaction; in other words not only are 'most contact' grandchildren cared for more than random grandchildren, but in either stream, daughters' children are cared for more than sons'.

A stepwise multiple regression was performed on grandmother's care index, with selection method of grandchild and relationship through son or daughter as the independent variables. Selection method of grandchild was coded 0 for random and 1

for most contact; relationship through son or daughter was coded 0 for son's child and 1 for daughter's child. The model summary shows that whether the grandchild is related through son or daughter is the principal predictor of the level of the care index but whether grandchild is 'most contact' or random has some additive predictive power.

Table 7.13: Regression Coefficients for Dependent Variable: Grandmaternal Care Index towards grandchild <=12 according to selection method of grandchild and sex of grandchild's parent (n = 246)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	2.176	.127		17.141	.000	
	Sex of grand-child's parent	.775	.164	.290	4.735	.000	.084
2	(Constant)	2.006	.131		15.762	.000	
	Sex of grand-Child's parent	.710	.163	.266	4.353	.000	
	Most Contact or Random	.489	.173	.172	2.820	.005	.113

### (ii) Grandmaternal Activity Index

A grandmaternal activity index was created by aggregating and taking the mean of four activities that grandparents carry out with their grandchildren, taking them to the park, taking them out shopping or on trips to cinema, theatre or sports events, playing indoor games with them, or going to visit friends or relatives; again each variable had 6 levels of response, ranging from 6 – at least once a week to 1 – not in the past year. A factorial ANOVA in which grandmother's activity index was the dependent variable and grandchild's selection method and sex of grandchild's parent were the independent variables produced highly significant main effects for both grandchild selection,  $F(1,452) = 17.940$ ;  $p < 0.001$ , and sex of parent,  $F(1,452) = 28.921$ ;  $p < 0.001$ ; there is a significant interaction between the two independent variables,  $F(1,452) = 5.237$ ;  $p < 0.05$ . In other words the grandmaternal preference for daughters' children is expressed for 'most contact' grandchildren but not for random grandchildren.

A stepwise multiple regression was performed on grandmother's activity index, with relationship through son or daughter and selection method of grandchild as the independent variables. The selection method of grandchild was coded 0 for random, 1 for most contact; relationship through son or daughter was coded 0 for son's child and 1 for daughter's child. The model summary shows that whether the grandchild was related through son or daughter is again the principal predictor of the level of the activity index but whether grandchild is 'most contact' or random also has substantial additive predictive power.

Table 7.14: Regression Coefficients for Dependent Variable: Grandmaternal Activity Index towards grandchild according to selection method of grandchild and sex of grandchild's parent (n = 454)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
		B	Std. Error	Beta			
1	(Constant)	2.001	.100		20.056	.000	
	Sex of grand-child's parent	.658	.131	.230	5.027	.000	.053
2	(Constant)	1.825	.104		17.510	.000	
	Sex of grand-Child's parent	.620	.128	.217	4.843	.000	
	Most Contact or Random	.656	.138	.213	4.765	.000	.098

Because there is a likely overlap between care activities and other sorts of general activity which in some cases may be carried out at the same time as care activities, a Pearson correlation test was carried out for grandmothers' care and activity indices. The test showed a highly significant correlation:  $r = 0.657$ ;  $n = 303$ ;  $p < 0.001$ . However, since the care index relates only to grandchildren aged 12 years and under, while the activity index encompasses grandchildren of all ages, the correlation is obviously limited to those grandmothers of children aged 12 years and under, while some of the points of interest in the activity index may well refer to older grandchildren.

Even so, there is a clear and interesting divergence shown by the regression statistics between grandmothers' care index and grandmothers' activity index. To summarise:



### (i) Care Index

1. Daughter's child is cared for more than son's child in both selection streams (no interaction)

2. Relationship to grandchild's parent is more important than method of grandchild selection in both behaviour sets.

3. Relationship to grandchild's parent is more important for care index than for activity index.

To put it another way care investment in grandchildren is daughter-dependent; activity investment in grandchildren is contact-dependent and contact is daughter-dependent.

### (iii) Grandmothers and Resources

Resources represent yet another type of investment, in which Dench and Ogg found an effect only in the responses of the linking parents group, in favour of paternal grandfathers giving money direct to grandchildren.

In factorial ANOVA analyses of responses confined to grandparents, it was found that in helping grandchild's parent with money and helping grandchild direct with money in the past year, there were no significant effects for grandfathers either in relation to contact or parentage of grandchild, nor any interaction between the two.

Table 7.15: Factorial ANOVAs of grandmaternal help with money either to grandchild's parent or direct to grandchild, according to selection method of grandchild (most contact or random) and sex of grandchild's parent, with grandpaternal significance added for comparison

Dependent variable	Independent variable	df	N	F	Sig	GF sig
Help grandchild's parent with money	Grchtype	1	149	1.769	NS	NS
	Grchpare	1		15.092	0.000	NS
	Grchtype* Grchpare	1		6.564	0.011	NS
Help grandchild direct with money	Grchtype	1	187	0.116	NS	NS
	Grchpare	1		2.780	NS	NS
	Grchtype* Grchpare	1		10.413	0.001	NS

In the case of grandmothers, however, for helping parents with money, as the graph (figure 7. 2) indicates, there is a highly significant effect for parent's sex and a significant interaction between parent's sex and grandchild selection stream; in helping grandchildren direct with money, the graph (figure 7. 3) illustrates the highly significant interaction between sex of grandchild's parent and grandchild selection stream. But what is striking in the case of direct help to parents is that, although there is no significant effect for selection stream over all, this breaks down into a much higher figure for sons' children in the random than in the 'most contact' stream. Likewise with money given directly to grandchildren, significantly more is given to sons' children in the random stream than in the 'most contact' stream.

Figure 7. 2: Grandmaternal help with money to grandchild's parent in past year

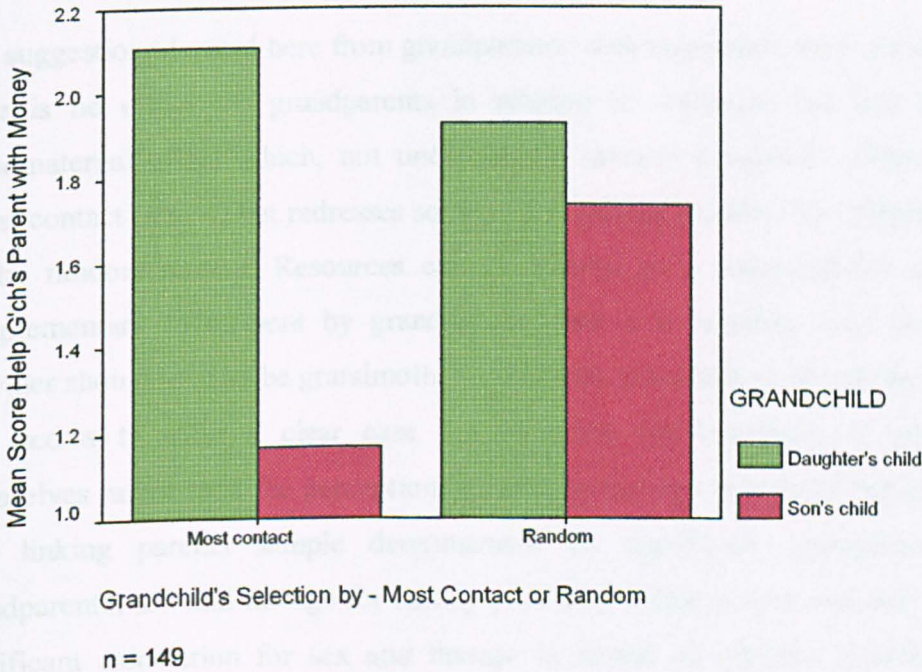
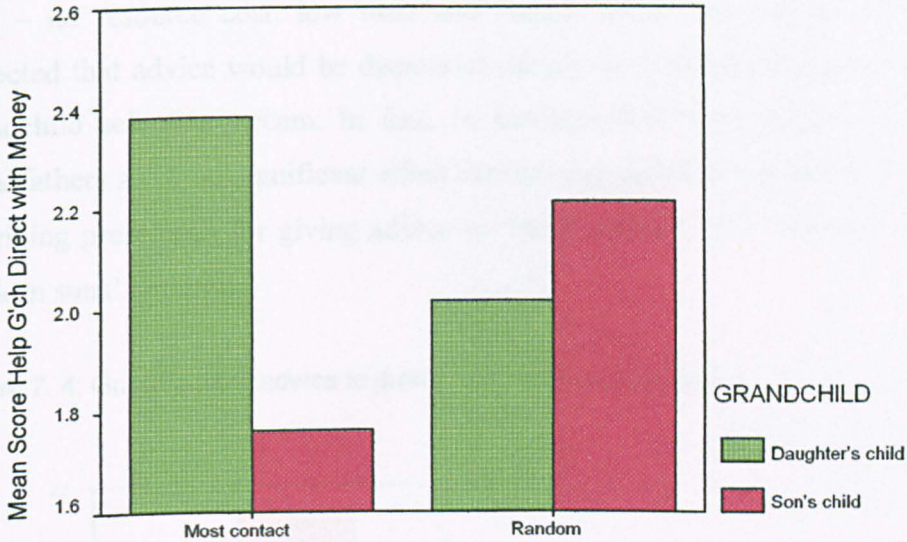


Figure 7. 3: Grandmaternal help with money to grandchild direct in past year



Grandchild's Selection by - Most Contact or Random

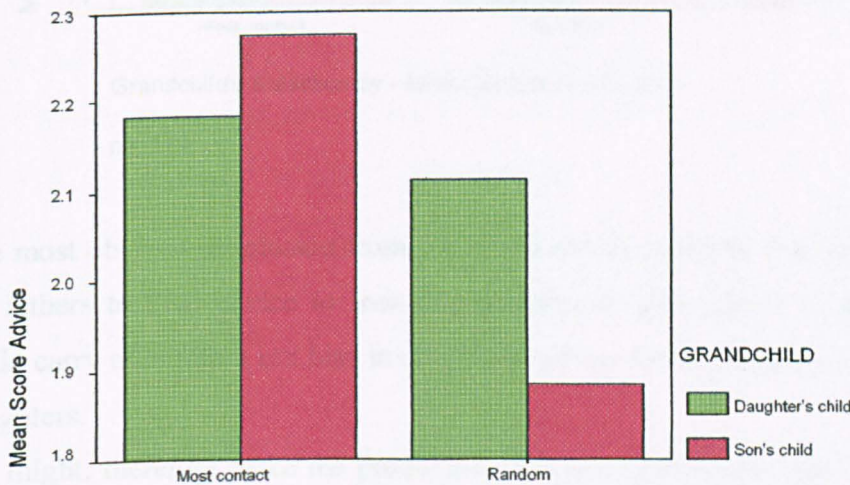
n = 187

The suggestion, derived here from grandparents' own responses, seems to be, not that there is no effect for grandparents in relation to resources but that there is a grandmaternal effect which, not unexpectedly favours daughters' offspring in the 'most contact' stream but redresses some of the balance towards the offspring of sons in the random stream. Resources can be viewed as a compensatory or perhaps complementary investment by grandparents, but it is puzzling why the resource provider should tend to be grandmother rather than grandfather. The giving of money also seems to offer a clear case for accepting the testimony of grandparents themselves rather than the perceptions of an unconnected sample of linking parents; (the linking parents sample demonstrated no significant association between grandparental sex and lineage for money provided to themselves, and only showed a significant association for sex and lineage in favour of paternal grandfathers, for money given to their offspring, an occurrence about which many linking parents could only have second-hand knowledge.) It is intriguing to speculate, if linking parents are mistaken and only *think* paternal grandfathers are the principal providers of cash to grandchildren, why they should do so.

#### (iv) Grandparental Advice

Advice is another discrete area of investment, which is distinguished by being low in cost – no resource cost, low time and energy costs. One might, therefore, have expected that advice would be dispensed equally by both grandparents and to either grandchild selection stream. In fact, in factorial ANOVAs (table 7.12.), although grandfathers show no significant effect for sex of grandchild’s parent over all, there is a striking preference for giving advice to ‘most contact’ sons’ children compared to random sons’ children.

