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Investigating the contribution of social ties to health inequalities in France.

PhD thesis of

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"We live in towns, work in teams, and our lives are a spider's web of connection – linking us to relatives, colleagues, companions, friends, superiors, inferiors. We are, misanthropes notwithstanding, unable to live without each other. Even on a practical level, it is probably a million years since any human being was entirely and convincingly self-sufficient."

Matt Ridley, The origins of Virtue. 1996 Penguin p5-6

Using French data, this thesis considers the impact of the social relations as described by Ridley on our health, and in particular it asks whether they have a greater impact on the health of those at the bottom of the social ladder compared to those at the top.

Abstract

Health inequalities, linked to differences in income or other social status indicators have been identified in France as has occurred for most developed countries. Generally a health gradient is observed. Close social relationships have been associated with good health both at individual and area levels.

Investigations using a cross-sectional general population survey complimented by an ecological study at the French departmental level found evidence of social health inequalities. Less than good self-rated health was more likely to be reported people in the lower income, education and professional groups compared to those higher up the social gradient. Departmental mortality was associated to the proportion of manual workers living in the department. People with less social ties reported poorer health after adjusting for age and socioeconomic status. This effect appeared to be slightly more important for men. There was some evidence that social ties may be more important for the health of people on a low income compared to their wealthier counterparts.

Résumé

Les inégalités de santé, qu'elles soient liées au niveau du revenu ou à d'autres indicateurs du statut social ont été identifiées en France comme dans la plupart des pays développés. Un gradient de santé est généralement observé. Un lien entre l'existence de relations sociales étroites et un bon niveau de santé a été identifié tant au niveau individuel qu'au niveau agrégé.
L'analyse des données d'une étude transversale d'un échantillon représentatif de la population française, complétée par une étude écologique à l'échelon départemental a permis de mettre en évidence des inégalités sociales de santé. Un niveau faible de santé était plus fréquemment déclaré par les individus les plus défavorisés, que ce soit du point de vue du niveau de revenu, du niveau d'éducation ou de l'appartenance à une catégorie socioprofessionnelle. A l'échelon départemental, la mortalité était positivement associée avec la proportion de travailleurs manuels. Les personnes ayant peu de relations sociales déclaraient des niveaux de santé comparativement bas une fois pris en compte les différences de structure d'âge et le niveau socioéconomique. Cette corrélation semblait un peu plus marquée chez les hommes. Certains résultats suggèrent que les liens sociaux sont plus fortement associés au niveau de santé parmi les personnes à faible revenus comparées à celles financièrement plus aisées.

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I currently work for the French Healthy City network. The energy and ideas for action from the 72 city members keeps me in touch with the real world. They are a continual reminder as to why I wish to contribute to the field of health inequalities. I thank the steering committee for allowing me to take leave during the summer of 2010 to finish this report.

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Le gradient d'inégalités sociales de santé a été identifié dans de nombreux pays, y compris en France. Ces inégalités ont un puissant effet néfaste sur la santé (Dorling et al 2007). Que ce soit chez l'homme ou l'animal, le positionnement dans la hiérarchie sociale influence fortement la longévité et la qualité de vie. Chez l'homme, ces hiérarchies sont construites autour de l'appartenance à une catégorie socioprofessionnelle, au niveau d'éducation ou à celui du revenu. La distribution de ce dernier est relativement plus équitable en France comparée à d'autres pays européens (Maurin 2007 ; Eurostat online data). L'espérance de vie à la naissance est élevée en France, mais l'écart homme-femme y est prononcé (84 ans pour les femmes, contre 77 ans chez les hommes). Malgré la qualité des services de santé, la mortalité prématurée des hommes en France est élevée, particulièrement parmi les travailleurs manuels (HCSP 2009). Vis-à-vis de cet indicateur, la France est le pays d'Europe de l'ouest où les inégalités sont les plus marquées (Kunst et al 1998). Alors que les inégalités chez les femmes sont relativement faibles et stables dans le temps, la santé des hommes de statut socioéconomique élevé s'est améliorée plus rapidement que celle des travailleurs manuels (Monteil & Robert-Bobée 2005).

L'étude des inégalités concerne également celle des déterminants de santé, puisque comprendre les premières facilitent la compréhension des seconds. Les politiques pouvant réduire les inégalités de santé sont également considérées dans ce travail puisque ces dernières sont socialement déterminées et qu'elles peuvent être réduites (Whitehead & Dahlgren 2006). Dans les pays économiquement aisés, il semble que la santé soit plus fortement associée aux écarts de statut social qu'au simple accès aux conditions matérielles (Wilkinson & Pickett 2006).

Les relations sociales sont essentielles à l'être humain. Les recherches en sciences sociales qui démontrent que le stress est associé aux relations sociales, ou plutôt à leur absence, sont corroborées par les résultats d'études conduites chez l'animal. Les liens sociaux peuvent être considérés comme une caractéristique fondamentale, et non facultative, de l'espèce humaine. Certaines études transversales et longitudinales ont étudié l'impact des liens sociaux sur la santé, à l'échelon individuel ou collectif (Holt-Lumstad et al 2010). Certaines suggèrent l'existence d'une relation causale entre statut social, cohésion d'une part, et d'autres intermédiaires psychosociaux tels que la confiance sociale d'autre part (Berkman & Glass 2000). Un faible statut social ainsi que l'absence de relations sociales sont source de stress. Les circuits biologiques reliant ce stress aux maladies chroniques commencent à être identifiés (McEwen & Gianaros 2010).

Dans le contexte décrit ci-dessus, les études quantitatives vont exploiter les données d'une étude transversale conduite en 1997 sur un échantillon représentatif de la population française. Ces analyses concernant le niveau socioéconomique individuel, les liens sociaux et la santé déclarée seront complétées par une étude écologique. Il s'agira de mesurer l'association entre des indicateurs de liens sociaux, deux indicateurs de défaveur socioéconomique, et la mortalité générale à l'échelon départemental.

Les inégalités de santé déclarée seront étudiées en utilisant le niveau de revenu, celui d'éducation et la profession comme indicateurs socioéconomiques. L'association entre plusieurs indicateurs de liens sociaux et la santé sera étudiée en tenant compte du niveau socioéconomique. Pour l'étude écologique, la mortalité à l'échelon départemental sera comparée à deux indicateurs du statut social. Le premier concerne la proportion de travailleurs manuels habitants dans le département. Le second correspond à un indicateur de défaveur socioéconomique créé selon les méthodes de Jarman et Townsend. Le niveau de lien social à l'échelon départemental sera estimé sur la base des résultats de trois enquêtes nationales conduites en 1997, 1998 et 2001.

Le statut social élevé et l'existence de relations sociales étroites sont généralement associés à un niveau élevé de santé déclarée, une morbidité et une mortalité moindres. Par contre, peu de travaux ont examiné si l'impact des liens sociaux est similaire quelque soit le statut social des individus. Il est possible que cet impact soit moins important chez les personnes situées en haut de l'échelle sociale. Alors que chez les personnes moins aisées, un réseau dense de contacts pourrait exercer un effet protecteur contre le stress biologique engendré par la défaveur socioéconomique.

Les résultats de nos études montrent qu'à l'échelon individuel, tous les indicateurs de statut socioéconomiques révèlent des inégalités. A l'échelon départemental, le pourcentage élevé de travailleurs manuels (indiquant un faible niveau socioéconomique) est positivement associé au niveau de mortalité. Nous avons également trouvé que les individus situés en haut de l'échelle sociale, ainsi que les jeunes, déclarent plus de relations sociales.

Globalement la présence de nombreux liens sociaux est associée à un bon niveau de santé, et ceci quelque soit le statut social. Vivre avec son conjoint, ne pas vivre seul, ne pas s'être senti seul la veille, avoir reçu un coup de téléphone, être membre d'un club, avoir un ami, et en général avoir de nombreuses relations (i.e. familiales ou amicales) sont autant indicateurs positivement associés à un meilleur niveau de santé déclarée. Dans l'étude écologique, une fois le niveau de défaveur socioéconomique pris en compte, la mortalité prématurée est plus

faible dans les départements où la proportion de personnes membres d'un club est élevée. Il en va de même de la proportion de personnes ayant reçues un coup de téléphone, ou ayant des contacts fréquents avec leurs amis.

La variable cognitive « s'être senti seul la veille » était significativement associée avec un faible niveau de santé à l'échelon individuel mais pas à l'échelon départemental. Les indicateurs de structure du réseau social, tel que « le fait d'avoir au moins un ami », une variable composite concernant l'amitié, ou encore la participation à un club ou une association, sont tous positivement associés avec une bonne santé déclarée à l'échelon individuel, et avec une plus faible mortalité dans l'analyse écologique. Ces trois variables permettent de mettre en évidence « la double peine », à savoir le fait qu'en plus de l'effet néfaste d'être situé en bas de l'échelle sociale, la santé des individus à faible revenu est plus nettement altérée par le manque d'amis et la faible participation aux associations.

Si nos résultats montrent que vivre avec son conjoint est associé avec une meilleure santé déclarée quelque soit le statut social, l'analyse stratifiée en fonction d'un indicateur socioéconomique composite suggère que cette relation est plus importante en bas de l'échelle sociale. Ces résultats ne sont cependant pas confirmés lorsque l'on tient compte du niveau de revenu. Une seule exception existe au tableau d'un niveau de santé croissant avec l'intensité des liens sociaux. Elle concerne les femmes économiquement aisées qui en l'absence de conjoint, déclarent un meilleur niveau de santé. A l'échelon individuel, l'indicateur général concernant les liens familiaux est positivement associé au niveau de santé, mais là aussi, l'importance de cette relation ne varie pas en fonction de la position socioéconomique. Les résultats de l'analyse écologique sont en contradiction avec ceux de l'étude individuelle, montrant un niveau de mortalité plus élevé dans les départements où les contacts familiaux sont plus fréquents. Cet effet est plus prononcé dans les départements défavorisés.

Des relations positives avec le voisinage semblent être associées à un meilleur niveau de santé individuelle déclarée par les femmes, sans que cette relation soit modifiée par le statut social. L'effet du voisinage n'est par contre identifié ni chez les hommes, ni dans l'analyse écologique. De façon surprenante, la qualité des relations avec les collègues de travail ne montre aucun lien avec la santé que ce soit en analyse individuelle ou écologique.

Un premier apport de notre étude est de contribuer à l'analyse quantitative concernant les inégalités de santé en France, où elle est peu développée comparativement à certains pays où la recherche sur les déterminants de santé est plus établie. Notre étude a également le

mérite de permettre une analyse de la relation entre liens sociaux et santé en tenant compte du facteur de confusion potentiel que représente le statut social.

Nous avons cherché à identifier parmi les variables socioéconomiques disponibles, celle présentant la plus forte association avec la santé. A l'échelon individuel, le revenu, le niveau d'éducation et la profession sont tous positivement et significativement associés à la santé, avec des gradients d'amplitudes comparables. Ce résultat diffère de celui de Jusot et al (2007a) pour qui le revenu présentait une relation plus étroite avec la santé que les autres variables socioéconomiques. Nos résultats indiquent que les femmes représentent une proportion importante du groupe disposant de faibles revenus et de celui des professions manuelles. Il semble que les femmes atteignent un niveau d'éducation comparable à celui des hommes sans avoir accès toutefois aux professions élevées, ou aux meilleures rémunérations. Ceci malgré les politiques familiales généralement considérées comme généreuses en France (Melchior & Berkman 2006). Nous avons rencontré des difficultés pour construire un indice de défavorisation afin d'étudier les inégalités, mais nous suggérons que le taux de chômage, la proportion de la population couverte par la couverture maladie universelle (CMU) et la proportion d'enfants redoublant en école primaire représentent des indicateurs potentiels de défaveur à l'échelle départementale. Des travaux supplémentaires sont nécessaires pour confirmer si ces indicateurs, par ailleurs facilement accessibles, peuvent être utilement combinés dans la construction d'un indicateur écologique de défaveur « Français ».

Les inégalités sociales de mortalité prématurée sont importantes en France et contrastent avec le niveau élevé de la couverture sociale, et les inégalités de revenu relativement faibles (Kunst et al 1997). Les résultats des études internationales conduites par Mackenbach & Kunst plaçant la France en position défavorable s'agissant des inégalités de santé ont été mis en question. Cependant, la méthode de classement des travailleurs en catégories manuelle et non-manuelle, sur laquelle repose ces résultats, a été validée (Cavelaars et al 1998, Erikson et al 1997). Il en va de même des approches distinguant les différences ou inégalités absolues et relatives (Dalh et al 2006, Kunst et al 1998b). En France, la forte mortalité prématurée évitable chez les hommes travailleurs manuels entraîne un écart prononcé de l'espérance de vie entre les sexes. Bien que certains comportements individuels entraînent des inégalités, d'autres facteurs psychosociaux pourraient avoir un impact. Il est possible que l'existence de normes sociales plus rigides renforce la hiérarchie sociale en France comparée à d'autres pays. Des travaux de recherche ultérieurs devraient étudier les caractéristiques spécifiques à chaque pays, telles que les normes culturelles ou le

système de valeurs, qui influencent potentiellement les relations entre le capital social, les inégalités de revenu et la santé (Mansyur et al 2008).

L'homme est un animal social possédant une empathie naturelle pour autrui et le désir d'établir des relations sociales (De Waal 1996). Ces attributs sont en accord avec l'idée que le processus évolutif est conduit par « l'autopromotion génétique » (genetic self-promotion Ridley 2004). L'absence de relations sociales peut avoir un impact négatif sur la santé aussi important que le tabagisme, la consommation d'alcool ou la sédentarité (Holt-Lumstadt et al 2010). L'absence de relations sociales, ainsi qu'un faible statut social, génèrent un stress biologique chronique délétère pour le cerveau et d'autres organes (Kim et al 2010, Sapolsky 2004, McEwen & Gianaros 2010).Il est possible que les relations amicales et d'autres liens sociaux réduisent l'impact négatif sur la santé créé par une position en bas de l'échelle sociale.

Globalement, nos résultats sont en accord avec ceux de la littérature scientifique, indiquant que les liens sociaux sont importants pour le maintien de la santé et ceci particulièrement pour les personnes socialement défavorisées. Les politiques de soutien et de développement des liens sociaux dans la population générale, par exemple l'aménagement urbain en créant des lieux de rencontre, la politique en faveur de la famille etc, devraient bénéficier à la santé en général et pourraient contribuer à réduire les inégalités de santé. Les liens sociaux semblent particulièrement importants pour la population masculine, et la population en âge de travailler. L'importance de la réduction du gradient des inégalités et l'impact positif des relations sociales étroites sur la santé devraient figurer parmi les axes principaux de la prochaine loi de santé publique prévue pour 2011/2012.

Contents

Introduction

In order to focus on health inequalities in France and impact of different types of social relationships on health, this report has drawn from knowledge developed by a large number of academic disciplines including psychology, animal biology, endocrinology, economics, the political sciences, demography as well as public health. Social epidemiology specifically studies the social distribution and social determinants of health (p6,Berkman and Kawachi 2000). Despite notable exceptions (e.g. Goldberg et al 2003; Leclerc et al 2008), this field still lacks recognition in France.

Social inequality gradients in health have been identified across the globe, including in France. They have a universally negative effect on health (Dorling et al 2007). How well and how long a person or an animal lives is powerfully shaped by their place in the social hierarchy. For humans, these hierarchies are built around occupation, education and income. France has a relatively fair distribution of income compared to other European countries (Maurin 2007; Eurostat online data). Overall life expectancy is high in France but it has a large gender difference (84 years for women but only 77 years for men). Despite having a good health care system, male premature mortality is high, especial amongst manual workers (HCSP 2009). French male premature mortality inequality is one of the worst when compared to other Western European countries (Kunst et al 1998). Whilst the female health inequality rates are low and have remained stable in France, the health of high socioeconomic status men has got better. Manual workers' health has not improved as quickly as the rest of the population (Monteil & Robert-Bobée 2005).