Figure 7. 4: Grandfathers’ advice to grandchildren in the past year

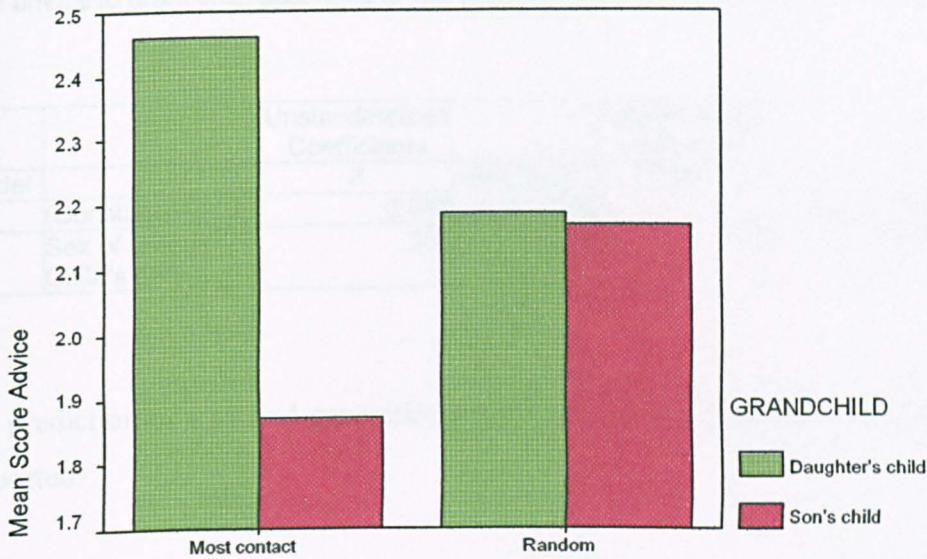


Grandchild's Selection by - Most Contact or Random

n = 77

On the other hand, grandmothers show the same tendency as in many other investment variables to favour daughters’ offspring in the ‘most contact’ grandchild stream but to treat grandchildren from either sex parent equally in the random stream, which, in effect, leaves sons’ children discriminated against in the ‘most contact’ stream.

Figure 7. 5: Grandmothers' advice to grandchildren in the past year



Grandchild's Selection by - Most Contact or Random

n = 174

The most obvious conclusion from these two results could be that there is a tendency for fathers to give advice to sons and mothers to give advice to daughters, which could carry over into a sex bias in relation to advice to the offspring of those sons and daughters.

We might, therefore make the prediction that grandfathers give advice to the sons of sons and grandmothers give advice to the daughters of daughters.

A multiple stepwise regression was performed, with advice to grandchild as the dependent variable, and sex of grandchild's parent and sex of grandchild to be entered stepwise as independent variables. Sex of grandchild was coded 0 for grandson and 1 for granddaughter; relationship to grandchild through son or daughter was coded 0 for son's child and 1 for daughter's child. In the case of grandfathers, not only does sex of grandchild have no predictive power but neither does sex of grandchild's parent. In the case of grandmothers, however, the model summary shows that sex of grandchild's parent is a significant predictor of grandmaternal advice-giving but the model excludes sex of grandchild as being without additive predictive power.

Table 7.16: Regression Coefficients for Dependent Variable: grandmother often last year gave advice to grandchild according to sex of grandchild and sex of grandchild's parent (n = 194)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	2.083	.066		31.503	.000	
	Sex of grand-Child's parent	.204	.083	.173	2.441	.016	.030

The prediction of a second-generation preference for own sex in advice-giving is not supported.

**(v) Sex of Grandchild in Care and Activity Indices**

Since advice-giving has its own peculiar cost/benefit characteristics, we also need to run separate stepwise regressions for grandmothers for the two computed behaviour indices, grandmothers' care index and grandmothers' activity index to see if sex of grandchild might be a predictor for these two further categories of behaviour, in addition to sex of grandchild's parent.

Taking the grandmaternal care index first, a multiple stepwise regression was performed, with care index as the dependent variable, and sex of grandchild's parent and sex of grandchild entered stepwise as independent variables. Sex of grandchild was coded 0 for grandson and 1 for granddaughter; Relationship through son or daughter was coded 0 for son's child and 1 for daughter's child.

Table 7.17: Regression Coefficients for Dependent Variable: grandmaternal care index of grandchild aged 12 or under according to sex of grandchild and sex of grandchild's parent (n = 303)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	2.220	.113		19.702	.000	
	Sex of grand-child's parent	.721	.146	.273	4.931	.000	.075

The model summary shows that sex of grandchild's parent is a highly significant predictor of grandmaternal care-giving but the model excludes sex of grandchild as being without additive predictive power.

The prediction is not upheld.

Turning to the grandmaternal activity index, a multiple stepwise regression was performed, with activity index as the dependent variable, and sex of grandchild's parent and sex of grandchild entered stepwise as independent variables. Sex of grandchild was coded 0 for grandson and 1 for granddaughter; relationship through son or daughter was coded 0 for son's child and 1 for daughter's child.

Table 7.18: Regression Coefficients for Dependent Variable: grandmaternal activity index with grandchild according to sex of grandchild and sex of grandchild's parent (n = 528)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	2.054	.095		21.532	.000	
	Sex of grand-child's parent	.621	.125	.211	4.954	.000	.045

The model summary shows that sex of grandchild's parent is a highly significant predictor of grandmaternal activity index but the model excludes sex of grandchild as being without additive predictive power.

The prediction is not upheld.

### 7. 5. MATERNAL GRANDMOTHERS

Since, for grandmothers in general, sex of grandchild's parent is a highly significant predictor of the level of investment in care and other activities with grandchildren, but the sex of the grandchild has no significant predictive power, it would seem useful to refine our analysis to the significant lineage route, by selecting maternal grandmothers to put the question about sex of grandchild in a narrower context. Furthermore, it would be useful to introduce another factor which might have some relevance to matrilineal grandmaternal care and activity levels, the age of the grandchild.

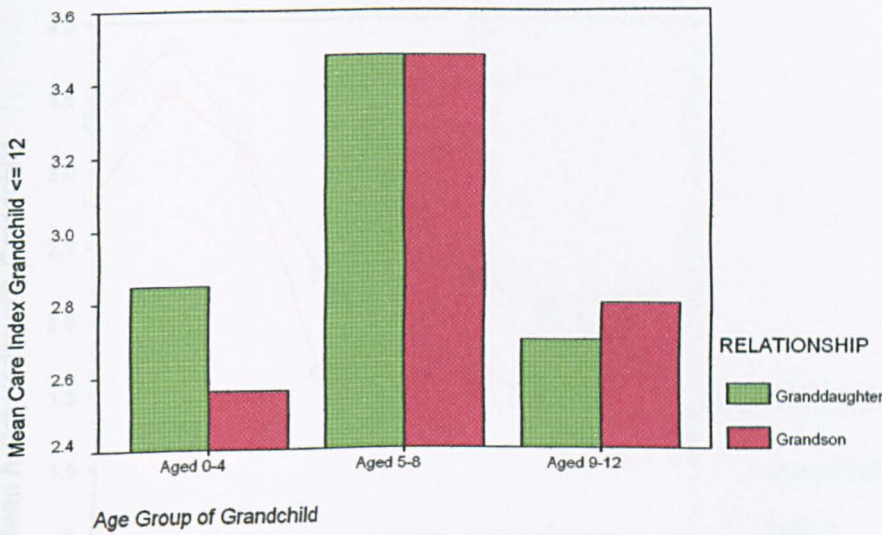
Taking into account the fact that care-giving relates to grandchildren of 12 years of age or under, while other activities are potentially carried out with grandchildren of all ages and the range of grandchildren's ages runs from under 1 to 58 years of age (although 74.2% are 18 years or under), there is likely to be a grandchild age effect in relation to grandmaternal behaviour, as was established for proximity of residence. The established grandmother hypothesis view would suggest that the greatest grandmaternal investment in daughters ought to take place when daughters' offspring are young, with one infant at the breast, perhaps, and other children unable to contribute very much to their own subsistence, leaving mothers with a substantial energy deficit in relation to self and offspring, unless assisted by a post-menopausal grandmother.

#### 7.5.1. AGE AND SEX OF GRANDCHILD IN CARE INDEX

The care index was computed from a set of activities of a similar character, forming a homogeneous set, and covers a limited range of ages. If we perform a factorial ANOVA, with maternal grandmothers' care index as the dependent variable and sex and age group of grandchild as the independent variables, there is a highly significant effect between subjects for age group,  $F(2,174) = 6.898$ ;  $p = 0.001$ . Sex of grandchild does not show a significant effect and there is no significant interaction between the independent variables. *Post hoc* multiple comparisons show that care of 5-8 year olds is highly significantly higher ( $p = 0.002$ ) than for 0-4 or 9-12 year olds; there is no significant difference in care levels between 0-4 and 9-12 year olds.



Figure 7. 6: Average care index of maternal grandmothers according to sex and age group of grandchild aged 12 years and under

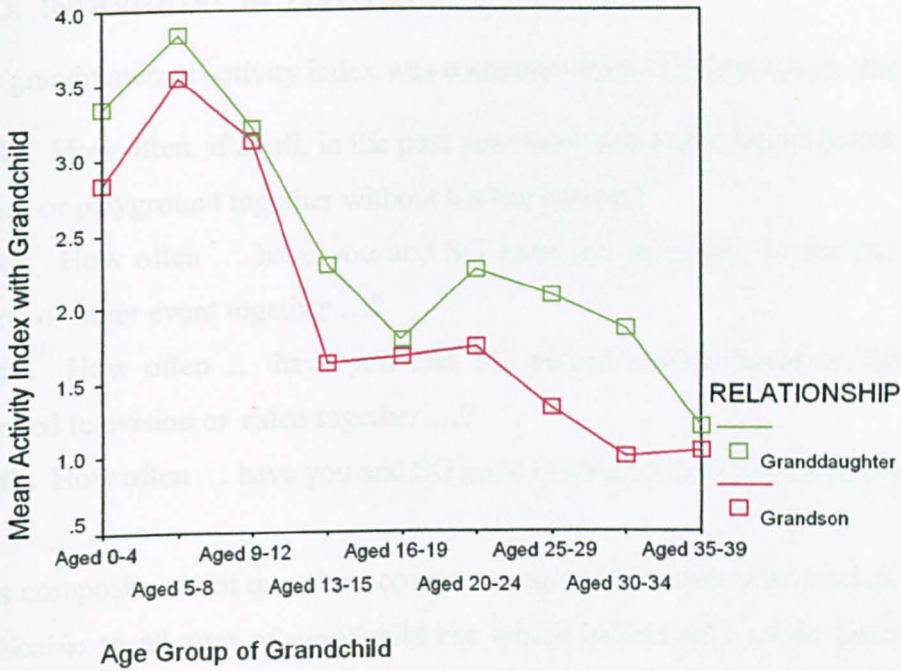


n = 180

### 7.5.2 AGE AND SEX OF GRANDCHILD IN ACTIVITY INDEX

The activity index is made up of a more heterogeneous set of elements than the care index and covers the full age range of grandchildren. For purposes of analysis we have omitted the oldest age group, 40+ years, since it numbers only three in this maternal grandmothers sub-sample. In a factorial ANOVA, maternal grandmothers' activity index is the dependent variable and sex and age group of grandchild are the independent variables. Once again age group difference is a highly significant effect,  $F(8,286) = 13.372$ ;  $p < 0.001$ , there is also a significant effect for sex of grandchild,  $F(1,286) = 4.854$ ;  $p < 0.05$ ; but there is no significant interaction between the independent variables. The *post hoc* comparisons show that the first three age groups, 0-4, 5-8 and 9-12 years old, are not significantly different from each other but are significantly different from all the other age groups; indeed the 5-8 year old group is highly significantly different from all the age groups aged 13 years and over.

Figure 7. 7: Average activity index of maternal grandmothers according to sex and age group of grandchild aged under 40



n = 304

This analysis of the activity index confirms the crucial importance of the early years for activities with grandchildren and echoes the pre-eminence of the junior school years between 5 and 8 as the peak period for maternal grandmothers' investment. This is no surprise given the overlapping nature of some of the activities making up the activity index with care activities; for instance going to the park must overlap with day-care, and playing games or watching TV must overlap with evening care. What is more interesting about the graph is the indication that the grandchild sex effect is occurring in the years of granddaughters' young adulthood. To explore this in more detail we need to look at the individual activities that were aggregated to compute the activity index.

### 7.5.3. INDIVIDUAL ACTIVITIES

The grandmaternal activity index was computed from the responses to four questions:

**Q244.** How often, if at all, in the past year have you and selected grandchild gone to a park or playground together without his/her parents?

**Q245.** How often ... have you and SG gone out shopping, to the cinema, theatre, sports or other event together ...?

**Q246.** How often ... have you and SG played indoor board or card games, or watched television or video together ...?

**Q247.** How often ... have you and SG gone to visit relatives or friends together ...?

This composite set of questions covers a range of activities which taken together are applicable to all ages of grandchild but which individually might possibly apply to different age groups. Using Dench and Ogg's own marker age points of 4 years and 12 years, question 244, for instance, would have most application to 4-12 year olds; question 246 would again be directed mostly at 4-12 year olds; question 245, on the other hand would tend cover the over-12s, with no top age limit; and question 247 is likely to apply to any age of grandchild over 4 years.

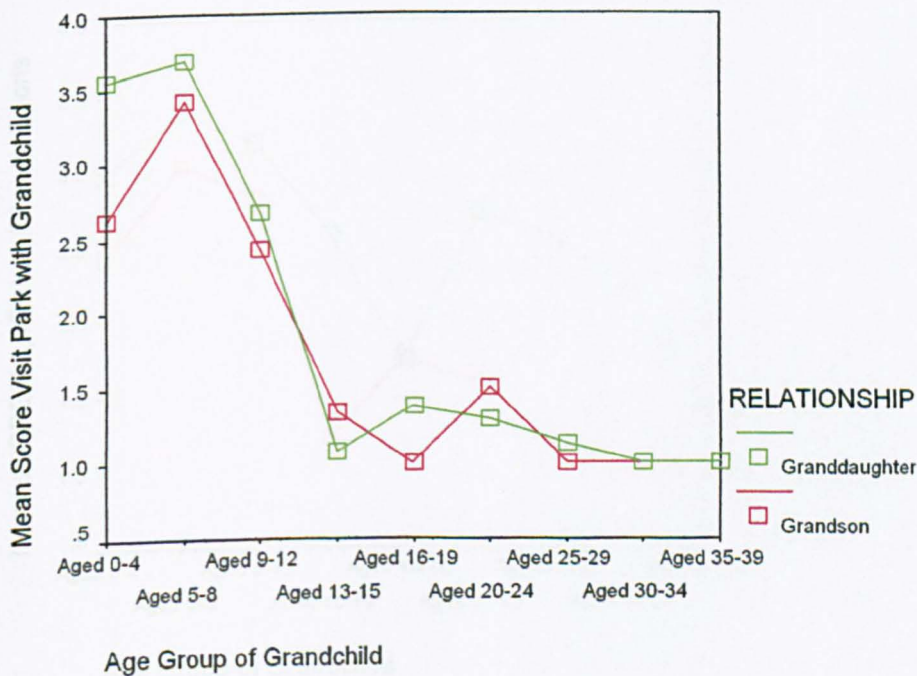
### 7.5.4. ACTIVITIES AND GRANDCHILD AGE GROUPS

We can analyse the four constituent activities to trace the variations of sex and age in the pattern of investment behaviour over time. In each case a factorial ANOVA was performed with the individual activity as the dependent variable and the age group and sex of the grandchild as the independent variables. It was again decided to leave out the 40+ year olds as being too few in number (3) to have significant power.

**(i) Taking Grandchild to the Park**

For taking grandchild on trips to the park, there is a highly significant effect for age,  $F(8,286) = 16.647$ ;  $p < 0.001$ . There is no effect for sex of grandchild and no interaction between sex and age. In *post hoc* multiple comparisons, the 0-4 years age group is highly significantly different from all age groups from 13 years onward; the 5-8 age group is significantly different from the 9-12 group and highly significantly different from those 13 years and onward; and the 9-12 group is significantly different from all but the 0-4 age group.

Figure 7. 8: Maternal grandmother goes with grandchild to the park without grandchild's parents, according to sex and age group of grandchild

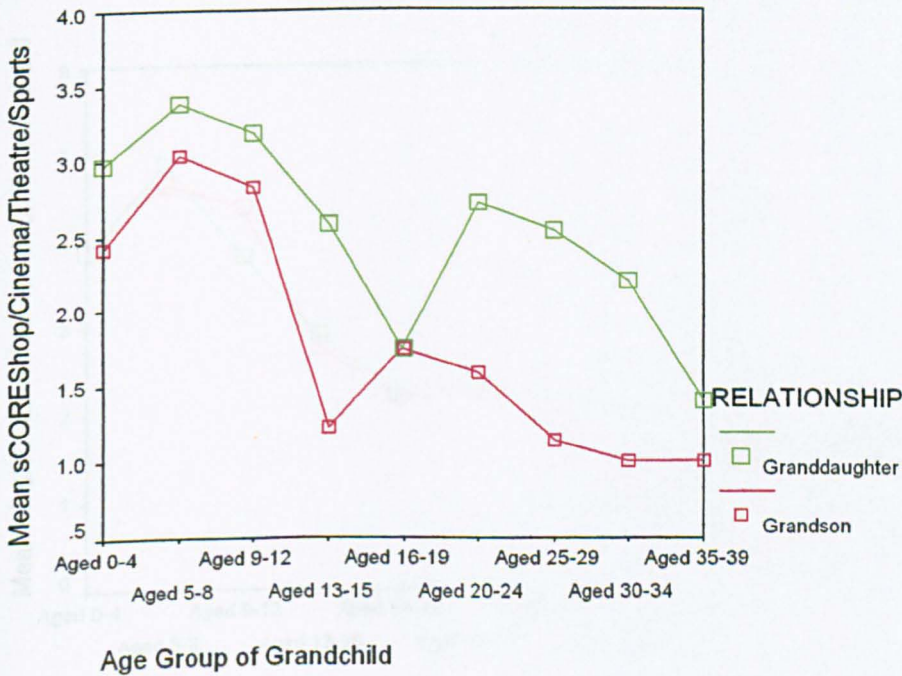


n = 304

**(ii) Taking Grandchild Shopping or on Other Outings**

For shopping and other outings, there is a highly significant effect for age group,  $F(8,286) = 4.666; p < 0.001$ , and a highly significant effect for sex of grandchild,  $F(1,286) = 8.940; p = 0.003$ , but no interaction between age and sex. The *post hoc* multiple comparisons reveal much less of a youth effect. The 0-4 age group shows no significant differences from any other age group; and the 5-8 and 9-12 year olds are only significantly different from the 16-19 year olds and the 35-39 year olds.

Figure 7. 9: Maternal grandmother goes shopping with grandchild or on other outings without grandchild's parents, according to age and sex of grandchild

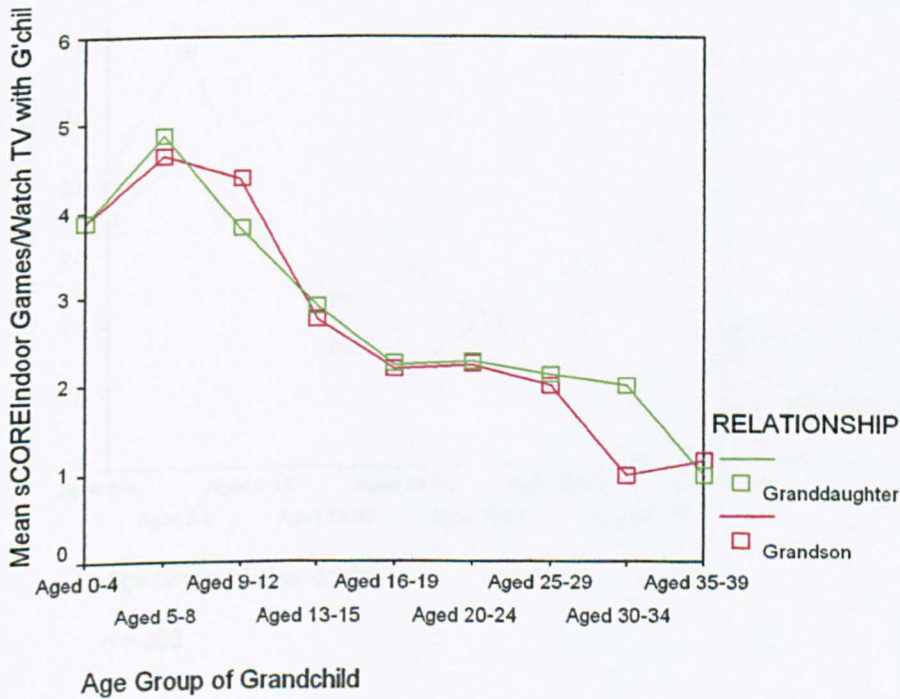


n = 304

### (iii) Playing Indoor Games or Watching TV

For playing games indoors or watching TV there is a highly significant effect for age,  $F(8,286) = 14.368$ ;  $p < 0.001$ , but no effect for sex and no interaction. In *post hoc* multiple comparisons the 0-4 year olds are not significantly different from the 5-8, 9-12 or 13-15 year olds but highly significantly different from all the other age groups. The 5-8 year olds are not significantly different from the 0-4 and 9-12 year olds but highly significantly different from every other age group. The 9-12 year olds are not significantly different from the 0-4, 5-8 or 13-15 year olds but highly significantly different from all the other age groups.

Figure 7.10: Maternal grandmother plays indoor games or watches TV with grandchild without grandchild's parents, according to sex and age of grandchild



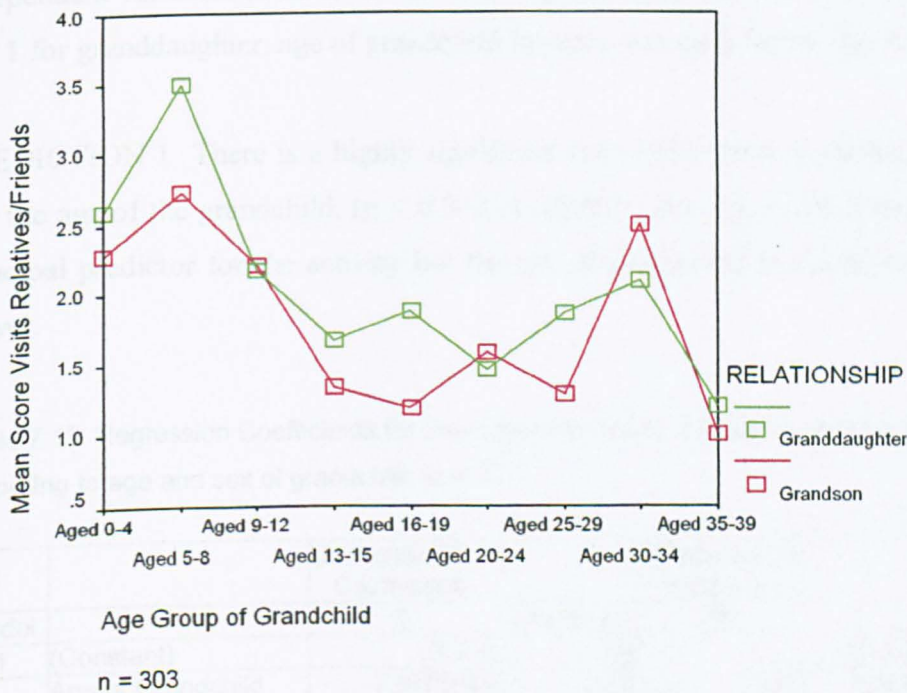
n = 304

between the scores of the grandchildren with whom they are most likely to visit. This study therefore proposed to make a set of predictions based on the following:

**(iv) Visiting Relatives or Friends**

For visiting friends and relatives, there is a highly significant effect for age of grandchild,  $F(8,285) = 5.542$ ;  $p < 0.001$ , but no effect for sex of grandchild and no interaction. In the *post hoc* multiple comparisons neither the 0-4 nor the 9-12 year olds are significantly different from any other age group. The 5-8 year olds are highly significantly different from every other age group except the 0-4, 9-12 and, perhaps oddly, the 30-34 year olds. The 30-34 year olds in turn are not significantly different from any other age group.

Figure 7.11: Maternal grandmother visits relatives of friends with grandchild without grandchild's parents, according to sex and age of grandchild



The suggestions about the most likely ages for the constituent activities seem fairly well borne out by inspection of the graphs for each activity. The two activities which most clearly lean to the primary years are going to the park and playing indoor games. But these are also the two activities which appear to show the least discrimination

between the sexes of the grandchildren with whom they are carried out. One might therefore proceed to make a set of predictions based on the ANOVA results.

**PREDICTION 1** There will be no effect for sex of grandchild in addition to age for going to the park.

**PREDICTION 2** There will be an effect for sex of grandchild in addition to age for going shopping and on outings.

**PREDICTION 3** There will be no effect for sex of grandchild in addition to age for playing indoor games.

**PREDICTION 4** There will be an effect for sex of grandchild in addition to age for visiting friends or relatives.

Each prediction was tested, using a stepwise multiple regression with the individual activity as the dependent variable and the age and sex of the grandchild as the independent variables to be added in. Sex of grandchild was coded as 0 for grandson and 1 for granddaughter; age of grandchild in years was used for the age variable.