The study of inequalities is also the study of the social determinants of health more generally, as inequalities enable a better understanding of everyone's' health and wellbeing. Policies that may reduce social health inequalities are also considered in this report as health inequalities are socially generated and can be reduced (Whitehead & Dahlgren 2006). In wealthy countries, findings suggest that health may be more strongly related to differences in social status rather than merely access to material goods (Wilkinson & Pickett 2006).

As quote from Matt Ridley at the start of this report suggests, social relationships are integral to being human. Evidence from the social sciences about stressful nature of relationships or rather the lack of them is supported by findings from socio-biology. Socio -biology can be defined as the study of the biological basis of all social behaviour (Clamp 2001). It generally considers the set of genes, rather than the individual, as the basic unit

of evolution. For animals and in particular for humans, being good at social relations is adaptive for evolutionary success. Social ties are fundamental to human existence and are not an optional add-on. A number of cross-sectional and longitudinal studies have examined how individual social ties and community-level social capital impact on health (Holt-Lumstad et al 2010). Causal pathways linking social status, cohesion and other psychosocial intermediates such as social confidence have been suggested (Berkman & Glass 2000). Low social status and also a lack of social relationships generates stress. The biological stress pathways that cause chronic disease are increasing being identified (McEwen & Gianaros 2010).

Within the context described above, the quantitative studies will use data from a cross-sectional representative survey that occurred in France in 1997. The information about individual socioeconomic status, social ties and self-rated health will be complimented by an ecological study. At the French departmental level, the associations will be calculated between a number of social ties, two measures of SES/deprivation and departmental mortality.

Fig 1 summarises the links between the study variables. Using income, educational attainment and occupation as indicators of SES, evidence of self-rated health inequalities will be investigated. The association of a variety of social ties with health will be calculated after adjusting for SES. At the ecological level, departmental mortality will be compared to two measures of social status. The first will be the proportion of manual workers residing in the department. The second is a deprivation index that will be created, similar to those produced by Jarman and Townsend. The departmental social ties will be estimated by combining data from three national surveys that occurred during 1997, 1998 and 2001.

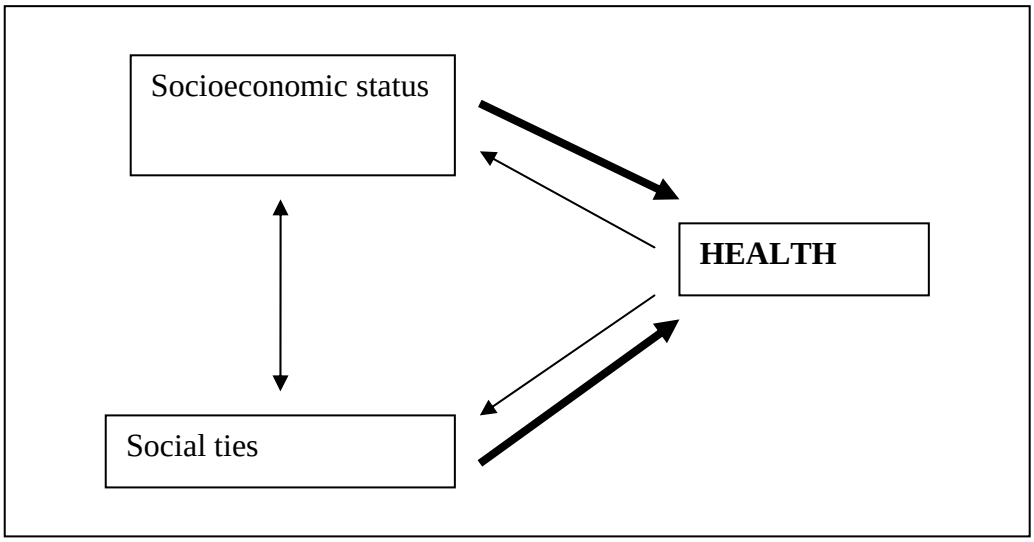


Fig 1 Possible relationships between social ties, SES and health

This study only has access to cross-sectional data from which no causal direction of the associations can be assumed. Other cohort studies, which can suggest causal directions have suggested that health can be assumed to be considered as the outcome indicator, as is suggested by the heavier arrows in Fig 1.

High social status and close social relationships are generally associated with better self-rated health, and lower mortality and morbidity. Less research has occurred to investigate if the impact of social ties on health is the same regardless of a person's position along the social gradient. A lack of social ties may have less of an impact on the health for someone of high social status. The economically vulnerable who have a rich network of social ties relationship may be protected from the chronic biological stress that appears to be associated with low socioeconomic status. Fig 2 illustrates this aspect of the study. All the findings will be discussed and compared to the published literature.

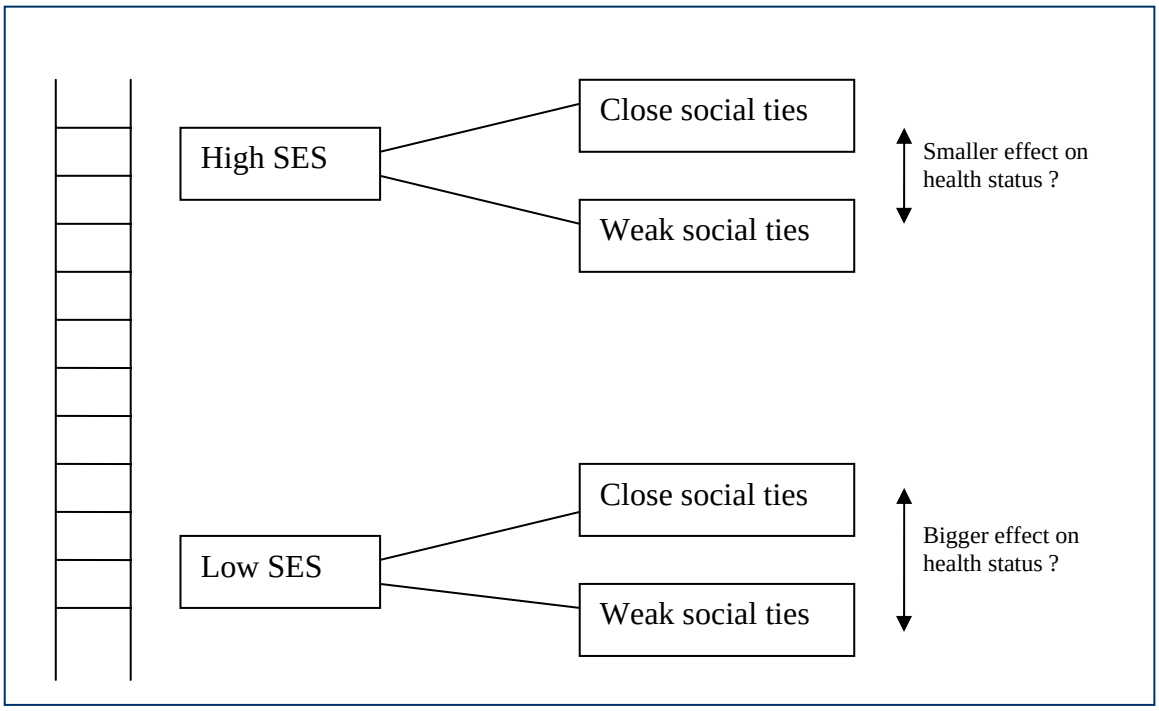


Fig 2 Study design to investigate the effect of social ties on health at different points on the socioeconomic gradient.

Two originalities of this study are that less quantitative research looking at health inequalities across the general population has occurred in France than some other countries which have a longer history of researching social health determinants. Secondly, not all investigations considering the impact of social ties on health, control for the possible confounding effect of social status.

Chapter 1 : Social health inequalities

"We live in a vastly unequal world. Over a billion people around the world have an income of less than $1 a day whilst in the USA cars and houses are getting bigger and number of millionaires is increasing rapidly" , (p1 Kawachi and Kennedy 2002). The mortality rates, in particular infant mortality rates, reflect this enormous difference between the economically rich and poor worlds. This chapter, however, will only address health inequalities within industrialised countries.

It could have been entitled health 'inequities'. Genetic and constitutional differences mean that the health of individuals inevitably varies. Older people tend to be sicker than younger people due to the natural ageing process. Three distinguishing features, when combined, turn mere health variations into social inequity (Whitehead & Dahlgren 2006). These features are systematic, socially produced and unfair. This notion of social justice is extremely important when coming to develop policies to address health inequalities. Despite discussion in the 1990's, the terms 'inequality' and 'inequity' are now synonymous in the public health community, both with a connotation of being unjust (p4, Whitehead & Dalgren 2006). This report has retained the more frequently used term of 'inequalities'.

The chapter is a literature review. It will describe different measures of social economic status (SES), summarize the health inequality literature both in terms of mortality and morbidity, describe in some detail the social health inequalities in France. It will then focus on the possible causes of health inequalities and finally discuss some of the policy implications.

1.1 Health inequalities – recent phenomena?

Although the majority of publications about health inequalities have occurred in the last quarter of a century, inequalities started being measured at least 400 years ago. The populations of Geneva (now in Switzerland) and Rouen (France) were particularly well documented examples. Table 1.1 shows mortality data from Geneva. It indicates clear social class differences both with childhood and adult survival. Although only a minority of people reached their 60th birthday in the 17th century, those from the upper classes were nearly 3 times more likely to do so than people from the lower classes. One hundred years later, mortality had decreased and the inequality between the classes had also gone down but was still large.

	1625-1684				1725 – 1790			
	Upper class	Middle Class	Lower Class	**Ratio Upper/ Lower**	Upper class	Middle class	Lower class	**Ratio Upper/ Lower**
Survivors at 10 years old / 1000 live births	625	490	397	**1.57**	722	592	562	**1.28**
Survivors at 60 years old / 1000 live births	307	174	109	**2.82**	417	320	255	**1.63**

Table 1.1: Mortality data for 3 social categories in Geneva during the 17th and 18th centuries (Perrenoud 1982 in Leclerc et al 2000 p28)

In the early 19th century, Villermé systemically studied the wards of Paris, classifying them using both environmental and poverty indicators. He showed that districts with a lower socio-economic level, as indicated by the proportion of houses for which no tax was levied, tended to have systematically higher mortality rates than better off neighbourhoods. He was then asked to undertake a national review of the main industrial sites. He interviewed workers, asking them about their household's income, their perceptions of health and he observed directly their working conditions. He was one of the first researchers to document that mortality was not primarily due to biological factors, but that there was direct link with poor living and working conditions.

The Black report published in 1980 in London was the first thorough national review of health inequalities and had recommendations for future policies. (Townsend & Davidson 1988). Its main findings were that marked differences existed in mortality rates between occupational classes, for both sexes and all ages. Many of the Black report's recommendations focus on the socio-economic environment, and the authors' suggest improvements to income benefits and preventative health care for children. Although its recommendations were not endorsed by then new government, the Black report remains a turning point. Reflecting on the impact of the Black report in 2001, Michael Marmot felt that although inequalities in health were known to researchers beforehand, it summarized the evidence, gave it focus, reached conclusions and hence brought the issue to public attention (Marmot 2001). During the subsequent 30 plus years, an enormous amount of research about health inequalities has occurred and our understanding about causes of occupational class differences in health has deepened.

1.2 Describing social health inequalities today

A large body of research has consistently found that health inequalities are linked to social status and that this remains true for both mortality and morbidity measures, including those of premature mortality, chronic and infectious diseases and for all ages

(Cavelaars et al1998; Wilkinson 2005; Mackenbach 2005; WHO 2008) However the greatest inequalities in mortality are observed for men and amongst people of working age (Melchior et al. 2005a;Adams et al. 2004;Chau et al. 2005). Inequalities, where poor people suffer most, can be seen for many different causes of mortality: infant, cancer and coronary disease but also in suicide and accidents rates (Dalstra et al. 2005). Only very few conditions don't follow this trend, notably asthma and breast cancer (Siegrist & Marmot 2006). The effect of social status of health is not a uniquely human problem. It is has demonstrated in various monkey and other animal populations (Sapolsky 2004; De Waal 1996). This also shows that inequalities are not simply due to differences in behaviours such as smoking.

SES inequalities are also evident for mental health. The French Barometre Santé found that both physical and mental health are closely related to income (Kubiak & Pin 2007). In the US, Ferrer & Palmer (2004) showed a gradient with lower mental health ratings found amongst lower income groups, and that difference was constant with age; whereas physical health inequalities were greater amongst middle-age people. Fone (2007) found that poor mental health was significantly associated with area-level deprivation after adjusting for individual factors. In a comparison of 8 countries, Pickett et al (2006) found that poor mental health was associated with greater income inequality.

Social health inequalities are found in all countries where they have been measured (Dorling et al 2007). Consistently, a health gradient has been demonstrated across the social status regardless of the SES measure used (Marmot et al1991;Monteil & Robert-Bobée 2005; Siegrist & Marmot 2006). The gradient shows that worse health is not just a problem of the poor.

The consistence of the gradient suggests that health inequalities are not simply due to material causes such as a lack of money. Although the exact amount varies with time, once an income of about 5,000$ per capita has been reached, comparing inequalities internationally shows that the level of health inequality is much more closely linked to a nation's income inequality rate (such as its GINI score) that it is to its total wealth (Wilkinson & Pickett 2006; Dorling et al 2007). At first glance, this is surprising. One could expect that as a nation became wealthier, all its members, especially the poor would benefit but this does not appear to be the case. In countries with high income inequalities, everyone, including the rich, have a lower life expectancy when compared to more equal countries (Wilkinson 2005). The income inequality hypothesis has not been accepted by all authors (Lynch et al 2004) and is discussed in relation to material and psychosocial causes of health inequalities in a later section of this chapter.

1.2.1 *Different measures of social economic status*

Social class is a concept often applied without a rigorous definition (Murray et al 2001) p195. Karl Marx gave social class a central position in his essays and mainly saw social class in its relationship to the means of production. Max Weber took a wider approach of market capacity as determined not only by capital ownership but also by skill and education, which combined to create life changes for individuals to receive rewards. The most frequently used measures of social class or social economic status (SES) are based on occupation, level of educational attainment or by current income. They each have their advantages and inconveniencies.

0ccupation scales

Most countries have their own occupation scales such as the UK's Registrar General's classification based on 5 social classes. The French system is described in Appendix 3. It is based on 4 main groups: senior professionals, middle professionals, employees/clerks, manual workers. There are 2 other much smaller groups that don't easily fit into the hierarchy, namely farmers and shop keepers/craftsmen. The Erikson-Goldthorpe (ECP) classification, where 7 categories are collapsed into manual and non-manual jobs, is the most commonly used for international comparisons (Kunst et al. 1998a; Erikson et al 1997) (see Appendix 3).

In France, as in other industries countries, the proportion of people in the occupational categories has changed. During the last 20 years, the number of farmers, shopkeepers and manual worker have gone down whilst the number of senior and middle professionals as well as employees/clerks have increased (Monteil & Robert-Bobée, 2005). Three quarters of the 'employees' category are women, whereas over 80% of manual workers are men.

Other occupation scales exist but are rare. As will be seen in the next chapter, Pan Ke Shon (1998) has shown that best friends commonly come from the same occupational class. The Cambridge scale was developed on this basis (Sacker et al 2001).

Education

Educational attainment as a measure of SES has the characteristic that, after a person reaches 20 to 25 years, it usually stays constant throughout life. It does not vary due to short term unemployment or at retirement. It is also possible to classify women who have not entered the workplace. However, education attainment is closely associated with

age. France has seen a rapid increase in graduates during the last 2 decades. Education attainment is predictive of occupation status and future income but length of education does not tell us about its quality (Lynch & Kaplan 2000) or its pertinence for the job market.

Income

Income data has the advantage that the quartiles of income cover the same proportion of the population over time and also international comparisons are fairly easy. Income is important for poverty studies as it is an indicator of access to material resources. However it is rarely asked at an individual level due to its confidential nature, (it is not included in census data for example). Income fluctuates throughout a person's lifetime, particularly at retirement. It can also be a problem to classify and compare young people who may have a low income due to attending university rather than unemployment. Net income including state benefits is a more useful measure than before tax income but it still ignores 'wealth' –such as savings, property or share ownership. Other general measures of wealth such as car and house ownership may have an effect on health, independent of income (Macintyre et al 1998). A more exhaustive description of the main inequality SES measures can be found in Mackenbach & Kunst (1997) and De Maio (2007).

1.2.2 Gender and SES

Both men and womens health follow the SES gradient but most studies find that social status is more closely associated with men's health than women's. This is despite animal studies showing that female monkeys are biologically affected by social status (Shively & Clarkson 1999). There are a few exceptions such as Koskinen & Martelin (1994) paper which found that single women had a steep SES/health gradient, similar to that of men. Early French data shows that a greater gradient is observable for female mortality if women are classified by their husbands' occupation than with their own (Desplanques 1985). Sacker et al (2000) found that a general scale of household disadvantage was a more reliable predictor of female mortality.

1.2.3 An area effect

There is a long tradition of mapping health outcomes by geographical areas (Gattrell et al 2000). France and Britain have some similarities in relation to spatial health inequalities. In both countries (see Fig 1.1), the north has a higher mortality rate than the south.

Spatial health inequalities are, in part, due to spatial variations in employment structure. Industrial areas may have more manual workers who may receive low wages than areas with a high level of professionals. Areas effects also may be due to air pollution causing respiratory diseases, lung cancer from passive smoking, poisoning from lead in water pipes, or colder weather reducing motivation for outdoor physical activities.

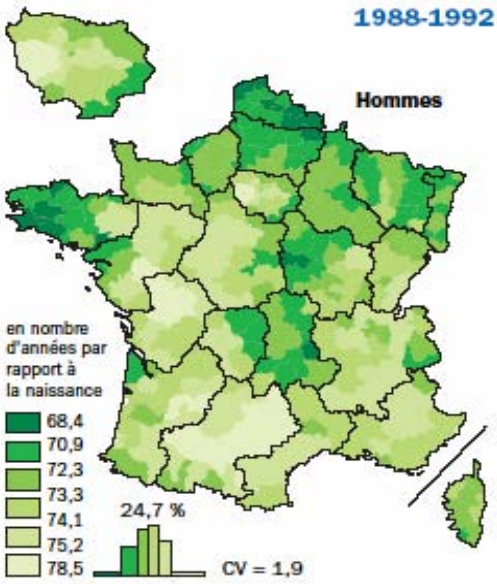


Fig 1.1. A map of France showing average life expectancy for men, (darker areas = shorter life expectancy) (Salem et al 2001)

Research on the reasons for observed area differences now distinguish between the effects of social composition and of social context (Macintyre et al 1993). Compositional effects refer to the aggregated characteristics of individuals living in an area, whilst contextual effects are the characteristics of the area which are independent of its individual inhabitants (Joshi et al 2000) p144. In order to disentangle the complex influences of living in a particular area (the compositional v contextual effects) evidence is required both about individuals and the areas they live in (Joshi et al 2000). Unlike regression analysis, multi-level modelling can take account of area clustering. The model can separate out 'between area' and 'within area' contributions, to see the amount that is explained by the differences between areas, once controlled for the characteristics of the individual people who live there. Augustin et al (2008) found that neighbourhood conditions (crime, abandoned buildings) were significantly associated with self-reported cardiovascular disease after adjusting for individual-level (compositional) risk factors.

Although some studies have found that neighbourhood characteristics do not have an effect on health after adjustments for individual characteristics (Henderson et al 2005; Augustin et al 2008), the majority do find an area effect. Disease risk factors (BMI, hypertension & sedentarism) were found to be associated with income inequality in US states (Diez-Roux et al 2000). Pickett and Pearl (2001) found that all, except 2, of the 25

studies reviewed reported a statistically significant association between at least one measure of social environment and a health outcome (contextual effect), after adjusting for individual level socioeconomic status (compositional effect). Riva et al (2007) confirmed this finding after looking at total of 86 studies. It appears that where we live at different times of our lives has an effect on health. Current residence area is more closely associated with violent death or psychiatric problems, whereas chronic illnesses such as CHD are associated with living in disadvantaged areas earlier in life (Naess et al 2008). (The effect of life-course exposure on health will be discussed later).

1.2.4 Relative or absolute measure of inequality

There are two main ways to present inequality data over time or between countries. The first is to show the absolute change in the mortality rates by social economic status (SES). The second is to present the relative ratio i.e. divide the mortality rate of manual workers by that of non- manual workers. This second method is more commonly found in the literature (e.g. Mackenbach et al 1997).

Whitehead & Dahlgren (2006) show neatly how the choice of method is extremely important. Their example (in Table 1.2) shows how calculating the absolute difference in mortality inequality suggests that it is reducing over time; but using a calculation for relative ratio, the gap appears to be increasing.

Rates and gaps	1995-1997	2001-2003	Change in inequality
Death rate for the 20% most deprived local authorities (in deaths per 100 000 popn)	173	129	
Death rate for England as a whole (in deaths per 100 000 popn)	141	103	
Absolute gap (difference) between disadvantaged and England as a whole	173-141 = **32**	129-103 = **26**	Reduction
Relative gap (ratio) between disadvantaged and England e	173/141 = **1.22**	129/103 = **1.25**	Increase

Table 1.2 Illustration of the difference results possible using absolute and relative measures of social inequalities from Dept of Health, UK, (Whitehead & Dahlgren 2006) p30

Marmot (2001) suggests that absolute differences are more important for public health than relative differences in death rates. Although intuitive, calculating relative mortality ratios has been criticised, particularly when making international comparisons. The relative ratio is affected by the size of the overall mortality rate. If the mortality rate is low, a slight difference from this rate would appear as a larger relative difference compared to a country with a high mortality rate. Unfortunately many international studies quote only relative rates.

1.3 Health Inequalities in France

Outside the field of public health, health inequalities have not been generally perceived as a significant problem in France. Apart from a few precursors such as Desplanques (1985), France was late in focusing attention on the social gradient of health inequalities (Chauvin & Lebas 2007). In the last 10 years, however, a plethora of books have been published and conferences organised, (e.g: Jourdain 2003; Chauvin & Parizot 2005; Leclerc et al. 2008; Basset 2009; Haut Conseil de Santé Publique, 2009). The spotlight had previously only been on the most vulnerable.

Research into health inequalities requires reliable data. Kunst recognised the quality of French data. "Only a few countries (the Nordic countries, France, and England & Wales) have detailed, reliable and nationally representative data on social-economic differences in mortality for most age-sex groups" (Kunst et al 1998a). Appendix 4 lists some of the principle sources of French data for social health inequalities.

1.3.1 Profile of health in France

France currently has a total population of nearly 64 million of which 62 million live in France metropolitan. The number of births has been rising since 1995 with a birth rate of 12.9/1000 persons and a total fertility rate per woman of 1.94 (DREES 2007). These rates are high for Europe. In France, there are specific taxation policies which favour having children and relatively abundant child care facilities. The infant mortality rate was 3.6/1000 live births in 2005 (DREES 2007) which is below the European average.

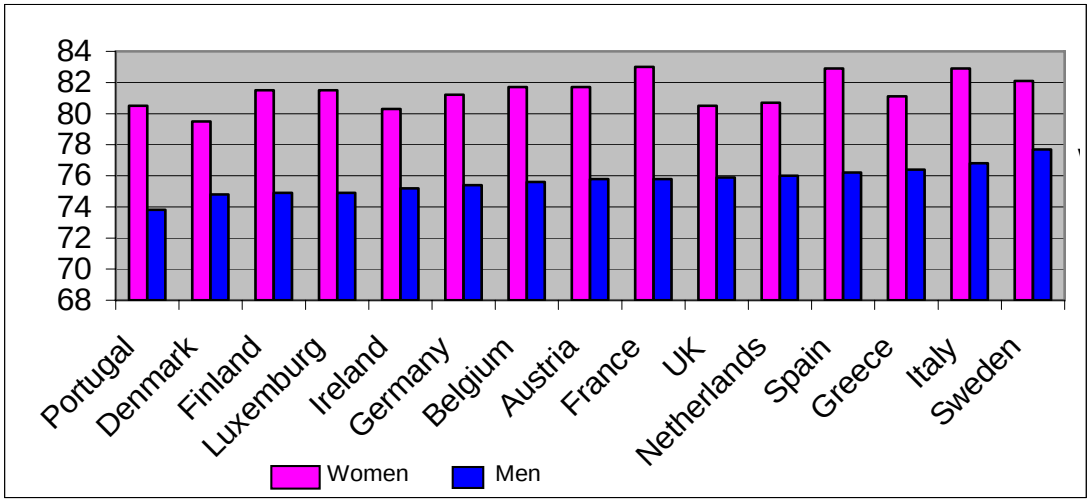


Fig 1.2 Life expectancy in 15 European countries, 2004 (Eurostat online data)

The crude mortality rate was 8.6/1000 inhabitants in 2005. This figure is pushed upwards by the aging population but pulled downwards by the lengthening of life expectancy (DREES 2007). Like most industrialised countries, in France the mortality rate,

standardised for age, for all causes of death is decreasing. Even recent figures continue to show a decline. For men, it is down from 823 (per 100,000 popn) in 2001 to 755 in 2005 and for women from 444 in 2001 to 418 in 2005 (Eurostat online database).

In 2004, life expectancy at birth was 76.7 years for French men and 83.8 for women. This is very good for women compared to other Western European countries, and is about average for men (see Fig 1. 2). Once the age of 65 is reached, French men can expect to live another 17 years, and women another 22, which is high compared to other developed countries. Of this, men and women will have, on average, 11 or 13 years respectively, without any incapacity i.e. not requiring help for basic living (Cambois 2006).

The difference in life expectance between the genders is particularly large in France (p 16 data source Credes, de Kervasdoué 2000). During the last 10 years, the gap has reduced a little, as men have gained 3.1 years to women's 2.0 years. This is mainly due to the decrease in cardiovascular mortality for men and more recently to the reversal of the rising trend of male cancer mortality, especially owing to less lung cancer (Mesle 2004).

1.3.2 Profile of health inequalities in France

Despite low overall mortality, France has the same pattern of inequalities found in other developed countries (Saurel-Cubizolles et al 2009). Fig 1.3 shows that the probability of death between 35 and 65 is closely linked to social professional class especially for men (Mesrine 1999). A senior professional man has a 13% probability of dying prematurely (between 35 and 65 years) compared to 26% probability for a male manual worker. A senior professional woman has only a 6.5% probability of dying against that of 10.5% for a women manual worker.

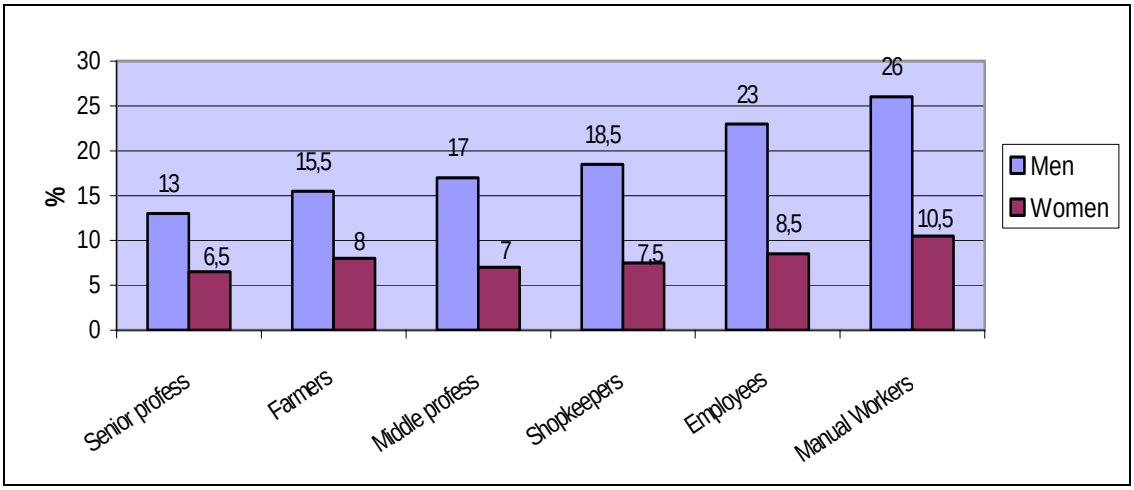


Fig 1.3 Probability of dying between 35 and 65 years old in France (%) (Mesrine 1999)

1.3.3 Life expectancy inequalities

Life expectancy at aged 35 is shown in the table 1.3 below. It shows that a senior professional aged 35 could expect to live another 46 years on average, so to 81 years in all (Monteil & Robert-Bobée 2005). The authors observe that the difference in life expectancy at age 35 between senior professionals and manual workers is 7 years for men and 3 years for women. The lowest life expectancy is for men who have never worked, who are labelled as inactive. Their life expectancy is a full 17.5 years less than the senior professionals and 12.5 years less than those who have been employed. This is due to the fact that 'inactive' men make up a small, 'extreme' group that covers only 3% of the male population. The exact reason why they have never had a job is not known. Being 'inactive', meaning never having been in paid employment, is far more common for women, 48% of whom are in this category in the EDP cohort 1991-99.

	Senior profs	Intermed profs	Farmers	Shopkeepers Craftsmen	Employees	Manual Workers	Inactive (never employed)	All
Men	46.0	43.0	43.5	43.0	40.0	39.0	28.5	41.0
Women	50.0	49.5	48.5	49.0	48.5	47.0	47.0	48.0

Table 1.3 Life expectancy at aged 35 by gender and employment. EDP cohort, deaths 1990-99 (Monteil et al 2005)

Senior professionals not only live longer but have greater proportion of their life without any incapacity. At age 35, they can expect to live 34 remaining years without any incapacity whereas manual workers will have only 24 years free of incapacity. The 6 or 7 year life expectancy difference increases to 10 years difference in terms of incapacity-free living (Cambois et al 2008).

1.3.4 An increasing divide?

Although overall mortality decreased in the last century, some reports have observed an increase in social health inequalities (Secretary for State for Health, 2003). Earlier in this chapter, Whitehead & Dahlgren (2006) demonstrated that it is possible over time for the absolute mortality rate between the disadvantaged and the population average to decrease when the relative gap (ratio) has increased. Ramsay et al (2008) confirmed that in the UK, relative differences in mortality between manual and non-manual groups persist and may have increased, however the absolute differences in mortality decreased.

In France, four studies have investigated health inequality divides (Mesrine 1999; Leclerc et al 2004;Monteil & Robert-Bobée 2005; Menvielle et al 2007). At first glance, the results seem inconsistent with Montreil, and Menvielle suggesting there has been an increase in inequalities and yet Mesrine and Leclerc proposing that the rate is constant. This is even more surprising when all 4 studies used age adjusted mortality rates from the Permanent Demographic Sample.