**PREDICTION 1** There is a highly significant correlation between going to the park and the age of the grandchild, ( $p < 0.001$  (1-tailed)). The age of the grandchild is the principal predictor for the activity but the sex of grandchild has significant additive power.

Table 7.19: Regression Coefficients for Dependent Variable: visit park with grandchild according to age and sex of grandchild (n = 307)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
		B	Std. Error	Beta			
1	(Constant)	3.216	.134		23.978	.000	
	Age of Grandchild	-7.075E-02	.008	-.458	-8.999	.000	.210
2	(Constant)	3.035	.159		19.074	.000	
	Age of Grandchild	-7.247E-02	.008	-.469	-9.217	.000	
	Grandchild sex	.370	.178	.106	2.080	.038	.221

The prediction is not supported.

**PREDICTION 2** There is a highly significant correlation between shopping and other outings and the age of the grandchild, ( $p < 0.001$  (1-tailed)). Both independent



variables are entered into the model, with the age of the grandchild having most predictive power for the behaviour and the sex of the grandchild having highly significant additive predictive power.

Table 7.20: Regression Coefficients for Dependent Variable: going shopping and on outings with grandchild according to age and sex of grandchild (n = 307)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	2.972	.146		20.418	.000	
	Age of Grandchild	-3.624E-02	.009	-.236	-4.246	.000	.056
2	(Constant)	2.679	.171		15.649	.000	
	Age of Grandchild	-3.904E-02	.008	-.254	-4.614	.000	
	Grandchild sex	-.601	.191	.173	3.138	.002	.085

The prediction is supported.

**PREDICTION 3** There is a highly significant correlation between playing indoor games and the age of the grandchild, ( $p < 0.001$  (1-tailed)). The model shows that only the age of the grandchild has predictive value for the behaviour; the sex of grandchild is excluded.

Table 7. 21: Regression Coefficients for Dependent Variable: Play indoor games and watch TV with grandchild according to age and sex of grandchild (n = 307)

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
Model		B	Std. Error	Beta			
1	(Constant)	4.362	.155		28.190	.000	
	Age of Grandchild	-7.885E-02	.009	-.446	-8.693	.000	.199

The prediction is supported.

**PREDICTION 4** There is a highly significant correlation between visiting relatives and age of grandchild, ( $p < 0.001$  (1-tailed)). The model shows that the age of the grandchild has highly significant predictive power for the activity and the sex of the grandchild has significant additive predictive power.

Table 7. 22: Regression Coefficients for Dependent Variable: visit relatives/friends with grandchild according to age and sex of grandchild (n = 306)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	r <sup>2</sup>
		B	Std. Error	Beta			
1	(Constant)	2.621	.135		19.374	.000	
	Age of Grandchild	-3.55E-02	.008	-.249	-4.475	.000	.062
2	(Constant)	2.436	.161		15.156	.000	
	Age of Grandchild	-3.370E-02	.008	-.261	-4.695	.000	
	Grandchild sex	.380	.180	.117	2.110	.036	.075

The prediction is supported.

Thus, in accordance with the greater tendency of women to keep in touch with female relatives, sex of grandchild is a predictor of frequency of visits to relatives in addition to age of grandchild. Sex of grandchild is also a predictor, in addition to age, of frequency of going shopping and on other outings. Unexpectedly, perhaps, sex of grandchild is also a predictor in addition to age of visits to the park, apparently due to a tendency to take out baby and toddler girls in preference to boys.

#### 7.5.5. ANALYSIS OF MATERNAL GRANDMOTHERS' INVESTMENT

##### (i) Care and Related Investment Activities

Our general conclusion about how sex and age of grandchild affect maternal grandmothers' investment in grandchildren, as measured by a suite of typical activities, must be that pre-school or primary school age (5-8 years of age more so than 0-4 and 9-12), regardless of the sex of the grandchild, are the primary predictors of activity investment in those activities that tend to overlap with childcare activities, that is visits to the park and indoor games. The pursuit of these activities in this manner is consistent with the proposition that maternal grandmothers behaving thus are acting in accordance with the predictions of the Grandmother Hypothesis, in that activities are carried out with young grandchildren of either sex, presumably to relieve daughters' time and energy budgets.

The fact that specific childcare is carried out by maternal grandmothers predominantly for the junior school age group (5-8 years) rather than the youngest age group of grandchildren (0-4) could be for a number of reasons: mothers prefer to care for babies and toddlers themselves and in many cases have given up work to do so,

returning only when children are old enough for school; working mothers prefer to have regular, professional care for their pre-school children; grandmothers themselves are reluctant to offer the amount of physical care required for babies and toddlers.

Insofar as the care index and the activity index represent two different types of investment in grandchildren, it appears that the levels of investment are higher in the activity index than in the care index: the peak age group is cared for on average at least once a year but not quite every six months, while sharing an activity with grandmother takes place at least every six months though not as often as every month. However, not unexpectedly, there is more variation between individual care elements than between the more social activities; for instance, a sick grandchild in the 5-8 age group is cared for once a year, whereas a grandchild of 0-4 or 5-8 years will be looked after in the daytime at least once a month. If we take the individual social/leisure activity with perhaps the greatest overlap with childcare, that is indoor games and watching TV, it records the highest score of any activity, at several times a month for the 5-8 year olds. The slope of the graph falls away after the primary years to once a year in adulthood, while going to the park plunges to a virtual flatline (not in the past year) after the age of 12. Indoor leisure activity is also without bias in relation to sex of grandchild, while going to the park is without sex bias from school age onward.

Thus care activities, taken together with certain other overlapping social and leisure activities, carried out for primary age children, particularly in the junior school age group, without regard to the sex of the grandchild, would appear to be the distinguishing features of grandmaternal help for reproducing daughters in accordance with the grandmother hypothesis. Although some activities have a social component, the predominant factor is the relief of the mother's time and energy burden through sharing some of the more costly activities required by primary school age children.

## **ii) Other Kinds of Investment Activity**

Almost by definition, then, the activities carried out by maternal grandmothers that do not follow these parameters in relation to age, sex of grandchild or type of activity are behaviours that are not in accordance with the grandmother hypothesis, as traditionally stated. They are investment activities of a clearly different character. But

in what respect are they different? One suggestion might be that the social element is paramount.

a) Visiting Friends and Relatives

Visiting friends and relatives is the most obviously social activity; there is still an age bias in favour of the 5-8 year olds, but the other two primary age groups are equalled in frequency by the 30-34 year olds, an intriguing blip, given the inevitable decline in going out visiting by grandmothers of such advanced years that they have grandchildren aged over 30. This is not an activity consistent with the conventional view of the grandmother hypothesis as a contribution to the maternal time and energy budget.

b) Outings

Shopping, going to the cinema, theatre, sports or other event, covers a number of different types of activity under the loose umbrella of outings. Some, like sports events, might have been assumed to be more the province of grandfathers and their grandsons; entertainments might have been expected to be neutral as to grandchild's sex, but following grandmothers' (as opposed to grandfathers') greater tendency to be more active with grandchildren.

c) Shopping

Shopping is a different kind of activity altogether. Is it functional, social, instructional, or a combination of all of these? We might expect it to be carried out by grandmothers preferentially with their granddaughters. But since it was not separated from the other constituent elements of the outings question, we have to cast a speculative look back at the ANOVA graph (*Figure 7. 9*). Firstly, there are two activity peaks, one in childhood, one in young adulthood. Secondly, although there is some grandchild sex difference in the primary years, there is a much clearer female sex bias in the years between 20 and 34. This would, I suggest, support the speculation that the first (primary) peak more or less represents the entertainment outings, the outdoor equivalent to the indoor games, and the second (young adult) peak represents shopping. Going shopping with young adult granddaughters is not an activity consistent with the conventional view of the grandmother hypothesis, in that there is no maternal time or energy burden to be alleviated.

Visiting friends and relatives is certainly a social activity that might be preferentially carried out with female relatives, but it is also one whose primary function, it could be argued, is to strengthen family bonds. Going shopping is more complex, involving social, practical and perhaps educational aspects. Both these activities, when carried out by grandmothers with adult granddaughters suggest an echo of mothers' activities with young adult daughters. We might refer to such behaviours as extended maternal investment.

#### d) Resources and Advice

We have also seen previously that in both resource provision and advice-giving grandmothers favour their daughters' offspring over their sons'. We should now examine these non-social types of investment to look at their age and sex of grandchild profiles.

Whereas 304 maternal grandmothers answered the questions whose responses were aggregated to compute the activity index, only 117 maternal grandmothers answered in the affirmative in relation to ever having given money to grandchildren's parents and were then questioned on frequency of the activity in the past year. Similarly only 119 maternal grandmothers answered in the affirmative to having ever given grandchildren money direct and were then questioned on frequency of the activity in the past year. Thus we can infer that only some 39% of active maternal grandmothers ever give money to grandchild's parents and a similar percentage to grandchild direct, (though not of course necessarily the same 39%). We could aggregate the two sets of variable scores to make a resource index but giving to parents and giving to grandchildren seem to me to be somewhat differently motivated activities. In relation to giving advice also, the figures show a certain grandmaternal reticence. Only 121 maternal grandmothers have ever given advice to their selected grandchild, (aged 4 years or over).

Factorial ANOVAs were performed with the responses, 'help with money to grandchild's parents', 'help with money direct to grandchild' and 'give advice to grandchild' as the three dependent variables; the independent variables in each case

were the sex and age group of grandchild (excluding 40+ years). The following results were obtained.

Table 7.23: Factorial ANOVAs of maternal grandmothers' help with money to parents or direct to grandchild, and advice to grandchild aged 4 years or over, according to sex and age group of grandchild (excluding grandchildren aged 40+)

Dependent variable	Independent variable	Df	N	F	Sig
Help with money to grandchild's parent	Grchsex	1	117	0.265	NS
	Grchage	8		3.541	0.001
	Grchsex* Grchage	8		0.882	NS
Help grandchild direct with money	Grchsex	1	119	0.430	NS
	Grchage	8		6.726	0.000
	Grchsex* Grchage	8		0.346	NS
Dependent variable	Independent variable	Df	N	F	Sig
Give advice to grandchild >=4	Grchsex	1	121	0.068	NS
	Grchage	8		1.643	NS
	Grchsex* Grchage	8		1.237	NS

In both the money situations there is a highly significant effect for age, there is no effect for sex of grandchild and no interaction between sex and age of grandchild. The age effects both show downward trends through the childhood to the adulthood of the grandchildren but the numbers of grandchildren in the older age groups are so few that it becomes problematic to draw conclusions from data points of older grandchildren. Broadly, one can conclude that provision of resources, though different in kind from care-giving, can be grouped with grandmaternal care activities as a functional contribution to grandmothering.

Giving advice, however, shows no significant effects; in other words, maternal grandmothers are as likely to offer advice to grandsons as granddaughters and to do so throughout the grandchild's life. Giving advice is an unusual investment element, in that it carries virtually no cost, either in time, energy or resources. For this reason one might have expected that it be dispensed equally by grandmothers of both lineages to the grandchildren with whom they had most contact. But, as we saw earlier, paternal grandmothers give less and maternal grandmothers give more advice to most contact

grandchildren than the equal amounts of advice they give to random grandchildren. In other words, giving advice is very much something a grandmother gives preferentially to her daughter's children. It is given regardless of grandchild's sex, so it looks like an activity that could be grouped with care. But it is given throughout grandchildren's lives, beyond the age appropriate to assisting mother with childcare, and in that respect looks more like an extended maternal investment behaviour. Perhaps we might term it a hybrid behaviour.

### **(iii) Grandchildren's Perspective**

Suppositions about the function of some behaviours maternal grandmothers carry out with adult children, like visiting relatives and going shopping or on outings, raise questions about the level of mutuality involved in the activities. Certainly one can imagine an adult grandchild taking an elderly grandmother on an outing rather than the other way round. But one has to ask why this mutuality tendency does not appear in, for example, indoor leisure activities. Why would it be more likely that an adult grandchild take grandmother to the cinema, rather than watch a video with her at home? The answer, I propose, is that the adult grandchild does neither. So if we confine the adult thrust of the outings variable to shopping, as I have suggested, could it not be that going out shopping is done at granddaughter's behest? The response must be that initiation of a behaviour by the recipient of the investment does not invalidate the investment nature of the activity any more than it would if adult daughters initiated the shopping trips they take with their mothers. On the contrary, the instigation of the activity may play a key role in grandmaternal as in maternal investment.