Careful reading shows that Mesrine (1999) found that the relative gap between the occupational groups was stable when comparing 1975-80 data to that from 1990-5, see Table 1.4. A slight increase in inequalities between some occupational groups (for example the managers and the employees) can be observed but the non-qualified manual workers appear to show a slight relative reduction in the inequalities compared to the professionals. Leclerc et al (2004) confirmed the finding when updating the information to 1999. This is true for both absolute and relative measure of inequalities. She stresses (and Mersine also found) that a big increase in inequalities had occurred when comparing the men who have never worked (inactive) to the employed population. Their relative risk has increase from 3.5 to 5.1 in 15 years.

	1975-1980	1982-1987	1990-1995
Senior professionals	**1**	**1**	**1**
Intermediate professionals	**1.2**	**1.2**	**1.3**
Employees	**2**	**1.9**	**2.2**
Qualified manual workers	**1.9**	**1.8**	**2.0**
Non qualified manual workers	**2.6**	**2.5**	**2.4**
Active	**1**	**1**	**1**
Inactive (never worked)	**3.5**	**4.3**	**5.1**

Table 1.4 Relative differences in mortality between occupational groups in France using standardised mortality rates for men aged 30-64. Decennial health survey, Mesrine (1999) & Haut Comité de Santé Publique (2002)

Monteil & Robert-Bobée (2005) concluded that there had been a slight increase in inequalities amongst the population that had worked. The ratio of mortality rates managers to manual workers had increased from 1.8 in 1976-84 to 2.1 in 1991-99. However, the absolute difference in mortality rate is only very marginal at 0.07. There is no change in absolute or relative difference between other professional groups. This difference may be due to the fact that their data set included men from age 35 to 80 rather than 30 to 64 years as the previous 2 studies had done. There has also been a significant change over time in the size of the occupational groups as discussed below.

Menvielle et al (2007) compared mortality according to education levels. This shows a more marked trend for both men and women. The difference in absolute age standardised mortality rate (per 100 000 person years) between those with no educational qualifications and those with a baccalaureate was compared. In 1974, for men, the difference was 456 and by 1996 it had grown to 615. In women for the same period, the difference had increased from 89 to 143. This shows an apparent clear increase in inequalities. If, however, the absolute differences in mortality rates for the other educational levels (CEP and professional diplomas) are compared, there is no increase in inequalities.

Figures looking at SES by occupational class or education level over time can be criticised due to the fact the number of people in the groups varies. With increasing technology the number of manual jobs has declined. In France, the number of manual workers fell up 7% and the number of farmers by 36% between the censuses of 1990 and 1999. The number of upper and intermediate professionals increased sharply (INSEE census online database). Pamuk (1985) took changing occupational class size into consideration when looking at mortality differentials in England before 1972. She found that both relative and absolute inequalities reduced in the 1920s but were increasing by the 1960s.

Using educational levels as a marker for social economic status (SES) does not avoid the problem of changing category sizes. In France, only 2% of women currently over 60 years of age have a degree or higher qualifications compared to over 17% of 25 year olds. The equivalent figures for men are 4% and 16% (INSEE 1999 census data). Young people with no educational qualification are almost nonexistent. Having a university degree is no longer exceptional. During the 1990s the percentage increase of men with a university degree (BAC +3) or higher was 54%, and for women the increase was a staggering 104%. Overall this means over time fewer people are in the low SES groups, and they are likely to be older. When this fact is taken into consideration, it does not appear that absolute or relative health inequalities are increasing significantly in France.

1.3.5 Premature and avoidable mortality

Eurostat calculated the standardised rate of premature death (deaths occurring under the age of 65) for 2002 as 219/100 000 for France. For men the rate was 306/100 000 (a drop of 20% since 1990), for women 134/100 000 (a drop of 13%). The female premature death rate is about average for the EU, but the male rate is still high when compared to the original 15 EU member states.

Of these premature deaths, a huge 39% of the male deaths and 24% of the female deaths are considered 'avoidable' (Péquignot et al 2003). 'Avoidable' deaths are those that are largely related to behaviours such as cancers of the oesophagus & lungs, liver cirrhosis, road accidents, falls, suicide and AIDS. France is in the worse position compared to the other countries of the EU15 but it is interesting to note that coronary heart disease which is relatively low in France, is not included in this indicator of avoidable deaths.

	All		**Men**		**Women**	
	Number of avoidable deaths <65ys	Mortality (1) /100 000	Number of avoidable deaths <65ys	Mortality (1) /100 000	Number of avoidable deaths <65ys	Mortality (1) /100 000
<25 years	3 165	18	2 386	27	779	9
25-44 years	9 649	57	7 404	88	2 245	26
45-64 years	25 094	195	20 173	321	4 921	74
Total for all ages <65yrs	37 908	75	29 963	120	7 945	31

Table 1.5 Avoidable premature mortality (under 65 years) in France: number and age standardised mortality rate per 100,000 (Péquignot et al 2003). (1) Age standardised mortality

The greatest numbers of avoidable deaths occur between ages 45-64 (details in Table 1.5) and men are very heavily over represented. A quarter of the deaths (9,500) are due to lung cancer, followed by suicide (7,300), causes directly linked to alcohol (6,500) and road accidents (6,500). The number of avoidable deaths has gone down in the last 20 years notably for men under 25 years old, the least changed category is those people aged 25-44, for both sexes (Péquignot et al 2003). The current INSEE database shows that road traffic accidents have reduced dramatically (explaining the reduction of avoidable deaths for young men) but lung cancer rates have increased for women.

	Male Premature Mortality /100,000 men			Ratio of difference (manual& employees/ senior profs
	Manual workers & employees	Middle professionals & shopkeepers	Senior professionals	
Ischemic heart disease	23.8	15.0	9.7	2.5
Cerebro-vascular disease	10.5	5.4	3.0	3.5
Alcoholism (cirrhosis)	25.0	7.4	2.5	**10.0**
Upper tract cancers	32.3	8.7	3.0	**10.8**
Lung cancer	30.8	15.3	8.9	3.5
Road accidents	31.0	20.1	11.5	2.7
Other accidents	25.7	12.5	9.7	2.6
Suicide	39.3	24.1	13.7	2.9
HIV/AIDES	14.9	15.8	16.6	0.9
All premature deaths	**365.9**	**196.8**	**127.3**	**2.9**

Table 1.6 Rate of male premature mortality (25-54 years) by socio professional category for various causes of death (adapted from Salem et al 2001)

Using slightly older data, Salem and colleagues calculated the male premature mortality rates for different diseases by socio-professional category (see Table 1.6). For manual workers and employees, the main causes of premature death (25 to 54 years) are suicides, road accidents and cancers of the lungs, upper respiratory and digestive tract (Salem et al 2001). For all premature deaths, the manual/employee group have 3 times greater relative risk of dying prematurely. However,the difference is much greater for some diseases. Manual/employees are 10 times more likely to die from liver cirrhosis due to alcoholism or cancers of the upper respiratory and digestive tract. Those at the top the social-professional ladder are most likely to die prematurely from HIV/AIDS, suicide and road accidents. At this time period, HIV/AIDS deaths were the only ones that did not follow the expected social gradient.

1.3.6 Vulnerable populations

	General Population (not vulnerable)		**Unemployed #**		**Minimum benefit (RMI) #**	
MEN	N= 239,236		N=156,287		N=87,571	
	%*	**Relative Risk****	**%***	**Relative Risk****	**%***	**Relative Risk****
Health Behaviours						
Smokers	36.9	1	52.4	1.4	58.6	1.6
Not used health services prev. 2 yrs	5.1	1	11.0	2.0	15.4	2.8
Health Indicators						
Poor self-rated health	24.1	1	36.8	1.4	45.3	1.7
Obesity BMI >30	8.2	1	9.8	1.1	9.3	1.0
Underweight BMI<18.5	3.0	1	4.4	1.5	6.3	2.1
High BP Syst >140 or Diast >90	23.2	1	25.4	1.1	26.0	1.1
Untreated dental carries	39.1	1	51.0	1.2	59.2	1.5
WOMEN	N= 277,371		N=193,039		N=84,595	
Health Behaviours						
Smokers	28.1	1	35.8	1.3	39.4	1.5
Not used health services prev. 2 yrs	2.1	1	4.6	2.2	6.1	2.6
Health Indicators						
Poor self-rated health	29.7	1	38.7	1.2	49.3	1.6
Obesity BMI >30	9.6	1	14.5	1.5	18.8	1.7
Underweight BMI<18.5	6.5	1	6.7	1.1	7.6	1.3
High BP Syst >140 or Diast >90	12.4	1	14.7	1.2	17.5	1.3
Untreated dental carries	32.8	1	41.6	1.2	45.6	1.5

Table 1.7 Comparing health indicators and behaviours for vulnerable populations (Moulin et al 2005)
* Prevalence standardised by age ** Relative risk adjusted for age and occupational category

(# People made unemployed receive a % of their salary for over a year, if unemployment persists or the person has never worked – only the minimum state benefit is available)

When comparing vulnerable populations (unemployed and those receiving the minimum state benefits) to the general population, table 1.7 shows that vulnerable people are more likely to have high blood pressure, untreated caries, smoke etc. Obesity occurs more frequently amongst vulnerable women than men. Twice as many men on minimum state benefit are classified as underweight than the general population.

1.3.7 Health Service Use

Data about clinical treatment in France does not routinely include the patient's SES. As social inequalities are currently ignored, Lang (2005) has suggested that the health service may in fact be contributing to inequalities. Not only are mortality rates higher for manual workers compared to senior professionals but manual workers are more likely to have at least one impairment (OR 2.11 manual workers /senior profs, 95% CI 1.68-2.66). All types of impairment are more likely: intellectual functions, language, hearing, vision posture etc. These social inequalities, identified in a sample of more than 6 000, were significant during employment but not after retirement (Chau et al 2005). The higher rates of impairment, morbidity rates and poorer self-rated health all suggest that manual workers are more likely to require health care services.

Despite probably having a greater need of health care services, people from low SES are less likely to attend health check-ups. Over 11,000 participants of the GAZEL cohort were offered health checks between 1999 and 2001, 45% accepted the invitation. Those from a higher social professional group were more likely to attend the check up (Coeret-Pellicer et al 2004). The distance to the health centre and reporting poorer health were associated with lower attendance.

Table 1.7 showed that vulnerable people (the unemployed and those on the minimum state benefit) are more likely to have dental caries and are less likely to have used the health system during the previous 2 years (Moulin 2005). Income plays a significant part in a person's decision to accept or refuse some treatments, up to 45% of the population on minimum state benefits in France refuse some health care treatments as they are perceived as too expensive (Boisguerin 2007). Fig 1.4 shows that the likelihood to refuse optician or dental treatment relates directly to household income. The social gradient is clear with people in the poorest income quintile being 3 times more likely to refuse than the richest quintile.

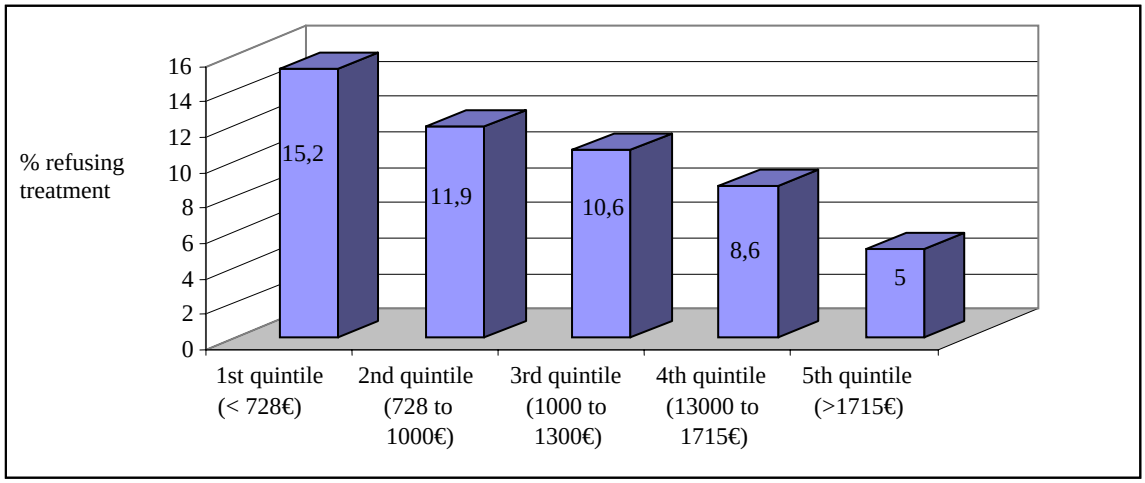


Fig 1.4 Percentage of people refusing dental treatment, replacement teeth, glasses or contact lens at least once during the previous 12 months, by equivalised income (OECD method) from 2004 data (DREES 2007).

People from lower down the social scale are less likely to have access to certain long-term or preventive treatments (Lombrail 2000; Lang et al 1998). Low SES people suffering with renal insufficiencies were less likely to have satisfactory care. They were less likely to receive treatment for hypertension, vitamin D, calcium or iron (Rozenbaum et al1983). Lang's study into coronary events (more details in CHD section below) demonstrates that in France once people are in hospital, all social groups receive largely the same treatment however, people from lower SES are less likely to go to hospital and benefit from specialised early treatment (Lang et al 1998). From a sample of 1316 outpatients attending a public hospital in France, vulnerable outpatients were less likely to have received the majority of preventive interventions (vaccinations, screening for cardiovascular risk factors, gynaecological cancers) before arriving at the hospital, compared to non-vulnerable patients (Pascal et al 2009). The authors suggest it may be necessary to set up specific prevention interventions targeting vulnerable patients within hospital consultations

Health care systems only contribute in part to the health determinants, however "*even if only a small part of health variations are due to health care, it is clearly preferable to have ready access to good quality health services in order not to make inequalities worse*" (Lombrail 2000 p 403,my translation).

1.3.8 Cancer rates and prevention

Cancer is the main cause of mortality in France. It accounts for 32% of all deaths for men and 22% for women. These cancers figures rise for premature deaths (under 65 years) with 44% of female premature deaths caused by a cancer and 36% of male deaths (Chérié-Challine et al 2003). Cancer in France has been shown to be related to social

status (Menvielle et al 2005; Melchior et al 2005a; Dejardin et al 2006; Saurel-Cubizolles et al 2009). The risk ratio (RR) of cancer of the pharynx was 9.2 for men without educational qualifications compared to those who had passed their baccalaureate. Risk ratios for other cancers included larynx RR=6.2, lung RR=3.5 (Menvielle et al. 2005). Similar patterns of social inequalities were also demonstrated if the person's socio-professional category was used instead of education. The social inequalities were present but less marked for women: stomach RR= 3.9; lung RR=1.6. No association with SES was found for colon or breast cancers (Menvielle 2005), however these results do not appear to be age adjusted.

Of the 567 cancer deaths identified in the GAZEL cohort, male employees and manual workers were at higher risk (Melchior et al 2005a). The incidences of smoking and alcohol related cancers amongst men showed a strong gradient. The age adjusted hazard ratio for smoking related cancers was 2.9 (95%CI 1.37 -6.38) for male employees and manual workers compared to managers and 2.18 (CI 1.15-4.11) for alcohol related cancers.

In one region of France, Provost & Poirier (2007) found that the likelihood of having a mammogram and a cervical smear was directly related to the woman's level of education (adjusted OR 3.1) and her equivalised income (adjusted OR between highest and lowest income quartile 4.9). People currently unemployed or receiving minimum state benefit (RMI) were far less likely to have attended screening. This confirms the earlier cited findings from Gazel etc about people from low SES being less likely to attend disease prevention examinations.

1.3.9 Coronary Heart Disease (CHD)

Internationally, coronary heart disease is a major cause of social health inequality (Mackenbach, 2005), however France has relatively low levels of CHD. Kunst et al (1999) did not find a difference in CHD mortality between manual and non-manual classes in France using 1981 data. Using more recent data, Saurel-Cubizolles et al (2009) generally observed that social inequalities were wider for men than women except for cardiovascular mortality. In particular, mortality due to ischemic cardiac disease was wider for women.

The 3 French registers of the WHO- MONICA project showed a strong relationship was observed between occupational categories and the incidence of acute myocardial infarction and coronary events as well as the number of deaths (Lang et al 1997). The

data covers premature incidence for men aged 30-59. Both incidence and mortality rates were lower among senior professionals. Incidence was higher among employees and manual workers, however, manual workers only had raised death rates. Smoking and high blood pressure were associated with the coronary events and were linked to social economic status. The authors also found education to be a reliable predictor.

Using the same data set, Lang et al (1998) looked at the hospital treatment for coronary heart disease. Overal, senior professionals had lower fatality at 28 days after an infarction. The team found that once admitted to hospital there was no difference in hospital care, nor fatalities, amongst the different SES. Senior professionals, however, were more likely to receive hospital care, to have seen a specialist doctor before the acute event and have had exploratory cardiac examinations such as a coronarography.

1.3.10 Workplace and Absenteeism

Data from the decennial survey shows that 14% of the French adult population say they have had to give up work due to health problems for at least 1 month during their working life (Gourdol, 2005). Stopping work due to illness occurs more often amongst manual workers, see Table 1.8. The social gradient is apparent with only 8.3% of higher professionals having stopped work compared to 16.4% of manual workers. The gradient is steeper for men. Manual workers also appear to stop for a longer time, half the manual workers were off work for at least 6 months where this was the case for less than a quarter of the higher professionals.

	Senior professionals	Middle professionals	Employees	Manual Workers
All *	**8.3%**	**12.5%**	**13.0%**	**16.4%**
Men *	7.1%	12.3%	15.4%	17.6%
Women*	10.3%	12.9%	12.8%	14.1%

*standardised for age (retired and unemployed classified by their last job

Table 1.8 Percentage of people who interrupted their work for health reasons for more than 1 month during their working life (Goudol 2005)

Back pain was investigated amongst the French working population. Male skilled manual workers were particularly at risk as were female shopkeepers/craftswomen. Female 'care' workers, but not health workers, were also at greater risk. Having a father who is senior or middle professional protects against the likelihood of reporting back problems (Leclerc et al., 2006). This suggests that coming from a more privileged background is protective, regardless of current occupation.

In the Gazel cohort, sickness absence is distributed along an occupational gradient. Physical work conditions were estimated to account for 42% of absences, and work stress accounted for 48% (Melchior et al 2005b). Overall, the authors estimate that about 20% of the occupational class gradient in sickness absence could have been associated with deleterious work conditions. Obviously this paper leaves open the reasons for the other 80% of difference. It is interesting to note that in another Gazel study, 'low decision latitude' also closely followed the employment gradient (with low grades reporting 4 times more 'low decision latitude, $p<0.001$) (Fuhrer et al 2002).

Other French studies appear to confirm poorer working conditions for manuals workers, 36% report working in a noisy environment (compares to only 4.8% of senior professionals) (Goudol 2005). More have to do lifting, repetitive movements or working on a production. A third of manual workers report having their work rhythm imposed by their superior; this only occurs amongst 1 in 8 of senior professionals. 20% of manual workers have to frequently interrupt their work schedule to do another unplanned task (Arnaudo et al 2004). From a questionnaire to over 3,000 people in employment, a sense of control at work was most important determinant of self-rated health (Jusot et al 2007a).

Interviews with GPs and workplace doctors showed that they thought the workplace hierarchy and the style of staff-management negotiations did have an impact on the health of the employees. Poor workplace relations were perceived to have a greater negative impact on the health of employees than managers (Guiol & Munoz 2006).

1.3.11 Perception of health, including self-rated health (SRH)

In France, lifelong adversity experience (housing and financial difficulties, periods of isolation) has been shown to be closely associated with poor SRH even after controlling for age and SES indicators (men OR 2.0, 95%CI 1.5-2.6; women OR 2.3, CI 1.9-3.0) (Cambois & Jusot 2010). The proportion of French people reporting poor health is related to income, educational and occupation level. People living in a household with an annual income of less than 6000€ have a relative risk (RR) of 1.18 of reporting poor health compared to a RR= 0.70 for those in households with an annual income greater than 17,600€; however these findings were not controlled for age (Lanoë & Makdessi-Raynaud 2005). An earlier study that controlled for gender and age found a slight link with SES group. In a scale where 10 equals excellent health and 1 is very poor health; higher professions reported an indicator of 8.2 compared to 7.8 for manual workers and employees (de Kervasdoué 2000). A more recent age-adjusted study, showed that men

in the poorest income quintile had an odds ratio of 3.1 (CI 1.8-3.5) of reporting poor health when compared to the higher income category (Cambois & Jusot 2010). Unskilled manual workers were more likely to report poor health (OR 2.9, CI 1.8-4.6) as were those with only primary education (OR 2.5, CI 1.8-3.3) compared to those with post-secondary qualifications. The results for women followed an identical pattern but were all slightly more marked.

The employment pathway of those declaring poor health has been followed. Of a survey of 4,500 people all in employment, 2/3rd reported having good health. Of these people reporting good health, 6.7% had stopped working five years later, (either become unemployed, taken early retirement etc). Of those who had reported poor health in the original survey, 15.2 % were no longer working 5 years later (Jusot et al 2007b). Even after controlling for age, gender, education, people declaring poor health were 1.5 to 2 times more likely to become unemployed.

D'Houtaud & Field (1984) analysed 4000 people's responses to an open question about what health meant to them. The survey occurred in the north-east of France during a health check up and found clear social economic differences. They organised the responses into 41 categories. Manual workers were more likely to talk about health in terms of absence of sickness and prevention behaviours (not to be sick, avoid excesses, to be able to work). The middle and upper classes were more likely to mention aspects of psychological wellbeing (live without constraints, to see the doctor as little as possible, to be in equilibrium).

1.3.12 Health Behaviours

The overall percentage of people who smoke in France is currently estimated at 27%. Smoking rates have fallen for men by 2/3rds from 1980 to 2003, every socio-professional group showing a reduction. Over the same period, the female rate has increased from 17% to 21%, it has increased for all occupational groups except 'senior professional' women. INSEE data coming from the Barometre Santé show a clear social gradient for smoking with 24% of male senior professionals smoking compared to 48% of manual workers. These figures are 21% to 31% for the corresponding female groups. However, the Gazel cohort showed no significant link between employment grade and smoking (Melchior et al 2005a).

When comparing smoking rates and poor education in 23 countries for adults aged over 45, France demonstrates less inequality than most other countries (data from 1991).

France shows a very low association with SES for men and a reverse association for women (better educated women smoke more). The expected association (less education, more smokers) does become apparent for younger people of both genders. In this age group, the inequalities for France appear similar to that in other Western European countries (Mackenbach 2005).

Mackenbach (2005) suggests typical 'smoking epidemic' trajectories for countries. In the early 1990's, he suggests that France was similar to Spain and Italy, where female smoking rates were at their peak, and that males rates were falling, especially amongst educated men who are the most frequent to quit. He would predict that later studies of these countries would show a total reduction of smoking, and also a steeper SES smoking gradient.

Despite liver cirrhosis being closely linked to SES (see Table 1.6), findings of studies asking about alcohol consumption have been more variable. The 1991 'decennial health survey' found that 19% of manual workers drank more that 5 alcoholic drinks per day compared to 10% of male 'professionals' (p394 Leclerc et al 2000). Between 5-8% of women drank more than 3 glasses per day but with no obvious social gradient. The Gazel study showed that low levels of drinking was not linked to employment grade, however, manual workers were over twice as likely to drink over 4 units of alcohol daily (Melchior et al 2005a). The 'Baromètre Santé' (a telephone survey of 5000 people in mainland France) did not identify any SES difference when the number of glasses of alcohol drunk the previous day was asked (CFES 2001). It is possible that it is more difficult to discuss a socially disapproved behaviour such as high levels of alcohol consumption on the telephone than to interviewer.

Although the prevalence of obesity is relatively low in France, it is linked to socio-economic status. In 10 Western European countries including France, overweight was associated with less education especially for women (in Machenbach 2005). A French study found that adult obesity levels were 12.9% where monthly incomes were less than 900€ per month compared to 5% in households with more than 3000€/month, (p38, reported by de Kervasdoué, 2000).

The SES of road users is not regularly collected however a 1997 study specifically looked at the occupations of drivers involved in accidents. Manual workers were the group that were most likely to be seriously injured. The professional occupational category as well as people who drive for a profession were the least likely to be involved in an accident (Haut Comité de Santé Publique 2002). As about a third of road

accidents are linked to excess alcohol, this may in part explain the variations as manual workers and the unemployed appear to consume more alcohol. Alternatively, it may be linked to higher SES groups having more recent cars which better protect their occupants against injury.

Although public health studies often focus on 'avoidable deaths' (see section 1.3.5) and health behaviour as they are perceived to be amenable to change, non-avoidable deaths also follow the same SES gradient.

1.4 Comparing France to other countries

1.4.1 Comparing measures of income inequalities

Although a number of different inequalities measures exist, one of the more frequently used is the Gini coefficient (De Maio 2007). The Gini coefficient measures the extent to which the distribution of income within a country deviates from a perfectly equal distribution, where a value of 0 represents perfect equality and 100 is complete inequality. The World Bank calculated that the French Gini coefficient has now stabilised and is at a level of 32.7 (see table 1.9).

Country	Gini coefficient	Quintile share ratio
France	***32.7***	***5.6***
Sweden	25.0	4.0
Netherlands	30.9	5.1
Canada	32.6	5.5
Belgium	33.0	4.9
Italy	36.0	6.5
UK	36.0	7.2
USA	40.8	8.4
Brazil	57.0	21.8

Table 1.9: Measures of income inequality for selected countries (World Bank Indicators 2007/8 http://hdrstats.undp.org accessed 20/07/09)

France has a lower level of equality than the Scandinavian countries such as Sweden but is relatively well placed compared to the UK, USA and Brazil. The second column of the table shows the ratio of equivalised income received by the richest 20% of the population compared to that by the 20% with the lowest income. France's richest 20% has an income 5.6 times greater than the poorest 20%. France has a fairer distribution of income compared to some other EU countries.

In France, the ratios of incomes (either deciles or quintiles) have remained fairly constant for the last decade (Legendre 2004), after showing a clear reduction in inequalities during the 70s and 80s (Maurin 2007). The income of the poorest 10% has increased by 16.3% from 1996 to 2001 (the top 10% by 13%) whilst the rest of the population have only seen their level of income increase by 9%. In other words, the poorest 10% is catching up with the average population, but the very rich are extending their gap from the average.

Other measures of relative poverty include the number of people living on an income 60% below the mean national income. In 2001 in France, 12.4% of the population live on or below the 60% poverty line (6.1% below the 50% line) (Legendre 2004). The percentage has been reducing slowly over the last 10 years. A fairly low proportion of the population are living in poverty compared to other European countries.

1.4.2 *Comparing mortality inequalities internationally*

An early paper comparing French mortality rates internationally found that inequalities rates were greater in France than elsewhere (Leclerc et al 1990). Using data from large national cohort studies, mortality was compared for middle aged men. According to this measure, social inequalities were of the same order in England and Finland, and greater in France. The differences relating to the principal causes of death leading to inequalities between the three countries were cancer and cirrhosis in France compared to accidents and cardiovascular diseases in Finland and England.

Kunst & Mackenbach (1994) showed that health inequalities by socio professional class in France were more than 6 times greater than Norway and Denmark. Mackenbach et al (1997) then showed that for mortality by occupational class in men aged 45-59, France had the largest inequality (RR 1.71, 95% CI 1.66-1.77) compared to 8 other countries (see Table 1.10). This calculation was based on comparing manual workers to non-manuals and excluded inactive men. In 1998, this team stated that ‘France leads the

Country	Rate ratio (95% CI) *	
	30–44 years	45–59 years
France	..	1·71 (1·66–1·77)
Finland	1·76 (1·69–1·83)	1·53 (1·49–1·56)
England/Wales	1·46 (1·24–1·74)	1·44 (1·33–1·56)
Denmark	1·53 (1·47–1·59)	1·33 (1·30–1·36)
Italy	1·35 (1·28–1·42)	1·35 (1·25–1·46)
Spain	..	1·37 (1·34–1·39)
Sweden	1·67 (1·59–1·75)	1·41 (1·38–1·44)
Norway	1·65 (1·57–1·74)	1·34 (1·30–1·39)
Switzerland	1·45 (1·36–1·55)	1·34 (1·29–1·39)
Netherlands	..	..
Germany (W)	..	..

Table 1.10 Relative premature mortality for men by manual versus non-manual occupation (Mackenbach, Kunst et al 1997)

international league table' (of the then 11 countries under consideration) (Kunst et al 1998b). These papers are widely quoted in France (e.g. reproduced in Leclerc et al 2000) but their results remain controversial.

Calculating relative mortality risks in order to compare countries has been criticised. As seen in an early section of this chapter, absolute and relative measures can show contradictory results. It may be that some countries have more 'extreme' groups i.e. a country with a highly developed tertiary sector may have few manual workers. This seems unlikely to explain the high French rate as the distribution of the population over 8 occupational classes was described for a number of European countries (Cavelaars et al 1998), and there were no very large differences between the countries. Relative calculations are also affected by the size of the overall mortality rate. If the mortality rate is low, a slight difference from this rate would appear as a larger relative difference compared to a country with a high mortality rate. The absolute rates have been calculated. When data was collected in 1985, the probability of dying for a manual male worker aged 45 to 65 in France was 27.6%, and for a non-manual worker was 16.2%. This gives a French absolute difference of 11.4% which is considerable larger than the absolute differences in mortality of about 5.5% in the Scandinavian countries and 7.5% in England (Kunst et al 1998b), and (p205 Dahl et al 2006).

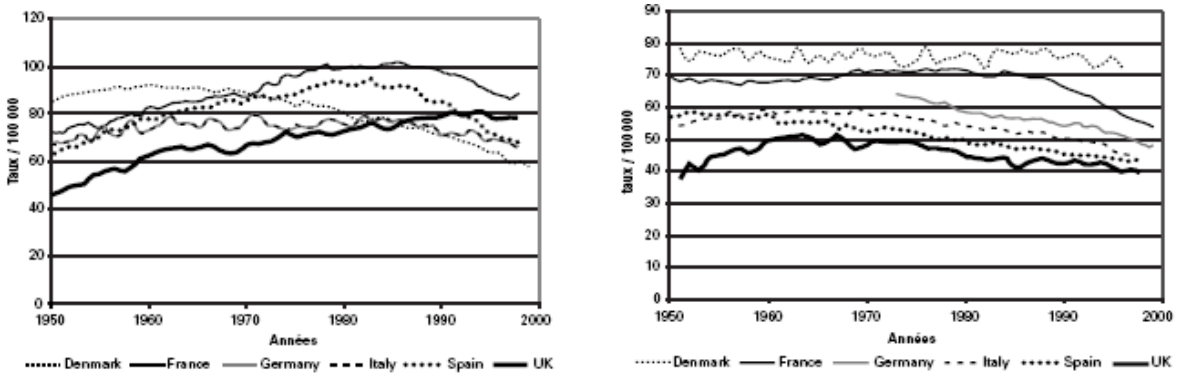
Clearly using relative or absolute measure, France appears to do very badly. One point should be noted however, the international comparisons by Kunst and Mackenbach use data for France from Desplanques 1985 report. Although this data set is large longitudinal study, the findings should be confirmed using data from another source. A more recent study by Dalstra et al (2005) compared specific diseases by education attainment for 8 countries, it found that France had low level of inequalities for all disease groups except hypertension. The French data came from the health and social protection survey (ESPS, see Appendix 4). A similar earlier comparison of diseases using the Desplanques data showed France to have a high rate ratio by manual v non-manual (Kunst et al 1998c). Apart from different data sources, explanations for the difference in these 2 studies is that one used education and the other occupation to measure SES; the diseases were self-reported; and also the Dalstra study followed people to age 79. France's striking inequality differences are amongst men of working age.