Although analyses so far have been confined to the grandparent sample of respondents, we can usefully at this point draw in some data from the adult grandchildren sample, not to compare grandmother and grandchild responses as such, since Dench and Ogg have made clear how much the generational perspectives differ, but to look at an additional factor in the grandchildren sample which is an apparently one-way behaviour without the element of mutuality potentially inherent in some other activities. In addition to being asked about visiting relatives, playing indoor games, and shopping and going on other outings together, adult grandchildren were also asked if they helped their grandparents with their shopping. Running one-way ANOVAs, with the four activities, indoor games, shopping and outings, visits to

relatives and helping with shopping, as the dependent variables and the sex of the grandchild's parent as the independent variable, and confining the analysis to granddaughters and grandmothers only, produced no significant differences between the scores for maternal and paternal grandmothers for any of the activities except helping with shopping,  $F(1,199) = 4.361$ ;  $p < 0.05$ . In other words, an adult granddaughter is significantly more likely to do the shopping for her mother's mother than for her father's mother. Thus, in spite of grandchildren's tendency in general not to report a matrilineal bias in grandmother-grandchild activities, shopping has a long-term, matrilineal function, as was discussed in detail in chapter 3.

#### **(iv) Effect of Numbers of Grandchildren**

One further factor, which bears on the question of whether grandmothers' investment behaviours are adaptive, is to link them with the number of grandchildren subjects have. We cannot reach any conclusions about their longer-term fitness, since their offspring, in most cases, have not yet completed their lifetime reproduction, but we can follow up the suggestion in Dench and Ogg that increasing numbers of grandchildren reduce the incidence of some behaviours. Carrying out a factorial ANOVA, with the matrilineal grandmaternal activity index as the dependent variable, and the age group of maternal grandmothers and the numbers in groups of grandchildren as the independent variables, shows no significant difference in activity index in relation to numbers of grandchildren, but there is a highly significant difference in relation to the age of the grandmother,  $F(8,272) = 8.729$ ;  $p < 0.001$ . Thus we can conclude that any decline in activities with increasing numbers of grandchildren is a function of the increasing age of the grandmother rather than of the increase in the numbers of grandchildren. Grandmaternal investment is an elastic resource that can expand in tandem with grandchildren's needs and continue as long as grandmothers are able to provide it.

### **7. 6. DISCUSSION**

We have the advantage in this chapter of being able to compare grandmaternal and grandpaternal attitudes and behaviour direct from their own responses, and this serves as a further check on subjects' reports in chapter 4 on their interactions with their mothers and fathers. The selection of one grandchild, either as random or 'most contact' gives an extra dimension to the analysis of grandparental relationships with



grandchildren. Whereas there is no difference between grandmothers and grandfathers in closeness, seeing and proximity of residence to grandchildren in general, there is a difference for both grandparents on these measures between the random and 'most contact' grandchildren. When we look at lineage (whether selected grandchild is the child of the respondent's son or daughter, then this has a significant effect on grandmothers' attitudes but not on grandfathers'. However, maternal grandmothers do not live nearer daughters' children than sons', though they do live closer to younger grandchildren.

In a series of grandparental investment behaviours, including activities of a specifically childcaring nature, such as taking the grandchild to and from school or mixed activities like indoor games and TV, which may cross over with baby-sitting, through social activities like going on outings or visiting relatives, to giving advice to grandchildren or giving cash to their parents, grandmothers consistently substantially favour the children of daughters, while grandfathers do not. These preferences are in part tied in with whether the grandchild was selected at random or is a 'most contact' choice. On a set of childcare measures put together to compute a care index, daughter's child is cared for more by grandmother than son's, whether selection is 'most contact' or random. But in a set of more general, socially oriented behaviours, computed to form an activity index, daughter's child is favoured more by grandmother only in the 'most contact' stream. This difference suggests specifically grandmotherly behaviour in the caring activities and a continuation of daughter-led maternal behaviour in the more complex, socially oriented activities.

In resource provision in the form of help with money for either grandchild or grandchild's parents, grandmothers again favour daughter or daughter's offspring, though significantly more is given to sons or sons' children in the random stream. One might suggest some kind of complementary resource investment is being made in sons' children, but grandmothers rather than grandfathers are making it. Where grandfathers do show some favour to sons' children, it is in giving them equal advice to that given to daughters' children in the 'most contact' stream.

While grandmothers clearly favour the children of daughters in most measures of grandparental investment, there is no second generation preference for granddaughters

rather than grandsons. Individual investment activities by maternal grandmothers, however, do show some limited grandchild sex bias. Maternal grandmothers prefer to take their baby granddaughters to the park as infants or toddlers, they take infant school-aged granddaughters to visit relatives and friends, in preference to grandsons, and they like to go shopping with their adult granddaughters. The stage when grandchildren are of primary school age, and especially infant school age, is the period of maximum activity with grandsons and granddaughters, whether the activity is some form of childcare, a social activity associated with childcare, like indoor games or TV watching in the evening, or a more overtly social activity like visiting friends or relatives. The differences between the ages of the grandchildren with whom the activities are carried out and whether there is a tendency to carry out the activity differentially with one sex of grandchild rather than the other, leads to an analysis of grandmaternal investment that seeks to break it down into specifically grandmaternal behaviour, an extension of maternal behaviour or behaviour that is a combination of both.

## CHAPTER 8

### CONCLUSION

#### 8. 1. INTRODUCTION

The objectives of this thesis, laid out in the introductory chapter, were to explore the function of the menopause by asking three questions:

1. Is the menopause an adaptation?
2. If so, what kind of environmental challenge brought about its evolution?
3. What are the evolutionary pressures, pervasive throughout the contemporary world, which maintain the menopause?

The introductory chapter marshalled evidence and argument to give an affirmative answer to the first question. In response to the second question, it proposed a hypothesis relating to a sudden and sharp expansion in both the volume and nature of maternal investment in offspring in our hominid ancestors. The third question was addressed in the remaining chapters of the thesis by examining in detail the nature of mothers' relationships with their offspring, viewed from the perspective of mothers towards their sons and daughters, of women towards their mothers and fathers, of step- compared to biological parents, and of grandparents.

#### 8. 2. MOTHERS AND CHILDREN

Mothers instinctively nurture both sexes of offspring equally. After all, they have certainty of maternity in both sons and daughters and the reproductive success of both is equally important to maternal fitness. In fact, it might even be argued that the greater variability of reproductive success in the male would make sons more likely to receive differential maternal investment, in line with the Trivers-Willard hypothesis that poor condition females will produce female offspring because females are generally less demanding and troublesome than males, but good condition females will produce male offspring because of their greater reproductive potential.

This study shows that affectively mothers are as close to sons as they are to daughters, when children are grown up mothers live on average no nearer to daughters than to

sons and are not more frequently in contact with daughters than they are with sons. In many activities of the kind that might be thought to typify parental investment, such as the giving of advice and loans or gifts of both small and large sums of money, there is no difference in the treatment of sons and of daughters. Leisure activities with children, where the benefits of the interactions, the pleasures of association at an enjoyable occasion, would be expected to be mutual, are not carried out differentially with sons and daughters.

But where a difference does appear, for instance when mothers go to stay with their children, (though not when children come to stay with mothers), then there is a pronounced differential in staying with daughters rather than sons and this differential is unaffected by whether sons and daughters have children or not. From one of the other behaviours that is differentially carried out with daughters, visiting friends and relatives together, one may gather some clue to the defining factors of mother/daughter interactions. Keeping in touch with relatives is known to be a particularly female trait; visiting friends together also helps to cement the bonds and develop the social skills which women are known to be adept at. Going on holiday together offers the opportunity for affiliative bonding, but it is hard to see how it provides greater social opportunities than leisure outings. So one is unable to formulate a simple rule that a behaviour is carried out significantly more with daughters if it is socially oriented. Other activities involve male/female division of labour. It is not unexpected, therefore, to find mothers helping daughters preferentially with their housework; such help offers economic (as well as perhaps instructional) benefits which ease the daughter's time and energy budget. Shopping is another division of labour activity, which encompasses affiliative, social, economic and instructional elements. It is not being suggested that economic or instructional exchanges are, of themselves, aspects solely of mother/daughter behaviour – advice and gifts or loans of money to sons and daughters non-differentially make that clear. What matters is not the nature of the maternal investment but whether the behaviour supporting it is one in which females specialise. One other factor emphasising this analysis is that both housework help (a minority activity) and shopping together (a majority activity) do not decline in frequency with subjects' age as sharply as do other activities, affiliative, social, economic and instructive. This suggests that the investment mother may make in daughter cannot be substituted from other sources,

partners, other relatives, friends, one's own offspring, nor just fade away with a reduction in need, as may other activities examined; which in turn supports the suggestion of a unique mother/daughter interaction. Most importantly, furthermore, this interaction begins before daughters ever have children and continues after their children are grown.

### 8.3. DAUGHTERS AND PARENTS

Some illumination is cast on the mother/daughter nexus by women's relationships with their own parents. Like their feelings towards sons, which are not substantially different from those towards daughters, subjects' affective attitudes towards fathers are not substantially different from their attitudes towards mothers; there is, though, a proviso: if subjects do express a closer connection with one parent rather than another, that parent is the mother, (just as where a closer connection to one child is expressed it is to a daughter rather than a son.)

Where parents live apart, subjects do not live closer to their mothers than their fathers, even if they are themselves parents (and thus their parents are grandparents). Subjects are in contact equally with both parents, but significantly more with their mothers if their parents live apart.

Activities are carried out with mothers significantly more than fathers, particularly when the subjects are young, though this is not an effect of salience arising from parents being alive against faded recollections of activities with dead parents, since although the 18-25 year-old subject age group scores highest, there is a fall for the 26-35 year olds before a rise again for the 36-45 year olds. Furthermore, recollected activities with deceased mothers score no less highly than those with living fathers. Nor is the parental status of the subject a significant factor in measuring investment activities with parents: there is no grandparental effect on women's general activities with their parents.

There is one activity, though, in which women might be particularly expected to rely on support from their mothers. It could be described as the division of labour activity *par excellence*, childbirth. 69% of respondents received moderate to substantial emotional or physical support from their mothers, at or around the time of childbirth,

compared to 54% from their fathers. Parental absence through death as well as estrangement was factored in here on the grounds that being alive is an essential requirement for being able to carry out the investment. (Excluding deceased parents, the percentages are closer at 78% for mothers and 69% for fathers.) Although fathers' support is significantly lower than mothers' in either case, it is still greater than in other activities in general or in any particular activity (the highest fathers' score was advice at 46%). This suggests that at this time especially fathers see the value in investment in daughters, motivated by the clear evidence of the contribution to their fitness of their daughters' reproduction. The ratio of fathers' to mothers' investment here (including deceased parents) is 78%. On more general, long-term investment measures, this study has concluded that, on frequency criteria, a father is worth 65% of a mother, falling to 60%, when costs are factored in. In other words, fathers are likely to bother most when the effort is least. Allowing for higher scores in perinatal support and emotional closeness, and an unknown element, relating to fathers' investment in sons, (but, from available evidence, not expected to make a substantial difference), fathers' parental investment contribution can reasonably be valued at around two thirds of mothers' in the UK today.

#### 8. 4. STEP-PARENTS

The effects of father absence have long been demonstrated through the work of Daly and Wilson, who have shown the deleterious effects that stepfathers can have in some families. The absence of mothers might be expected to have even more devastating effects and studies of traditional societies have established a substantial impact on infant mortality. But in the modern, post-industrial world, where the parameters are not life or death, but relative success or failure in competing for the advantages which will contribute through reproductive success to long-term fitness, by a number of measures relating to health and education, stepchildren have been shown to be disadvantaged.

Anne Case's American study, pertaining to food spending and nutrition, found that stepmothers discriminated against any non-related child in the family, while stepfathers discriminated only against foster children. The present study, using a British dataset, the Family Expenditure Survey, which does not distinguish adopted from biological offspring, reaches a somewhat different conclusion: taking household

income and family size into account, stepfathers do discriminate against stepchildren in food expenditure, but stepmothers do not, unless the age of the stepchild is taken into account, with discrimination being a function of the increasing age of the stepchild.

Although these results are the reverse in step-parent terms of those in the American study and therefore the reverse of what was expected in the attempt to replicate the study, they nonetheless support the contention expressed in Case's conclusions on health discrimination, that a single father makes no improvement to his children's well-being by taking a partner, while a single mother, in taking a partner, actually does worse for her children.