Despite having a good health care system, France does appear to have very high mortality for avoidable diseases amongst male manual workers aged 45 to 59 (Haut

Conseil de Santé Publique 2009). This results in high health inequalities rates when compared to other Western European countries. Mackenbach et al (2008) showed that France has average levels of inequalities for obesity but very low inequalities for smoking. Cigarette smoking does not appear to be the cause of the high mortality amongst male middle-aged manual workers.

1.4.3 Comparing cancer and other specific disease rates

Cancer is the main cause of mortality in France. Comparing France to 5 other western European countries for premature deaths from cancer shows that France has the worst rate for men and the second from worst for women (Chérié-Challine et al 2003). As Leclerc's (1990) article showed, cancer is closely linked to SES in France. Reducing its impact on premature mortality would have a beneficial effect on reducing social health inequalities.



Men Women

Fig 1.5 Evolution of premature cancer rates (0-64 years) from 1950 to 2008 in 6 European countries (Chérie-Challine et al 2003). *French data = top solid line*

In other diseases which are rarer in France such as heart disease, there is less SES inequality than with cancer (Kunst et al 1999). This is a common pattern with, for example, heart disease being the greater cause of premature mortality in the UK and showing the greatest link to SES inequality.

When comparing France to 7 other European countries for self-reporting chronic conditions, France showed one of the lowest levels of social inequalities for nearly all conditions e.g. cancer, heart disease, except hypertension (Dalstra et al 2005). The SES measure was education attainment. The result of France showing such low levels of inequalities may be due to the fact that the sample covered people up to 79 years old. As seen earlier, although premature mortality is closely liked to SES in France, the association is less strong for older populations.

1.4.4 Comparing self-reported health (SRH) internationally

Self-reported health has been shown to be a reliable predictor of morbidity and mortality (Appels et al1996;Goldberg et al 2001;Idler et al 2004). Early Eurostat data showed enormous variations amongst countries (Eurostat web site: 2001 - 2004 data) but the results of more recent surveys are far more constant. A 2007 survey shows the range is from 34% of Greek people saying their health is good or very good to 51% of people living in Spain, (Table 1.11). In France, 43.5% of people report good or very good health, close to the EU average of 44.7%.

	France	Spain	Italy	Germany	Belgium	Estonia	Czech Rep	Ireland	Denmark	Greece
SRH % good or very good	**43.5**	51	51	47	47	45	42	38	33	34

Table 1.11 Percentage reporting their health as good or very good for a sample of European countries (2007, European Health Interview Survey, Eurostat online database)

Whereas mortality is marked by very high levels of inequality in France compared to other European countries, this does not appear to be the case for SRH. France had an 'average' position for inequalities compared to 6 other European countries when SRH was compared by household equivalent income (Mackenbach et al 2005). The study found that higher household equivalent income was associated with better self-assessed health among men and women in all countries, particularly in the middle-income range. In the higher income ranges, the relationship is generally curvilinear and characterized by less improvement in self-assessed health per unit of rising income, thus suggesting that there is a decreasing health gains per unit increase in income amongst the most wealthy. Similar 'average' level of inequalities for France was found using men's SRH by occupational group for 7 countries (Cavelaars et al 1998) and comparing manual to non manual workers for 11 countries (Mackenbach et al 1997)

Hyde et al (2006) compared self-rated health (SRH) from the Gazel cohort to that of cohorts from England, Germany and the Netherlands. An association was found between SRH and SES for men from all countries, but it was the weakest in France. There was no association for French women. This may indicate that there is little health inequality in France but other studies do not confirm this finding. It is more likely to be due to only 6% of the French sample was classified as having low SES compared to 29% to 69% from the other countries. The other data came from nationally representative longitudinal studies, whilst that from France came from a cohort of employees from just one

company. This publication demonstrates the necessity to make international comparisons from data that has been collected in a similar manner.

1.4.5 Comparing 2 cohorts: Whitehall and Gazel

The cohorts (Whitehall in UK and Gazel in France) are similar in many respects: number of participants, average age, however fewer of the French participants received higher education and their fathers are more likely to have been manual workers (Fuhrer et al., 2002). The outcomes of sickness absences (> 7 days) and self-rated health were compared from 2 cohorts, and the age standardized prevalences are shown below in Fig 1.6. Similar gradients of sickness absence and self-rated health can be observed even if the French cohort are more likely to take sick leave and the British more likely to report less than good health. If the highest and lowest occupational categories are compared, both cohorts have found about 4 times more sickness absence and similar patterns for self-rated health (Melchior et al., 2003).

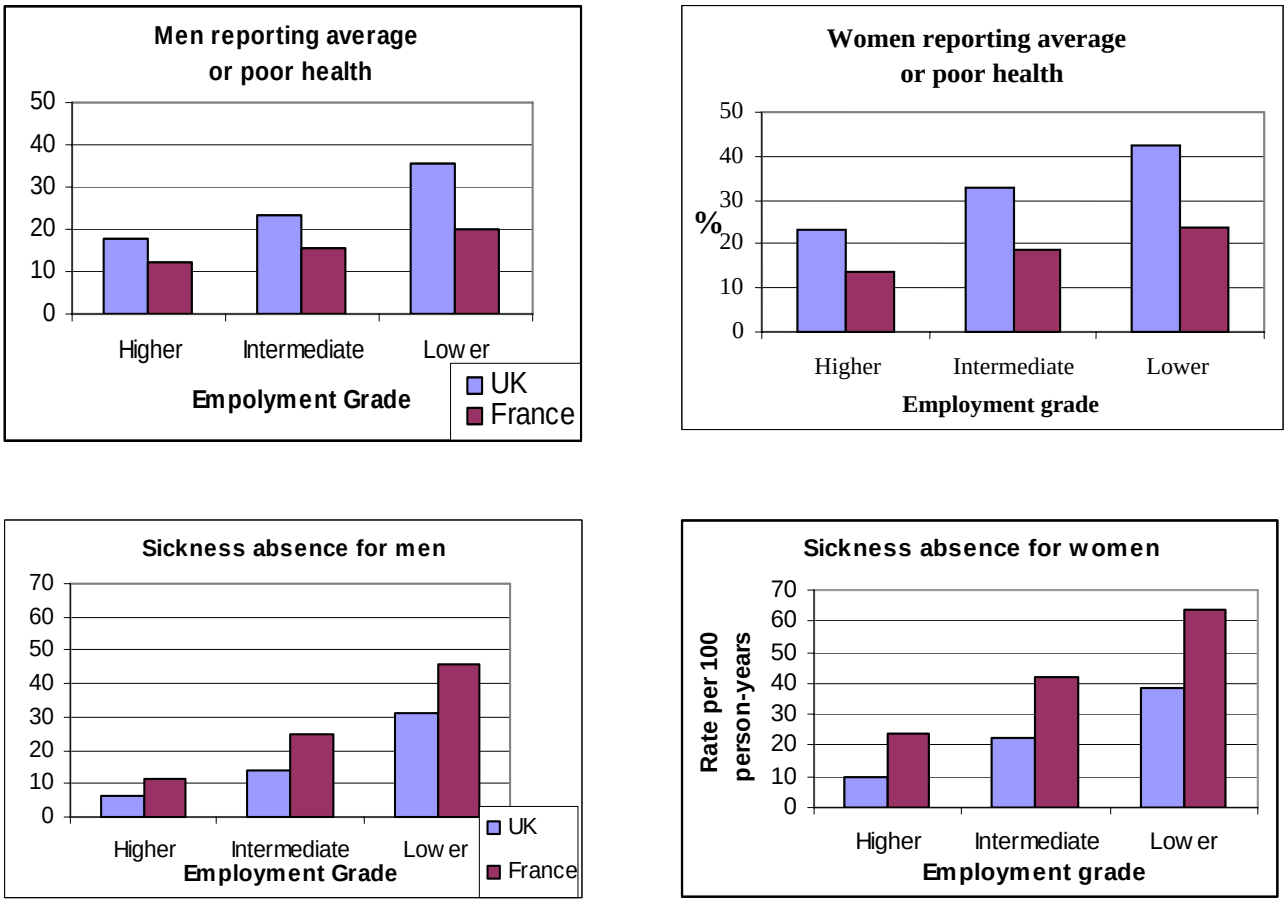


Fig 1.6 Participants from 2 cohorts reporting long term sickness absence (>7 days) and less than good heath by employment grade, by sex adjusted for age. (Fuhrer, Shipley et al 2002)

When trying to look at the explanatory factors, the pattern of alcohol drinking was different in the 2 countries. In the UK, people from low grades drank less whilst in France they drank more than the high grade employees. A greater social gradient in smoking can be observed in the UK than in France. People in lower employment grades in the UK consume less fruit and vegetables, however in France, the lower employment grades eat more fruit and vegetables than the higher grades. As the authors themselves point out, the 2 cohorts show similar health inequality gradients yet smoking and fruit consumption, considered to be important explanatory factors for inequalities in the UK, don't appear to be significant in the French sample (Fuhrer et al., 2002).

It is interesting to note that another variable 'low decision latitude' closely followed the employment gradient in both countries. Men at all grades were far more likely to report having little possibility to take work decisions than women. This may be due to a real difference or another explanation could be that the need to feel autonomous at work is more important for men.

1.4.6 Taking a life course approach

There has been discussion of whether health inequalities are mostly influenced by current factors such as current income or by an accumulation of factors throughout a lifetime which is known as the life course model. In the US, McDonough et al (1997) found that significant increases of mortality were associated with persistent low income and also with income insecurity. There is now a substantial body of evidence that an accumulation of life chances lead to better health rather than simply one's current situation (Kuh et al 2002; Davey Smith & Hart 2002; Adams et al 2004; Singh-Manoux et al 2004; Maty et al 2008).

In France, Leclerc et al (2006) found that childhood SES had an impact on back pain independent of adult SES. Adversity experienced in childhood rather than in adulthood, was more closely associated with poor SRH and chronic diseases (even after adjusting for current social status) (Cambois & Jusot, 2010). Again after adjusting for current SES, female obesity was found to be more closely associated with childhood economic hardship and father profession than the women's adult status (Khlat et al 2009). No association was found for men. However, in Newcastle UK, a downward socioeconomic trajectory over the whole life course was associated with poorer self-reported mental health in men ($p<0.001$) but not women (Tiffin et al 2005). From Gazel data, Melchior et al (2006a) found that downward trajectory or continual low status was associated with an increased premature mortality for both men and women. Melchior et al (2006b) also

observed from the French Life History Survey, that lifetime socioeconomic circumstances are associated with functional limitations in midlife.

Kahn and Pearlin (2006) found that persistent hardship had a more damaging effect on health than episodic difficulties, so that the health effects of early hardship could be obviated if followed by no further hardship. Comparing self-rated health to childhood (father's occupation) and current occupation SES for 4 countries showed inconclusive results but generally stronger associations between adult SES and health than childhood SES. The results for France were slightly different as they showed an association with both childhood and adult SES and health for men but no association with either marker of SES for women (Hyde et al 2006).

The GAZEL study in France found not just social class differences (manual workers v managers RR= 2.20), but also men who had experienced no upward professional mobility (RR=3.73) showed an even greater increased risk of developing cancer. This association is partly, but not totally, explained by higher tobacco and alcohol consumption. There was no significant similar association for women (Melchior et al 2004).

Using the Permanent Demographic Sample (EDP), Cambois (2004) showed a close relationship between occupational mobility and mortality for men between 1968 and 1975. Favourable occupational moves put them at less risk of mortality than their ex-colleagues. The reverse was also true for those who had slid down the occupational hierarchy. For people who had moved class, their mortality risk was in between the class they had left and the one they had moved too.

Life course experience, and in particular childhood experience, does appear to have an impact on health. The negative impact on health of a downward social trajectory has been more clearly identified for men than women. Lang et al (2009) has suggested that the life course approach is more likely to explain the fundamental causes of health inequalities.

1.5 Explaining health inequalities: Behaviour, material poverty and psychosocial factors

Social inequalities have a universally negative effect on health (Dorling et al 2007). There are several competing theories as to why social inequalities should be related to health. These theories started to be outlined in the 1980 UK Black report and have continued to

be discussed since. The selective social mobility hypothesis may have a slight effect (Jusot et al 2007b) but Douglas Black dismissed it as at most only marginal (Black 1991). The SES differences in health may be due to differences in personnel behaviours such as cigarette smoking, to a lack of material resources necessary to obtain sufficient heating, quality food or to psychosocial factors. The health differences can't only be accounted for by differences in lifestyle behaviours. Studies from the Whitehall cohort show that a combination of all individual risk factors (smoking, blood pressure, body mass index…) accounted for between a quarter to a third of the mortality gradient (Blane et al1996; Marmot, 2004). A new Whitehall paper has shown that behaviours (e.g. smoking) during life-course may account for more of the mortality differences (Stringhini et al 2010). Even allowing for measurement error, a significant proportion of the differences must be due to something other than individual risky behaviours.

Much of the debate about health inequalities has focused on the damage done by poverty. The term 'poverty' usually refers to material poverty, the inability to buy sufficient food, heating etc. Numerous studies, in France as elsewhere, have shown that there is a gradient in health amongst those who are not poor. The higher a person's socioeconomic position, the lower the person's morbidity and mortality. The earlier illustrations e.g. Fig 1.3 or Table 1.3 shows that in France like other developed countries, a teacher or shopkeeper who has sufficient income to meet their material needs: a comfortable house, food on the table etc. yet these groups of people have a greater probability of dying prematurely than people classified as senior professionals.

Although still debated (eg Lynch et al 2004), in industrial countries there appears to be little relation between national average income and life expectancy, moreover, there seems to be an association between mortality and income inequality (Mackenbach & Bakker 2002; Wilkinson 2005; Wilkinson & Pickett 2006). Looking at data for 126 countries Dorling et al (2007) found that mortality was higher for a given level of overall income in more unequal nations than those which are more egalitarian. Income inequality rather than material wealth was more closely associated to mortality, especially for young people. Relative childhood poverty appears to be closely associated with health (Emerson 2009). Kondo et al (2009) reviewed 27 studies covering 60 million people. They found that greater income inequality was associated with poorer self-rated health, and the association increased in more income unequal countries. Specific health conditions such as overweight and mental health appear to be associated with income inequalities (Pickett et al 2005; Pickett et al 2006) as are many other societal problems such as homicide.

Researchers have suggested that geographic areas with greater social inequalities may suffer from systematic underinvestment in schooling, health care, and these "neo-material" factors consequently lead to poorer health status among the disadvantaged (Muntaner & Lynch 1999; Lynch et al 2004).

Another school of thought proposes a psychosocial explication that disparities in social standing (measured by level of education, income or occupation) create stresses that can eventually damage a person's health (Subramanian & Kawachi 2004; Marmot & Wilkinson 1999). The biological evidence for the damage this social stress can cause will be examined in the Chapter 3. Biological pathways have been identified which suggest that chronic stress has an extremely negative effect on many vital organs and can lead to premature aging (Sapolsky, 2004).

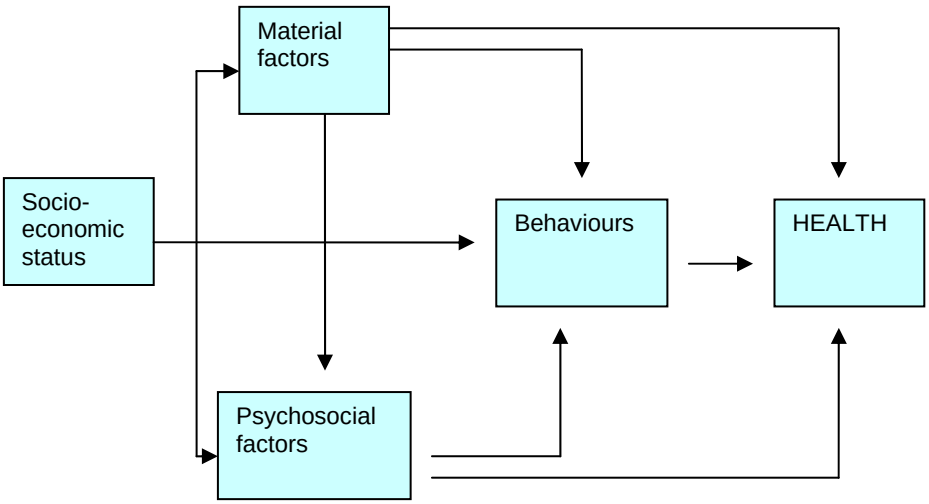


Fig 1.7: Factors which have been shown to mediate between SES and health (Mackenbach, 2005)

These two points of view (material causes or psychosocial factors) sometimes appear as opposites; as if only one could be the correct explanation of health inequalities but probably the two approaches are complementary. The discussion today is less about the existence of the different boxes in Fig 1.7 but rather what their relevant sizes are. There can be a real lack of resources in some families. Better schools are often in upper middle class areas where parents are more actively involved in ensuring the quality of the education that their children receive. However, as the same social gradient exists between all classes in all countries of what ever political colour, and health is less good in societies where income differences are bigger, a more fundamental psychosocial explanation seems likely (Subramanian & Kawachi 2004; Wilkinson & Pickett 2006).

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The psychosocial hypothesis would suggest that unequal distribution of resources that lead to increased competition (Marmot 2003). Areas with greater unequal resources

mean more competition, more stress, increased violent confrontation and even homicide (Wilkinson 2005; Neapolitan 1999; Wilkinson & Pickett 2005). It is also suggested that more egalitarian areas are more socially cohesive, leading to greater levels of trust and cooperation, less psychosocial stress, and consequently to better health status (Kawachi et al 1997). Some of the psychosocial factors that Chauvin and Parizot (p72005) list as important for health are psychological capital (self esteem), social integration, ability to access health care and health beliefs.

1.5.1 A resilient underclass?

Ferrer and Palmer (2004) found the expected association between self-rated health and income, however they also observed that most of the variability is found is the middle and lower centiles rather than the upper portion of the distribution. There appears to be a resilient subgroup of lower socio-economic status people who maintain good self-rated health throughout life, while a more vulnerable lower socioeconomic status group experiences rapid deterioration in health as they reach middle age. (The SRH measure was SF12 which covers both mental and physical health. The data came from a national survey in the US covering 47,000 adults). If these results are replicated by other studies, a key research question is to see where these resilient subgroups have extra psychosocial resources such as social networks or a feeling of empowerment etc or extra material resources. For example, perceived control has appeared to mediate some of the effects of material deprivation on health in post-communist countries (Bobak et al 2000). Despite adjusting for education, income and occupation, (Singh-Manoux et al 2003) found that a persons belief about his/her place in the socioeconomic order was a predictor of ill health.

1.6 Reducing inequalities: Policies

Back in 1991, Whitehead wrote that “the widespread evidence shows systematic and avoidable differences among the health of social…groups. The debate is no longer about whether inequalities in health exist, but about what can be done about them” (Whitehead & Dahlgren 1991). The sub-titles of 2 recent French publications ‘from observation to action’ and ‘not an inevitability’ are in agreement (Leclerc et al 2008; Haut Conseil de Santé Publique, 2009). However Mackenbach (2005) reminds us that the omnipresence and persistence of inequalities should warn against unrealistic expectations of a substantial reduction in health inequalities in the short term.

A country's political tradition is the framework in which new policies can be developed. Espelt et al (2008) showed that health inequalities seem to be less prevalent in some European styles, notably that of the 'Social Democratic' countries. Whilst Eikemo et al (2008) found the least inequalities amongst countries with Bismarckian welfare regimes. The influential WHO commission has three overarching recommendations to close the health inequality gap in all countries regardless of their political tradition. They are :

1. To improve daily living conditions
2. To tackle the inequitable distribution of power, money and resources
3. To measure the problem and assess the impact of action (WHO, 2008)

The importance of the first comprehensive national review of inequalities – the UK's Black report – has been discussed earlier. In 1998, the UK's second independent inquiry into inequalities in health was published (Acheson 1998). Its monitoring report found that a narrowing of inequalities had occurred in absolute terms for teenage pregnancy, road accidents and deaths from cancer and circulatory diseases. However, these reductions did not translate in a narrowing of the relative gap (Health Inequalities unit 2008). Earlier this year, a new independent inquiry 'Fair Societies, Healthy Lives' proposed that reducing health inequalities will require action on six policy objectives:

- give every child the best start in life
- enable all to maximise their capacities and have control over their lives
- create fair employment and good work for all
- ensure a healthy standard of living for all
- develop healthy and sustainable places and communities
- strengthen the impact of ill heath prevention (Marmot 2010).

Other European countries have developed similar policies e.g. the Netherlands (Den Haag 2001), Norway (2007) and Sweden (Stockholm 2000). The themes in the Swedish report are particularly interesting as they emphasize a psychosocial approach to reducing inequalities. They include: strengthen social capital (reducing poverty, housing segregation, isolation and loneliness); growing up in a satisfactory environment (having a secure parent-child bond, schools that strengthen children self-confidence); improving conditions at work and reducing unemployment, as well as creating a satisfactory physical environment.

A review of the 2007 Norwegian policy believed that the introduction of the White paper had been possible as several reviews of the inequality data had already occurred. The reviews increased awareness of inequalities in Norway. Also a change of Government provided the high level commitment needed to introduce new national policies (Strand et al 2009). The implementation of the White paper, which aims to level-upwards the social gradient, is under the responsibility of the Health Ministry but requires an intersectorial approach. The national government supports counties and local municipalities via local

action plans and a grants scheme. Health impact assessment is being implemented as a new 'planning and building' refers to the health determinants and requires that they are taken into consideration in all official planning exercises.

Concluding from the Norwegian experience the authors suggest any national policy development requires (Strand et al 2009) :

- a clear and indisputable political mandate based on high level support and direction
- good quality relevant data and research
- an intersectorial understanding of the essential concepts of the social determinants of health.

An intersectorial approach seems indispensable. A meta-analysis of 64 papers suggests that the cost-benefit ratio of investing in education on health is highly positive (Furnee et al 2008).

1.6.1 Inequality policies in France

Even if France was in the forefront of public health in the 19th century, the 'new' public health movement born after the second world war has developed essentially in the Anglo-Saxon and north European countries (p163 Spira & Flahault 2007). Public health has not been seen as a priority, and therefore it was not at the top of decision makers' agendas (Leclerc et al 2000). It took the health scares of the 1990's such as contaminated blood for transfusions, CJD, then subsequently the summer heat wave and avian flu, to increase the legitimacy of public health. In August 2004, for the first time for 100 years, a new law relating to public health policy was introduced. Equally, socio-economic health inequalities were not high on the public health agenda. Until 10 years ago, there were few data, researchers working on this topic were rare and France was often absent from international conferences (Lang in Mackenbach & Bakker 2002). This is in stark contrast to regional geographical differences which have been identified and debated for at least 2 decades. As mentioned earlier, the number of quality publications discussing the French inequality gradient has increased during the last decade.

The French welfare state is based on the principle of solidarity (EC 2007). This commitment is highlighted in the first article of the French Code of the Social Security and is understood as sharing responsibility and providing support for all members of the society. A guaranteed minimum wage was introduced in 1970 (Loncle & Muniglia 2006). Twenty years ago the minimum income (RMI Revenu minimum d'insertion) was introduced (it was adapted in July 2009 to become a slightly different benefit known as the RSA Revenu solidaire d'autonome). In 2005, 1.3 million people received this benefit which not only acts as an income safety net but allows free access to health services

(Chauvin & Lebas 2007). For most medical care in France, the patient has to pay the doctor and then is partly reimbursed by the social security system.

In 1999 the Universal Medical Coverage (CMU) law came into force (Paris:Law N° 99-641). It allows people who may not have gained the right via employment (i.e. those recently arrived in the country or divorced) to access health care services. On top of the compulsory national insurance, 83% of the population subscribe to a private supplementary insurance to ensure the majority of their medical costs are reimbursed. The CMU co-payment allows low income people to have 100% of their health costs covered. This right applied beforehand to those receiving certain benefits but the new law simplified the entry criteria, for example the majority of young people (18-25 years) now benefit from free health care. In the general population however, inequalities still exist as manual workers use 6% of their income to pay for complimentary medical insurance compared to 3.7% of income of senior professionals (IRDES 2008).

In 1998, a law against social exclusion was approved. Article 71 of this law outlines measures aimed at guaranteeing access to healthcare for all. It enabled the development of regional programmes relating to the prevention and access to health care for at risk populations (PRAPS). . Some of these programmes do appear to have been successful, in particular that relating to suicide (Bellanger et al 2007). These programmes have been followed by the 'permanent access to health care' (PASS Permances d'accès aux soins de santé) based in hospitals. There were 370 PASS in France in 2003 and they focus on supporting vulnerable people by improving partnerships between the health and social sectors (Chauvin & Lebas 2007; HCSP 2002).

The National Observatory of Poverty and Social Exclusion was set up as a result of the Law against exclusion of July 1998. It is a multidisciplinary council which aims i) to disseminate existing data relative to poverty and exclusion, ii) to commission research, and iii) to produce an annual report to Government. The National Council for Policies to Combat Poverty and Exclusion (CNLE) reports to the Prime Minister. It advises the Government about the fight against poverty and social exclusion. In particular, it attempts to coordinate the national government, non-government organisations and local agencies who are active in this field. A Ministry of Work, Housing and Social Cohesion has been created as has the Agency for social cohesion and equal opportunities (ACSE). In parallel, there has been a process of revitalising 'problem' estates which were created as a result of spatial segregation. The riots around Paris and in many other cites of autumn 2005 brought into focus the need for greater social cohesion. Urban social cohesion contracts (CUCS) create a formal partnership between local and national governments

allowing extra financial resources to be available for priority areas to improve the wider urban determinants of health including employment, education and housing as well as public health. 'Hopeful suburbs' (Espoir banlieues) is another new programme for urban areas. Another type of initiative is the ASVs (Ateliers Sante Ville), with their focus on reducing inequalities. They now cover 300 deprived neighbourhoods and are generally managed by city councils. Their funding comes from three sources: 35% regional health agencies (the old DRASS); 45% city/agglomeration, 10% from Regional Public Health Group funding and 10% from other sources (ACSE 2009).

Despite this active desire to reduce economic poverty for the most vulnerable, policy development has not recognised the existence of a gradient of health between the social professional classes. The public health law (Paris 2004) states in its first article that "Public health policy concerns…reducing health inequalities", but the gradient of health inequalities between social-professional classes is not specifically mentioned. Of the 100 objectives, only two relate to poverty and/or inequalities. Objective 33 aims to reduce the financial barriers to medical care for people on incomes just above the CMU threshold. Objective 34 aims to increase the life expectancy of vulnerable groups. The law has indicators for each objective. Life expectancy between occupational categories, as well between those in and out of work, and by place of birth, are the proposed indicators for Objective 34.

The 2004 law also introduced regional public health plans for the 22 regions. Some, such as the one in Rhône-Alpes, had a focus on inequality reduction (Cluze et al 2007). Regional health governance radically altered in April 2010 with the creation of Regional Health Agencies. The Agencies have not yet published their plans. Three public health books were produced as guidance for the new directors, one of which focused on inequalities. It contains 16 specific strategies (ex: work place, mental health & nutrition) and 3 general strategies which focus on childhood, the environment and territories (Basset 2009).

Elsewhere, a review of policies in different European countries praised the policy of inviting all French employees to annual health examinations (Mackenbach & Bakker 2003). These give an opportunity to introduce preventive messages to those who otherwise may have few contacts with the medical system.

1.6.2 Comments on French inequalities policies

Fassin, Lang et al (in Leclerc et al 2000) suggest the need to reduce inequalities in French society generally. They also proposed greater equality in accessing health care and prevention, an evaluation of the impact of policies and more public debate on the issue of inequalities. Whitehead & Dahlgren (2006) support this approach as they propose that the most effective strategies are those that integrate health-equity objectives into existing social and economic programmes.

An EU-funded survey looked to see if policies on social inclusion had been mainstreamed into national policies. When asked if the government had mainstreamed poverty and social inclusion into legislation relevant to economic development, only 3% of respondents in France replied positively compared to an EU average of 14%. Replying to the question about mainstreaming social inclusion into health services, the French replies were the same as the EU average at 22% (probably reflecting the universal health insurance legislation) (Loncle & Muniglia 2006).

In 2003, Mackenbach & Bakker (2003) felt France, like Italy, was at a 'stage of concern'. Couffinhal et al (2005) when reviewing European health inequality policies felt that France was behind countries such at the Netherlands, UK and Sweden. As can be seen in the section above, France has some public policies and also a large number of non-statutory organisations working to reduce the impact of poverty on health. A problem with these worthy policies is that they are not aiming to reduce inequalities across the social gradient. Reducing social inequalities can not only focus on poverty reduction. A far larger proportion of attributable deaths come from early deaths from people above the poverty line (Marmot 2001; WHO 2008), and this approach has not yet come to the forefront of French policy making.

The one objective of the 2004 public health law is a positive step but France is far from having a comprehensive health inequalities plan. Some researchers have called for a radical funding approach such as adopting 'RAWP' Resource allocation working party principles to ensure health care funding is more equally distributed (Bellanger & Jourdain 2004). The long term problems accumulated in communities would require significant funding over a substantial period in order to produce successful results. At a sub-national level, the public health plans of the new Regional Health Agencies could be an effective tool for focusing on health inequalities. The WHO healthy city programme which has the reduction of inequalities at its heart, has been active for the last 20 years. In France, 72 cities are members of the national network. The CUCS (Urban social cohesion contracts) could be real examples of the type of policy that would allow the integration of health-

equity objectives into broader social and economic programmes suggested by Whitehead & Dahlgren (2006).

The EU has called for development of national strategies that target both up and down stream determinants and to prioritise sustainable actions that address the inequality gradient (EC 2007). These statements came from a working group that fed into the WHO's Commission on social determinants (2008). The new French public health law planned for 2011/12 could be a key opportunity. In preparation of the new law, the Ministry of Health commissioned a review of health inequalities that is due to report during the summer 2010. A recent report from the national expert committee for public health about health inequalities contains 16 recommendations (HCSP 2009). The first of which is that the new law contains an inequality objective which aims to reduce the social gradient via actions relating to the health determinants.