## 8. 5. GRANDPARENTS

Just as in the case of mothers and fathers, (regardless of their grandparental status), the behavioural differential persists between grandmothers and grandfathers. Clearly, grandmothering from this general perspective can, at least in part, be seen as an extension of maternal behaviour, which culminates in the birth of the first grandchild, the embodiment of the subject's longer-term fitness.

But insofar as grandmother's investment continues to be made preferentially in the children of daughters rather than those of sons, as is clear from a number of measures analysed in chapter 7, does it thereby constitute a more developed, specifically grandmaternal behaviour? Grandmothers have more contact with the children of daughters than with the children of sons, they take care of them more often, take them out or play with them indoors, they give daughters' children more advice than sons'; in general their activities with grandchildren peak in their primary school years and fall away thereafter. While the grandchild is young, grandmaternal behaviour in general tends to make no distinctions between grandsons and granddaughters, any more than maternal behaviour does between sons and daughters. Advice-giving makes no distinction between grandsons and granddaughters and carries on throughout their lives. But some grandmaternal activities with grandchildren do show sex differences at certain ages: for instance, grandmothers take their baby granddaughters to the park more often than their baby grandsons; and they take their infant school age granddaughters to visit friends and relatives more often than they do their infant

school age grandsons. Most strikingly, in that complex, division of labour activity, shopping, grandmothers show a preference for going shopping with granddaughters, especially in their adult years. The differential is evident from the 20-24 year-old age group of granddaughters on, so it is not a typical grandmother hypothesis activity, relieving the burden of hard-working mothers. But neither is it a great-grandmaternal effect, arising by extension from the grandmother hypothesis, since it is immaterial whether the granddaughter has children or not. More plausibly, it seems to be an extension of maternal investment, carried on into the next generation. And some light is thrown on the function of the activity by seeing that adult granddaughters, alone of all activities they carry out with and for their grandmothers, preferentially help their maternal grandmothers with their shopping, rather than their paternal grandmothers.

Of course, the level of mutual benefit in a shared activity does not necessarily solve the problem of who is the prime instigator of that activity. The answer to the question *cui bono?* may be instructive, but evolutionary biology is full of conflicting interests, especially in familial relationships, that are ultimately resolved in net fitness terms. A granddaughter would appear to draw no fitness benefit from helping her maternal grandmother to shop, but nonetheless be the instigator of the activity. If shopping is more than a simple subsistence activity (and for women, at least, it does seem to be), then other, perhaps less tangible benefits may accrue to granddaughters, in affiliative, social and instructional terms, beyond the economic.

## 8. 6. SUMMARY

Proponents of the grandmother hypothesis make it clear that it is the time and energy-challenged mothers of young children who requires grandmaternal investment, to their mutual benefit in fitness terms (“what increases my daughter’s fitness, increases mine”). But the father of children also has a fitness interest in his spouse’s time and energy budget and, as we have seen in chapter 5, his failure to give support, even at the two-thirds input level of fathers, may have a deleterious effect on the fitness prospects of deserted offspring and therefore on his own. But fathers’ discounted investment in current offspring is offset against the potential of future investment in new offspring elsewhere. Mothers have no such choice. Their much greater investment in reproduction and nurture and the lower variability of their reproductive success ensures their greater investment in offspring.



But the investment differential towards daughters is not just a function of a certainty of paternity discount against sons (estimated at between 5-10% by Russell and Wells (1987)). Nor is it driven simply by a preference for the social company of members of the same sex (though this may form an element of the differential). A fine judgment must be exercised to achieve the right balance of investment in sons to maximise their reproductive success. But just as investment by fathers is discounted in relation to investment by mothers, then equally, investment in sons must be discounted in relation to investment in daughters, since daughters are future mothers and sons are future fathers. Daughters will, like their mothers, build upon the physical exigencies of pregnancy, gestation, lactation and infant care, expressed even-handedly towards sons and daughters, with a correspondingly greater investment in offsprings' later childhood and adolescence, when daughter/son differentials emerge, and on into adulthood. In other words, mothers invest more in their daughters as they mature because their daughters will in turn invest more in *their* children than their sons will, and this investment will over time be made preferentially in *their* daughters, who will in turn similarly invest more than their brothers – and so on over time -- a rolling differential of investment, directly down the matriline.

In contrast, investment in sons must be discounted to a degree and in sons' sons further so, in these modern post-industrial societies in which marital breakdown and serial monogamy may lead to impaired contact with sons' offspring, a tendency which may extend into the next generation, and so on. This is not to say that the same rule holds good in all societies. In those where claustration and other restrictions on women's mating opportunities occur, and where polygynous systems may obtain, the mother-in law can be the key investor, watching and directing her daughter-in-law in the interests of her sons' reproductive success.

The objectives of mothers and daughters do not entirely overlap, of course: mothers have other children who also make demands, in accordance with the Trivers parent-offspring conflict hypothesis (1974). Perhaps those other children will be daughters, in a refinement of the hypothesis. But while sons will preferentially seek investment from the 100% rather than the 67% parent, they and their mothers also know that they

will ultimately pursue a different reproductive strategy from their sisters, a strategy like that of their fathers.

Of course, in modern, post-industrial societies, the two-thirds father makes an important contribution to both sexes of offspring, far more than the maternal grandmother. He helps make it possible to equip sons and daughters not just socially and educationally, but materially also, for the complex world in which they must compete to construct a life that leads to fully realised reproductive success. But in the past, at whatever point the menopause evolved, we do not know how salient fathers were in social groups or what system of mating obtained; nor do we know what the survivability of grandmothers was. Whatever the major environmental challenge that presented itself, in the final analysis mothers must have had to rely, as they do now, on themselves. The likelihood of evolving a potentially deleterious trait to benefit another individual is extremely remote unless the benefits of the fitness return unequivocally outweigh the costs. It makes no logical sense to suggest that older females would have ceased reproducing to benefit their offsprings' infants, possessed only of reproductive *potential*, when they themselves could have gone on producing further offspring with reproductive potential, whose relatedness to them was .5 rather than .25. They can only have ceased reproduction to benefit their daughters if that benefit was the realisation of their daughters' reproductive success – the value of *RS* is greater than that of *RP*. If it benefitted mothers to cease reproduction in order to assist their daughters to reproductive success, then it was a maternal strategy. If those daughters went on to successful reproduction, then immediately thereafter a grandmaternal strategy would have operated in support of a maternal strategy.

As it happens, women in the UK today do help their daughters with children more when those children are young and making extensive demands on the time and energy of their mothers. But women are not supporting daughters with children preferentially over daughters without and women's investment in their adult daughters is greater before those daughters have children.

The concept of the matrilineal character of much maternal investment (and thence grandmaternal investment) emerges from the analysis of the data gathered for this thesis as a phenomenon separable from any social preference mothers might have for their daughters.

The conclusion of the thesis is that, in this society at least, the menopause is maintained by the force of its function in maximising maternal investment first and grandmaternal investment second, but driven by the maternal potential within every daughter.

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**WOMEN AND THEIR FAMILIES**

This survey is aimed at discovering the differing strengths and characters of certain of the family relationships that women have, how they get on with children and parents, what activities they get involved in together. The questionnaire is designed to give an overall picture of these relationships.

Not all questions may be relevant to you, for instance questions about children or grandchildren. Please just answer the questions that do apply to you, including biographical details. The questionnaire is anonymous and the information derived from your answers will be held in an anonymous database. If you are answering by email, please check boxes with an X instead of a tick.

Thank you for your co-operation.

**CHILDREN**

**A/ UPBRINGING OF CHILDREN**

*(Please answer even if you are childless)*

*Tick one box against one statement only*

- Q1 a) Bringing up sons is generally harder than daughters
- b) Bringing up daughters is generally harder than sons
- c) Both sexes are equally difficult/easy to bring up
- d) Difficulty/ease of upbringing depends on individual child

Agree a lot	Agree a bit	Not sure

IF YOU HAVE NO CHILDREN AND NO GRANDCHILDREN PLEASE GO TO SECTION J/ (page 4)

IF YOU HAVE NO CHILDREN LIVING BUT DO HAVE GRANDCHILDREN PLEASE GO TO SECTION G/ (page 3)

OTHERWISE, PLEASE ANSWER ALL QUESTIONS IN SECTIONS B,C,D,E & F APPROPRIATE TO THE SEX OF YOUR CHILD(REN)

**B/ ATTITUDES TO CHILDREN**

- Q2 a) I feel closer to my son(s) than to my daughter(s)
- b) I feel closer to my daughter(s) than to my son(s)
- c) I feel equally close to both sons and daughters

*Tick one box only*

Agree a lot	Agree a bit	Not sure

- Q3 a) My son(s) is/are closer to me than to his/their father
- b) My son(s) is/are closer to his/their father than to me
- c) My son(s) is/are equally close to both of us
- d) Father is deceased/never acknowledged

*Tick one box only*

Agree a lot	Agree a bit	Not sure

*Tick if applies*

- Q4 a) My daughter(s) is/are closer to me than to father
- b) My daughter(s) is/are closer to father than to me
- c) My daughter(s) is/are equally close to both of us
- d) Father is deceased/ never acknowledged

*Tick one box only*

Agree a lot	Agree a bit	Not sure

*Tick if applies*

**C/ RELATIONSHIPS WITH PARTICULAR CHILDREN**

- Q5 I have a special relationship with ...
- a) my son/one of my sons
  - b) all of my sons
  - c) my daughter/one of my daughters
  - d) all of my daughters
  - e) none of my children in particular
  - f) all of my children in their own way
  - g) my son/daughter is an only child

Tick one answer. [If answer a) or c) also give birth order

		eg 1st]

**D/ PROXIMITY TO CHILDREN**

- Q6 My son lives...
- a) less than 15 minutes away from me
  - b) 15 minutes to 1 hour away
  - c) 1-5 hours away
  - d) 6-10 hours away
  - e) more than 10 hours away
  - f) at home (at least part of the time)

Tick one box per son

1st son	2nd son	3rd son	4th son

- Q7 My daughter lives ...
- a) less than 15 minutes away from me
  - b) 15 minutes to 1 hour away
  - c) 1-5 hours away
  - d) 6-10 hours away
  - e) more than 10 hours away
  - f) at home (at least part of the time)

Tick one box per daughter

1st d'ter	2nd d'ter	3rd d'ter	4th d'ter

**E/ CONTACT BY VISIT, TELEPHONE, LETTER, E-MAIL WITH CHILDREN NOT RESIDENT**

(Only answer for children who do not live at home any part of the time)

- Q8 I am in contact with my son ...
- a) at least once a week
  - b) at least once a month
  - c) at least once a year
  - d) less than once a year

Tick one box per son

1st son	2nd son	3rd son	4th son

- Q9 I am in contact with my daughter ...
- a) at least once a week
  - b) at least once a month
  - c) at least once a year
  - d) less than once a year

Tick one box per daughter

1st d'ter	2nd d'ter	3rd d'ter	4th d'ter

- Q10 a) My son stays regularly with me  
 b) I stay regularly with my son  
 c) Neither of us stays regularly with the other

Tick which apply for each son

1st son	2nd son	3rd son	4th son



*Tick which apply for each daughter*

- Q11 a) My daughter stays regularly with me  
 b) I stay regularly with my daughter  
 c) Neither of us stays regularly with the other

1st d'ter	2nd d'ter	3rd d'ter	4th d'ter

**F/ REGULAR/OCCASIONAL ACTIVITIES WITH CHILDREN**

*Tick which apply for each son*

- Q12 With respect to my son, from time to time ...  
 a) I give advice to him  
 b) I go shopping with him  
 c) I go on holiday with him  
 d) I visit friends /relatives with him  
 e) I go out with him on leisure activities  
 f) I help him with housework  
 g) I lend/give him small sums of money  
 h) I lend/give him large sums of money

1st son	2nd son	3rd son	4th son

*Tick which apply for each daughter*

- Q13 With respect to my daughter, from time to time  
 a) I give advice to her  
 b) I go shopping with her  
 c) I go on holiday with her  
 d) I visit friends/relatives with her  
 e) I go out with her on leisure activities  
 f) I help her with housework  
 g) I lend/give her small sums of money  
 h) I lend/give her large sums of money

1st d'ter	2nd d'ter	3rd d'ter	4th d'ter

**GRANDCHILDREN**

IF YOU HAVE NO GRANDCHILDREN PLEASE GO TO SECTION II (next page)  
 OTHERWISE, PLEASE ANSWER ALL QUESTIONS IN SECTIONS G & H APPROPRIATE TO THE SEX OF YOUR CHILD(REN)

**G/ CONTACT BY VISIT, TELEPHONE, LETTER, E-MAIL ETC WITH GRANDCHILDREN**

*Tick one box per son*

- Q14 I have contact with my son's child(ren) ...  
 a) at least weekly  
 b) at least monthly  
 c) at least yearly  
 d) hardly ever  
 e) never  
 f) ... live(s) in the same house as me

1st son	2nd son	3rd son	4th son

*Tick one box per daughter*

- Q15 I have contact with my daughter's child(ren) ...  
 a) at least weekly  
 b) at least monthly  
 c) at least yearly  
 d) hardly ever  
 e) never  
 f) ... live(s) in the same house as me

1st d'ter	2nd d'ter	3rd d'ter	4th d'ter

**H/ CHILDCARE ASSISTANCE (BABYSITTING, TAKING TO/FROM SCHOOL, ANY OTHER KIND OF MINDING) OF GRANDCHILDREN**

*Tick one box per son*

Q16	I help my son with childcare ...	1st son	2nd son	3rd son	4th son
a)	at least weekly				
b)	at least monthly				
c)	now and again				
d)	rarely				
e)	never				

*Tick one box per daughter*

Q17	I help my daughter with childcare ...	1st d'ter	2nd d'ter	3rd d'ter	4th d'ter
a)	at least weekly				
b)	at least monthly				
c)	now and again				
d)	rarely				
e)	never				

**PARENTS**

**I/ ASSISTANCE OF PARENTS WITH OWN CHILD(REN) AROUND THE TIME OF BIRTH**

IF YOU HAVE NO CHILDREN PLEASE GO TO SECTION J/

*Tick one box per parent*

Q18	When I had my child(ren) parental support was ...	Mother	Father
a)	very important		
b)	quite important		
c)	not important		
d)	not available (parent estranged)		
e)	not possible (parent deceased)		

*Tick which apply for each parent*

Q19	When I had my child(ren) either parent ...	Mother	Father
a)	dropped in often		
b)	came to stay		
c)	kept in touch		
d)	was not involved		
e)	was not alive		

**J/ PROXIMITY TO MOTHER & FATHER**

IF MOTHER AND FATHER BOTH DECEASED PLEASE GO TO SECTION L/ (next page)

IF BOTH PARENTS ARE ALIVE AND LIVE TOGETHER PLEASE ANSWER Q22 & OMIT Q23

IF PARENTS LIVE APART OR EITHER PARENT DECEASED PLEASE OMIT Q22 & ANSWER Q 23

*Tick one box*

Q22	My mother and father live ...
a)	less than 15 minutes away from me
b)	15 minutes to 1 hour away
c)	1 to 5 hours away
d)	6-10 hours away
e)	more than 10 hours away
f)	in the same house as me

- Q23** Either parent lives ...
- a) less than 15 minutes away from me
  - b) 15 minutes to 1 hour away
  - c) 1 to 5 hours away
  - d) 6-10 hours away
  - e) more than 10 hours away
  - f) in the same house as me

*Tick one box per parent living*

Mother	Father

**K/ CONTACT BY VISIT, TELEPHONE, LETTER, E-MAIL WITH PARENTS NOT RESIDENT**  
*(Only answer if parents do not live in same house as you)*

- Q24** I am in contact with either parent ...
- a) at least once a week
  - b) at least once a month
  - c) several times a year
  - d) rarely
  - e) never

*Tick one box per parent*

Mother	Father

*Tick which apply for each parent*

- Q25** a) My mother/father stays regularly with me  
 b) I stay regularly with my mother/father  
 c) Neither of us stays regularly with the other

Mother	Father

**L/ REGULAR/OCCASIONAL ACTIVITIES WITH PARENTS LIVING AND DECEASED**

- Q26** My parents do now/used to ...
- a) give me advice
  - b) go shopping with me
  - c) go on holiday with me
  - d) visit friends/relatives with me
  - e) go out with me on leisure activities
  - f) help me with work around house/garden
  - g) lend/give me small sums of money
  - h) lend/give me large sums of money

*Tick which apply for each parent*

Mother	Father

**M/ ATTITUDES TO MOTHER AND FATHER**

- Q27** a) I am/was closer to my father than my mother  
 b) I am/was closer to my mother than my father  
 c) I am/was equally close to both my parents  
 d) I am/was not close to either of my parents

*Tick one box against one answer only*

Agree a lot	Agree a bit	Not sure

- Q28** a) I get/got on better with my father than my mother  
 b) I get/got on better with my mother than my father  
 c) I get/got on equally well with both my parents  
 d) I do/did not get on well with either of my parents

*Tick one box against one answer only*

Agree a lot	Agree a bit	Not sure

Tick one box against one answer only

- Q29 a) I feel/felt a special bond with my father  
 b) I feel/felt a special bond with my mother  
 c) I feel/felt a special bond with both my parents  
 d) I feel/felt no special bond with either of my parents

Agree a lot	Agree a bit	Not sure

Tick one box against one answer only

- Q30 a) I've learnt a lot about life from my mother in particular  
 b) I've learnt a lot about life from my father in particular  
 c) I've learnt a lot about life from both my parents  
 d) I've not learnt much about life from either of my parents

Agree a lot	Agree a bit	Not sure

**N/ BIOGRAPHICAL DETAILS**

AGE	18-25		26-35		36-45	
	46-55		56-65		66+	

Tick box

MARITAL STATUS	Married		Cohabit		Single	
	Div/Sep		Widow			

Tick which apply

CHILDREN	Yes		Tick box	If Yes	Sons		Daughters		Number
	No								

Of whom -	Sons -	Number		Ages		D'ghters-	Number		Ages
	Adopted					Adopted			
	Step					Step			
	Foster					Foster			

EMPLOY- MENT	Full-time		Pt-time		Retired		Student	
	None							

Tick box

GRAND- CHILDREN	Yes		Tick box	If Yes	Children of Sons		Children of D'ghters		Number
	No								

SIBLINGS	Yes		Tick box	If Yes	Brothers		Sisters		Number
	No								

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THANK YOU FOR YOUR HELP

Information from this questionnaire will be treated confidentially and held in an anonymous format in an electronic database

## *Appendix B*

### PROTOCOL FOR CODING WOMEN AND THEIR FAMILIES QUESTIONNAIRES

- Q1** a) and b) are mutually exclusive; if both checked, choose strongest response; if equal responses, check c). If a), b) and c) checked, select c); if either a) or b) checked + d) at 3 or 2 strength, code both; if both c) and d) checked, log both, unless one of responses is "not sure", which ignore. If both "not sure" log both
- Q2** Answers mutually exclusive; if multiple answer given, choose strongest response score. If a) and b) equal, choose c).
- Q3** Again a) to c) mutually exclusive, so as Q2; if d) checked, no code; furthermore, if option chosen which conflicts with known widowhood, no code .
- Q4** As Q3.
- Q5** Where respondent has children of 1 sex only and therefore checks b) or d), recode as f) since seeking distinction between sons and daughters.
- Q8** If child resident at home, code -5 [not applicable] for child under 18 and 5 for children 18+.
- Q9** As Q8.
- Q10** If left blank, code -5 if child is resident at home or -9 [user missing] if 0 is not a reasonable assumption (eg when child lives less than 15 mins away.)
- Q11** As Q11.
- Q12** If preceding proximity and contact questions answered then score all 0s if no box checked. If young children, <11, code -5
- Q13** As Q12.
- Q16** Allow e) if any grandchild  $\leq 14$ ; otherwise code -5 even if a score given, if children older.
- Q17** As Q16.
- Q18** If neither parent has any box checked , code user missing. If one checked and the other not, code user missing for unchecked one. If one parent checked in one but not the other of Q18 & 19, code unchecked user missing, unless given dead in one in which case extrapolate to the other.
- Q19** Same provisos as Q18. In addition this questions allows possibility of more than one response. "Kept in touch" is considered to be subsumed under responses a) or b), but if both a) and b) are checked, score 5.

Q24 As Q8

Q25 as Q10

Q26 If both columns blank, score 0s if Q18 & 19 and/or Qs27-30 have been answered substantially. (If only one column blank, score zeroes.) Otherwise, if both blank, code user missing.

Q27 Answers a) to c) are mutually exclusive: code strongest response. If a) and b) are at same level, code c); if a), b) and c) are at same level, code c); if a) or b) at same level as c), code a) or b). But d) can co-exist with a) or b).

Q28 As for Q27.

Q29 Code a) and/or b) or c) or d) – ie can have either a) or b), or a) and b) together, but not with c) or d). But if a) and b) equal, select c).

Q30 Choose strongest response of a) or b); if a) & b) checked equally, score c) – but can have a) or b) + c) at different response levels.

## BIOGRAPHICAL DETAILS

**AGE** Introduce new code of 7 where there are children in their 50s

**CHILDREN** Include biological, adopted (and step where respondent includes them) children in children – yes/no – and numbers—sons & daughters; then split into biological and non-biological for ages.

**EMPLOYMENT** If left blank, code 0 (except where age and other omissions indicate that -9 more suitable).

**GRAND-CHILDREN** If left blank code 0, (unless respondent single). If children too young to have own children, ie under 18, code -5. Give ages in years, rounded to nearest year.

**SIBLINGS** If left blank code -9. Omit ages because of mortality level of older respondents' sibs.

**OVERALL** If an answer has been omitted and the question is not one where a reasonable assumption may be made, code value-missing (-9).

## QUESTIONS ASKED IN GRANDPARENTING MODULE OF 1998 BRITISH SOCIAL ATTITUDES SURVEY<sup>1</sup>

- [190-5] Can I ask you, which of these types of relatives do you have alive at the moment? Please include adoptive and step-relatives:  
Son(s)/Daughter(s)  
Parent(s)  
Grandparent(s)  
Grandchild(ren)  
Great-grandparent(s)  
Great-grandchild(ren)
- [196] (For all with children but not grandparents or grandchildren) Can I just check how many of your child(ren), if any, are currently living in your household for at least two nights per week?
- [197] (If any) And do/does your child(ren) who live in your household have any grandparents alive at the moment?

### (For all with grandchild) GROUP A

(How much do you agree or disagree with the following statements about your grandchildren?) [198-201]

- [198] My grandchildren are a very rewarding part of my life
- [199] Now my own children have grown up I want a life that is free from too many family duties
- [200] I have often put myself out to help look after my grandchildren
- [201] To help look after my grandchildren, I have had to cut down or give up my work
- [202] How many grandchildren do you have, including step-grandchildren?
- [203] (*For odd serial numbers only*)  
Is there one grandchild you have more contact with nowadays than the others?
- [204] (*If no*) Isn't there one grandchild you have a little more contact with nowadays than the other(s)?
- [205] (*For even serial numbers only*)  
I'd like to ask some questions about just one of your grandchildren. If you tell me their first names, then I can pick just one to ask about.  
(*For all with grandchild*)
- [228] Is (name of selected grandchild) your granddaughter, your grandson, your step-granddaughter or your step-grandson?
- [229] Is (name of selected grandchild) your daughter's child your son's child, your daughter's step-child, your son's step-child, your step-daughter's child or your step-son's child?
- [230] How old was ... last birthday? [231] or about how old...?
- [232] Have you had any contact at all with him/her in the last two years?
- [233] (*If no*) Can I ask how long is it since you last had any contact with ....?
- [234] Some people would say they feel 'close' to their grandchildren. Others would say they do not feel particularly 'close'. What about you? Would you say you feel very close to ..., fairly close, not very close, or, not close at all?
- [235] Does ...'s mother have a paid job at the moment?
- [236] Who does ... live with at the moment?

<sup>1</sup> For full wording of questionnaire schedule, and percentage frequencies of all answers, see BSA98 report – Jowell et al, 1999, appendix III.

- [237] May I just check, does ... live in the same household as you?
- [238] How often do you see ...?
- [239] About how long would it take you to get to where ... lives?
- [240] How often do you have contact with him/her by telephone?
- [241] And how often **in the past year** has .. spent time during the day with you, **without** his/her parents?
- [242] And how often **in the past year** has ... stayed with you overnight, **without** his/her parents?
- [243] (Using this prompt card) please say how often, if at all, **in the past year**, you have given a present to, or received one from ...?
- [244] And how often, if at all, **in the past year** have you and .... gone to a park or playground together without his/her parents?
- [245] (ditto)... gone out shopping, to the cinema, theatre, sports or other event together ....
- [246] (ditto) .. played indoor board or card games, or watched television or video together ...
- [247] (ditto)...gone to visit relatives or friends together...
- [248] (ditto)...gone away at weekends or for holidays...
- [249] (ditto)...gone away at weekends or for holidays **with** his/her parents?  
(Where selected grandchild aged 12 or under)
- How often, if at all, in the past year have you done any of the following things for ....; including things to help your daughter or son?
- [250] ... helped with baby-sitting or child-care **during the day**?
- [251] ... helped with baby-sitting or child-care **in the evenings**?
- [252] ... taken ... to, or collected him/her from, nursery, play-group or school?
- [253] ... cared for ... in the home, during an illness or after an accident?
- [254] (Where selected grandchild over 12) How often, if at all, **in the past year** have you cared for ... during an illness or after an accident?
- [255] At the moment, are you **yourself** providing **long-term** care for anyone which takes up a lot of your time? [256 - & who for]
- [257] Have you **ever** helped out ...'s parent(s) with **money** for ..., or not?
- [258] **In the past year**, have you helped out ...'s parents with money for ...?
- [259] Have you **ever directly** helped out ... with money, or with regular pocket money, or not?
- [260] **In the past year**, have you helped out ... **directly** with money?
- [261] (Where grandchild 4 or more) Some grandchildren, as they grow older, may need **advice** on things. Have you **ever** given ... this sort of **advice**, or not?
- [262] **In the past year**, have you given ... this sort of advice?
- [263] May I just check, are both ...'s **own** parents still living?
- [264] And are ...'s parents – together, separated, or divorced?
- [265] (If not together) How long ago was the (separation/divorce)?
- [266] (If GC father dead) How long ago did ...'s father die?
- [267] (If GC mother dead) How long ago did ...'s mother die?  
(If GCs parents not together) At the time of the (death/breakup)...
- [268] Did ... stay with you for some of the time?
- [269] Did you have **more** contact with ...? ,
- [270] Did you have **less** contact with...?
- [271] Did it become more difficult to keep in contact with ...?
- [272] Were you not allowed to see ...?
- [273] Grandparents and parents do not always agree on how best to bring up children. Please say which applies to you and ...'s parents about :-  
We have agreed about almost everything  
We have agreed more often than not  
We have **disagreed** more often than not  
We have **disagreed** about almost everything  
Upbringing has not really been discussed



- [274] (*Where selected grandchild under 16*) When important decisions are being made that affect ..., **nowadays**, do you usually have a big say, some say, not a very big say, or no say at all?
- [275] (*Where selected grandchild 16 or over*) When important decisions were being made that affected ..., when he/she was younger did you feel you usually had a big say, *etc* ?

**(For all with grandparents) GROUP B**

(How much do you agree or disagree with the following statements about your grandparents?) [276-279]

- [276] My grandparents are an important part of my life
- [277] I wouldn't see my grandparents as often as I do if I didn't have to
- [278] My grandparents are not very interested in my life
- [279] I don't see as much of my grandparents as they would like
- [280] How many grandparents do you have alive, including step-grandparents?
- [281] (*For odd serial numbers only*)  
Is there one grandparent you have more contact with nowadays than the others?
- [282] (If no) Isn't there one grandparent you have a little more contact with nowadays than the other(s)?
- [283] (*For even serial numbers only*)  
I'd like to ask some questions about just one of your grandparents. If you tell me their first names if you know what they are or, if not, what you call each of them, then I can pick just one to ask about.  
(*For all with grandparent*)
- [297] Is (name of selected grandparent) your grandmother, your grandfather, your step-grandmother or your step-grandfather?
- [298] Is (name of selected grandparent) your mother's parent, your father's parent, your mother's step-parent, your father's step-parent, your step-mother's parent or your step-father's parent?
- [299] How old was ... last birthday? [300] or **about** how old?
- [301] Have you had any contact **at all** with him/her in the last two years?
- [302] (If no) About how long is it since you last had any contact with ...?
- [303] Some people would say they feel 'close' to their grandparents. Others would say they do not feel particularly 'close'. What about you? Would you say you feel very close to (grandparent) etc as [234]
- [304] May I check, does ... live in the same household as you?
- [305] How often do you see ...?
- [306] About how long would it take you to get to where ... lives?
- [307] How often do you have any contact with him/her **by telephone**?
- [308] And how often **in the past year** have you spent time during the day with ... without your parents?
- [309] And how often **in the past year** have you stayed with ... overnight, **without** your parents?
- [310] (Using this prompt card) please say how often, if at all **in the past year**, you have given a present to, or received one from, ...?
- [311] And how often, if at all, **in the past year**, have you and ... gone out shopping, to the cinema, theatre, sports or other event together?
- [312] (ditto) .. played indoor board or card games, or watched television or a video together?
- [313] (ditto) .. gone to visit relatives or friends together?
- [314] (ditto) .. gone away at weekends or for holidays **without** your parents?
- [315] (ditto) .. gone away at weekends or for holidays **with** your parents?  
How often, if at all, in the past year have you done any of the following things for ... without your mother or father, but including things done to help your mother or father?
- [316] .. helped ... with the shopping?
- [317] .. helped ... with household jobs, like cooking, washing or repairs, or with gardening?

- [318] .. taken ... to, or collected him/her from, places he/she needed to go?
- [319] .. cared for ... in the home, during an illness or after an accident?
- [320] At the moment, are you yourself providing long-term care for anyone which takes up a lot of your time? [321] .. & who for?
- [322] Has ... ever directly helped you out with **money** or with regular pocket-money, or not?
- [323] **In the past year**, has ... helped you out directly with money?
- [324] Some grandchildren as they grow older, may need advice on things. Has ... ever given you this sort of **advice**, or not?
- [325] **In the past year**, has ... given you this sort of advice?
- [326] May I just check, are both your own parents still living?
- [327] And are your own parents together, separated or divorced?
- [328] (*If not together*) How long ago was the (separation/divorce)
- [329] (*If father dead*) How long ago did your father die?
- [330] (*If mother dead*) How long ago did your mother die?
- (*If parents not together*) At the time of the (death/breakup)...
- [331] Did you stay with ... for some of the time?
- [332] Did you have **more** contact with ...?
- [333] Did you have **less** contact with ...?
- [334] Did it become more difficult for you to keep in contact with ...?
- [335] Were you not allowed to see ...?
- [336] Parents and grandparents do not always agree on how best to bring up grandchildren. Please say which applies to ... and your parents:-  
 They have always agreed about almost everything  
 They have agreed more often than not  
 They have disagreed more often than not  
 They have disagreed about almost everything  
 Upbringing has not really been discussed

(For all without grandchildren/grandparents, but with child(ren) with grandparent(s))

**GROUP C**

([338-369] = Questions for selecting particular child and grandparent)

- [370] Is ... (selected grandparent) ...'s (selected child) grandmother, his/her grandfather, his/her step-grandmother or his/her step-grandfather?
- [371] Is he/her on ...'s mother's side, or his/her father's side?
- [372] How old was ... last birthday? [373] or about how old?
- [374] Has ... had any contact **at all** with ... in the last two years?
- [375] (*If no*) About how long is it since ... had any contact with ...?
- [376] Some grandchildren and grandparents would say they feel 'close'. Others would say they do not feel particularly 'close'. What about ... and ...? Would you say that they feel very close to each other, fairly close, not very close, or, not close at all?
- [377] Does ...'s mother ('Do you?' if female) have a paid job at the moment?
- [378] Who does (child) live with at the moment? (Both parents or one ...)
- [379] May I check, does (grandparent) live in the same household as you and (child)
- [380] How often does (child) see (grandparent)?
- [381] About how long would it take (child) to get where (grandparent) lives?
- [382] How often does (child) have any contact with (grandparent) by telephone?
- [383] And how often **in the past year** has (child) spent time during the day with (grandparent) without his/her parents?
- [384] And how often in the past year has (child) stayed with (grandparent) overnight, without his/her parents?
- [385] (Using this prompt card) please say how often, if at all, **in the past year**, (child) has given a present to, or received one from, (grandparent)?

- [386] And how often, if at all, in the past year, have ... and ... gone out shopping, to the cinema, theatre, sports or other event together without his/her parents?
- [387] (ditto) .. played indoor board or card games, or watched television or a video together without his/her parents?
- [388] (ditto) .. gone to visit relatives or friends together without his/her parents?
- [389] (ditto) .. gone away at weekends or for holidays together without his/her parents?
- [390] (ditto) .. gone away at weekends or for holidays together **with** his/her parents?  
How often, if at all, **in the past year** has (child) done any of the following things for (grandparent) without his/her mother or father, but **including** things done to help his/her mother or father?
- [391] .. helped ... with the shopping?
- [392] .. helped ... with household jobs, like cooking, washing or repairs, or with gardening?
- [393] .. taken ... to, or collected him/her from, places he/she needed to go?
- [394] .. cared for ... in the home, during an illness or after an accident?  
(Where selected child aged 12 or under)  
How often, if at all, in the past year has (grandparent) done any of the following things for (child) including things to help (child's) parents?
- [395] ... helped with baby-sitting or child-care **during the day**?
- [396] ... helped with baby-sitting or child-care **in the evenings**?
- [397] ... taken ... to, or collected him/her from, nursery, play-group or school?
- [398] ... cared for ... in the home, during an illness or after an accident?
- [399] (Where selected grandchild over 12) How often, if at all, **in the past year** has (grandparent) cared for (child) during an illness or after an accident?
- [400] At the moment, is (grandparent) providing long-term care for anyone, that takes up a lot of his/her time? [401 & who for]
- [402] Has (grandparent) **ever** helped you out with **money** for (child) or not?
- [403] In the past year, has (grandparent) helped you out with money for (child) ?
- [404] As far as you know, has (grandparent) ever directly helped (child) out with money, or with regular pocket money, or not?
- [405] In the past year, as far as you know, has (grandparent) helped (child) out directly with money?
- [406] Are you and (child's other parent) together, separated or divorced?
- [407] (If not together) How long ago was the (separation/divorce)?
- [408] (If widowed) How long ago did your (husband/wife/partner) die?  
(If parents not together) At the time of the (break-up/death) ...
- [409] Did (child) stay with (grandparent) for some of the time?
- [410] Did (child) have **more** contact with (grandparent)?
- [411] Did (child) have **less** contact with (grandparent)?
- [412] Did it become more difficult for (child) to keep in contact with (grandparent)?
- [413] Was (child) **not** allowed to see (grandparent)?
- [414] Grandparents and parents do not always agree on how best to bring children up. Please say which applies best to you and (grandparent):- card as for [273]
- [415] (Where child under 16) When important decisions are being made that affect (child) nowadays, does (grandparent) usually have a big say, some say, not a very big say, or, no say at all?
- [416] (Where child 16 or over) When important decisions were being made that affected (child) when she/he was younger, did (grandparent) usually have ...(same response options)?

(For teenage grandchildren in **YOUNG PEOPLE'S SOCIAL ATTITUDES** survey) **GROUP D**

- [47] How much do you agree or disagree with each of these statements about you grandparents?
- a My grandparents are an important part of my life
- b I wouldn't see my grandparents as often as I do if I didn't have to

- c My grandparents are not very interested in my life
- [49] How much do you agree or disagree with each of these statements about grandparents?  
(49.a – 49.e ---same propositions as general questionnaire A11, a-e, as given below)
- [50] Can I just check how many grandparents you have? (Grandparent selected [51-54])
- [55]a Is (grandparent) your grandmother, your grandfather, your step-grandmother, or, your step-grandfather?
- [55]b And is she/he your mother's parent, your father's parent, your mother's step-parent, your father's step-parent, your step-mother's parent, or, your step-father's parent?
- [56]a How old was (grandparent) last birthday, or are you not really sure?
- [56]b About how old do you think she/he is?
- [57]a Have you had any contact at all with her/him in the last two years?
- [57]b About how long is it since you last had any contact with ( grandparent)?
- [58] Some people would say they feel 'close' to their grandparents. (Same as [303])
- [59] Does (grandparent) live with you?
- [60]a How often do you see (grandparent)
- [60]b And how often do you talk with her/him on the telephone?
- [61]a How often in the past year have you spent time during the day with (grandparent) without your parents?
- [61]b And how often, in the past year, have you stayed with (grandparent) overnight, without your parents?
- [62]a Has there ever been a particular time in your life when (grandparent) was very involved in looking after you?
- [62]b Why was that?

**(Question for all British Social Attitudes 1998 respondents)**

- [A.11] How much do you agree or disagree with each of the following statements?
- a People today don't place enough value on the part grandparents play in family life
- b In most families, grandparents should be closely involved in deciding how their grandchildren are brought up
- c Grandparents have little to teach the grandchildren of today
- d Many parents today do not appreciate the help that grandparents give
- e Grandparents tend to interfere too much with the way their grandchildren are brought up
- f With so many working mothers, families need grandparents to help more and more