1.7 Conclusion

The study of inequalities is also the study of the social determinants of health more generally, it enables a better understanding of everyone's' health and wellbeing (Wilkinson & Pickett, 2006). There is an additional reason why studying them is important, which is one of social justice (WHO 2008). Health inequalities are socially generated and can be reduced.

Social inequality gradients in health have been identified across the globe, including France. Despite a minimum wage, universal access to education and health care, health inequalities are not reducing. In other industrialised countries the same pattern has occurred (Kawachi & Kennedy 2002). High social status people (whether that is measured by income, occupation or education) have seen their life expectancy increase faster than those lower down the scale. Whilst the female health inequality rates have remained stable in France, the health of high SES men has improved. Manual workers' health has not got worse, it just has not improved as quickly (Monteil & Robert-Bobée, 2005).

Premature mortality rates for French men are high and show particularly large inequalities between occupational classes. These appear to be at least in part due to excessive alcohol consumption by manual workers. Table 1.6 shows that cirrhosis and upper tract cancers are ten times more frequent amongst manual workers than senior

professionals. This gradient is much stronger than that for lung cancer for example, so smoking differences are less likely to be the major cause of inequalities. Accidents and suicide are also causes of premature mortality. What is it in French society that makes working age men, in particular those from low social backgrounds to drink excessively and for some, to feel so unhappy they wish to end their life?

There is increasing evidence that social health inequalities have a psychosocial component, which is as important as access to material resources. The Whitehall studies have shown that university-educated civil-servants in stable jobs with reasonable incomes have worse health than those above them in the workplace hierarchy. The psychosocial differences between the grades appear to be more important for health than only lifestyle or material differences (Marmot 2004). A social gradient or hierarchy exists in all countries but appears to be flatter in some than others. It is often identified by looking at a country's relative income inequality, however in France, income inequality is low (illustrated by the Gini coefficient) and yet male health inequalities are one of the largest in Western Europe. Other causes of inequalities must be having an impact on health.

Factors, such as poor work conditions or decision latitude, may explain some of the health differences. Also the rigid social signals (such as using 'tu' or 'vous') could result in cultural norms generating a more apparent social hierarchy in France than in some other countries. There is a wide variety of social security schemes accessible to people from a particular profession. Each scheme offers its members a different level of social, health, unemployment and retirement benefits. Access to higher education may also be an issue, at age 12 the children of manual workers make up 32% of secondary school places but only 6% of those at the preparatory classes necessary to enter the elite engineering and 'grand ecoles' are from manual backgrounds (Maurin, 2007).

Problems with collecting socioeconomic status and health data from surveys do exist (Kunst et al 1998a). Despite this and other methodological problems such as controlling for composition to identify contextual effects in area studies, the international body of evidence about social health inequalities is now extremely strong. Some countries have explicit policies to reduce health inequalities. In order to have an effect on the deeply-rooted and complex causes of health inequalities, a policy must cover the levers outside the health sector.

The lack of a national French inequality policy may be addressed with the adoption of a new Public health law in 2011-12. As Leclerc et al (2008) conclude, the best motor to

make progress ‘is a collective awareness of the existence of health inequalities, that they are unacceptable and that we can reduce them’ (my translation).

Chapter 2: Social relationships

Intuitively, most people would say that social relations are important to them. When a child starts at a new school, we ask if they have made friends. We generally think it is sad if families loose contact. But why are social relationships so important to humans? This chapter will describe studies from different fields examining social relations: animal studies, in particular of primates; hypotheses and evidence from evolutionary development and the different type of social support humans can provide each other. It will not consider the relationship between babies and their parents, such as Bowlby's attachment theory. The necessity for a vulnerable baby to establish a relationship with an adult who can provide protection and food is clear. Rather this chapter considers why adults who, in this modern world, can fulfil basic needs such as obtain food alone, choose to invest time and energy in establishing social relationships.

The central idea of the chapter is that relationships such as friendships do not exist simply in order to provide practical help at a time of crises, or to share 'health promoting' information but rather that they are fundamentally important to human beings. Human have evolved into social beings as it improves their chance of survival. The next chapter will examine the link between health and social relations.

2.1 Social Groups

2.1.1 Social relations-learning from animal observations

A social relationship can be defined as the sum of the interactions between two individuals over time including its content and quality (Richard 1985). A relationship can occur between individuals who neither benefit nor desire interaction (Cords 1997), however most relationships do occur through choice. It is often thought that complex societies of some vertebrates, most conspicuously our own, represents a crowning achievement of evolution, according to Alcock (1998), this is a mistake. Humans are not unique higher beings with social rules that are completely divorced from other species (De Waal 1996). There is a wealth of information from biologists about animal (non-human) groups as well as knowledge from the fields of anthropology and psychology. Some animals, such as honey bees and ants, have developed such close social relations so that they can not survive alone.

2.1.2 Social groups

A social group is made up of animals that interact regularly and know one another individually. Simonds (1974) describes how most primates live in social groups. The exceptions include orang-utans but even these appear to have social networks. The networks are harder to recognise than groups as the boundaries are not socially discrete. He lists five criteria necessary for an integrated social organisation (see Table 2.1).

1.	A complex system of communication (almost everything a social animal does serves as a type of communication – audible grunts, non-verbal communication via facial expressions, grooming, body posture).
2.	The division of labour (in larger baboon groups, for example, the young males act as front and rear guards to the other group members).
3.	Cohesion (in primate groups most cohesion is lifelong, especially for females).
4.	A permanence of individual members.
5.	A tendency to bar entry to other members of the species.

Table 2.1: Criteria for social organisation (Simonds 1974)

2.1.2 Cost and benefits of social living

Although there are clear benefits to animals of social living, there are also costs. These have been summarised below in Table 2.2

Benefits	
	Reduction in predator pressure by improved detection or repulsion of enemies
	Improved efficiency in the capture of large prey
	Improved defence of key habitat or food
	Improved care of offspring via shared care
Costs	
	Increased competition within the group for limited resources
	Increased risk of infection by contagious diseases
	Increased risk of interference with parental care by other group members

Table 2.2 : The major fitness benefits and costs of social organisations (Alcock 1998)

Lions are an example of animals living in a close social group. A pride of lions can defend a hunting territory more effectively than as individuals, and are more effective at capturing prey. However, a down side to group living can also be illustrated by lions. In a group, subordinates are exploited by dominants. Male lions push the females aside at a kill even though the females are more likely to have expended energy making the kill (Packer et al 1990).

2.1.3 Play as method for developing social bonds

Play is a social instrument which brings the playing individuals into close, intimate contact that often involves intense tactile stimulation. Repeated play enables the regular

playmates to maintain a group familiarity that persists beyond infancy through other processes such as grooming.

Savannah baboons have one of the most tightly knit societies (Simmonds 1974). These fundamental social bonds are developed in part by play as juveniles. As baboons births are spaced at least two years apart, infants don't play with siblings but with same age peers. This creates strong horizontal groups that cut across the vertical kin relationships, similar to humans ones. Play helps loosen the infant's bond with its mother and seek wider social relationships.

2.1.4 Gift giving

A gift is an individual or collective voluntary act which may or may not have been solicited by the person(s) who received it (Godelier 1999). Gifts can strongly reinforce social bonds but they are rarely given without strings attached or the expectation of some kind of reciprocal act (Ridley 1997). Male chimpanzees are more likely to go hunting for meat, and to hunt for longer, if there is an ovulating female in the group. This female will receive more of the meat than others, and as a result, the female is more likely to have intercourse with the males who provided the food (Stanford et al 1994).

In 1925, Mauss studied in depth the question of gift giving and found remarkable similarities in gift exchange across continents and across time periods amongst humans. He identified not only the ingrained desire or obligation to give, but also the obligation to reciprocate the act when a gift is received (Mauss 1950). Gifts create bonds within and between groups. The act of giving creates a twofold relationship between the giver and the receiver: a relationship of solidarity because the giver shares what he has; and also a relation of superiority because the one who receives the gift becomes indebted to the giver at least until the receiver response with another gift (Godelier 1999).

Every gift embodies some coefficient of sociability. It cannot be understood only as an object but also in social terms. "If friends make gifts, then gifts make friends" (p 186 Sahlins 1974). The exchange of goods can be seen in terms of 'pooling' or as 'reciprocity'. Pooling of goods such as money or food occurs within a relationship. It is a collective action with a social boundary, for example an extended family sharing food (Sahlins 1974). This pooling reinforces the group's cohesiveness and can be clearly seen as a way to promote survival at times of food shortage or when some members of the group are engaged in other activities such as fighting or child rearing.

In close groups, pooling goods is the norm. Reciprocal gift exchange is most common between people from different communities. A typical modern example would be the obligation to return an invitation after being asked to a dinner party or barbeque. Reciprocity is an action that provokes a reaction, it covers a wide range of exchanges. At one end of the continuum is the freely given assistance or gift, at the other end, a self-interested seizure of trying to get something for nothing. Obviously most gifts lie somewhere between these two extremes. However, the more distant the community, the less strongly the reciprocity may be felt and even negative behaviour condoned e.g. stealing a woman from another tribe (Sahlins 1974).

2.1.5 Anti-social behaviours

Anti-social behaviour is to some extent culturally defined (Pennington et al 1999). Aggressive acts are those intended to injure another physically or psychologically, whereas an accident may have the same result but was not intended.

Lorenz (1966) sees aggression as being instinctive, with aggressive energy needing to be released occasionally if it is not to build up to dangerously high levels, also known as the pressure cooker of emotions. He believes aggression is adaptive for survival as fights between rivals serve to select the strongest leader. Although anti-social behaviours are damaging for the formation of social relations, they may be in some cases still promoting genetic fitness. The murder of relatives appears to contradict this reasoning, but, murder rarely occurs between genetic relatives, rather the victims are likely to be spouses, step-children etc. Only about one in 25 murder victims are killed by their genetic relatives (Pinker 1997). Child-rearing is a costly undertaking. Step children are enormously more at risk from abuse and infanticide than natural children. They are a 100 times more at risk to be fatally abused even when confounding factors such as poverty or traits of people who tend to remarry, are taken into account (Daly & Wilson, 1997).

Social groups, when in opposition, appear to enhance aggression. Football hooliganism is an obvious example. Le Bon (in Clamp, 2001) describes the violence of the mob during the French Revolution as primitive and irrational behaviour. It has been suggested that the origins of war was to get or keep women (Pinker 1997). Although the price to go to war can be very high (i.e. death), successful warriors in primitive societies have more wives and children than those who have never been to battle, however the

cost of possibility making the ultimate sacrifice means that in most occasions, war is avoided.

According to Lorenz (1966) ritualised aggression helps to preserve the species against unnecessary bloodshed. Repeated ritualised contests within a group result in a hierarchy. Big men obviously have an advantage for physical battles but it also appears to be the case in ritualised contests. Taller men are more likely to have professional jobs (Mackenbach 2005). They are employed more and are more likely to be elected president (the taller candidate won 20 of the 25 US contests from 1904 to 2000) (Clamp 2001). The evolution of language has provided another weapon in the battle for dominance and way of multiplying the result via a reputation. Physical size is less important if one has a fearsome reputation (Pinker 1997). Winning a battle means the word spreads and further battles can be won more easily but, especially in this age of the mass media, failures often become public too.

2.1.6 Language

Language is closely associated with sociality (Dunbar 1996). Only animals which associate in relatively permanent groups develop oral communications from grunts to bird song, known as language. Language serves a vital function in managing social relationships. Although other forms of communication such as grooming are also important in social ties, Dunbar postulates that verbal language is a far more efficient means of developing relationships.

2.1.7 Altruism

In contrast to aggression; Pennington et al's (1999) loose definition of pro-social behaviour is "any act that carries positive value in society" (p280). Helping behaviour is a sub category and is the intentional act to benefit someone else. Altruism is motivated by the wish to help someone else rather than oneself and is classified as a sub category of helping behaviour.

Altruism has been a puzzle for animal behaviourists. Why would one animal or person help others (eg raise the alarm) at some cost to itself? The earlier section shows that gift-giving may not be a selfless act but usually an element of reciprocity occurs, even if this is delayed. It also appears that observed altruism in most cases is in fact 'reciprocal' altruism. This is where an individual endures a short term loss until the help is reciprocated, at which time it earns a net increase in reproductive success (e.g. female

lion expending energy to kill for the pride) (Alcock 1998). In evolutionary biology, the label of altruism has been restricted to the cases in which the donor loses reproductive opportunities as a result of helping another. Closer observation shows that although the individual has less chance of breeding themselves, they are helping close relatives so their action still promotes the likelihood of some of their genes making it to the next generation. For example, the siblings of the breeding pair of Florida Scrub Jays have been observed to help rear the breeding pair's young (Woolfenden & Fitzpatrick 1998). More alarm calling has been noted when ground squirrels live in closely related kin groups (Sherman 1985).

Animals benefit by being helpful to one another if they interact often enough to build up trust. By keeping their promises and fulfilling their contracts, rather than opting for the short-term benefits of lying and cheating, they might obtain larger benefits over the longer terms. This logic of reciprocity was news in the 1970's to animal behaviourists, but not to economists. The economic principle is called the 'folk theorem of repeated games'. It is called a folk theorem because it was discovered independently by so many different games theorists in the early 1950's that no individual has been credited. The theorem states that repeated interactions can be as powerful as contract law in maintaining cooperation. This explains why traditional Chinese-style business that builds trust through repeated interaction can work as well as American-style business based on contracts and litigation. This theorem of repeated games clearly needs a concept of punishment for those who engage but then don't reciprocate (Miller 2000).

2.2 Evolution and human groupings

The field of evolutionary psychology may be defined as the application of Darwinian ideas of evolution to human behaviour. This approach assumes that human nature has been shaped by natural selection and it is a recent development of socio-biology, which attempts to explain social behaviour in terms of evolutionary and other biological principles (Clamp 2001). The current European lifestyle has only existed for a relatively short time (200 years since the industrial revolution) – for example, enjoying the taste of foods high in sugar and fat was a useful trait in pre-industrial times when hard physical labour was the norm. Today a desire for these foods can lead to obesity and its related health risks. Evolutionary physiology explains behaviours in terms of natural selection to solve problems faced by our ancestors.

Species that live in close social groups have evolved in this way as it helps them to raise more offspring and therefore transmit more of their genes to the next generation, a process known as increasing genetic fitness (Dawkins 2006). This is the argument of the selfish gene. According to (Maynard-Smith 1993), there may be fundamental human characteristics that are genetic in origin that underpin our culture.

Although lending money to a nephew can be seen as kinship selection, giving money to a beggar or people in another country is more difficult to understand in terms of genetic fitness. Why does solidarity with others exist? It has been argued that people who display solidarity with others are preferred as mates. Miller (2000) uses the example known to all waiters(resses) that men leave more tips than women, and that men when they wish to impress leave especially large amounts. Tipping is a classic example of apparently irrational kindness, a voluntary donation to non-relatives. He suggests that our ancestors favoured kind individuals who had the ability and generosity to help other. They were un-attracted to cheats, cowards and other anti-social behaviours. Alternatively, tipping could also be interpreted not as being generous but simply displaying wealth.

Miller, a committed Darwinist, believes that by intelligently choosing their sexual partners, individuals influence the kind of offspring they produced. Mate choice is a very powerful natural selector. He suggests that if all females refused to mate with males who ate meat, any genes predisposing individuals to vegetarianism would spread like wildfire! (p4 Miller 2000). Pro-social behaviours are seen as virtues in our society (Ridley 2004), and so human altruism is not the evolutionary paradox it once appeared. Human behaviour has not developed simply as a result of our selfish genes. In the 30th anniversary edition of his influential book, Dawkins himself writes how its ideas have been superseded (p vii). It is rather that our genetic traits have been selected and this selection had occurred due to an interaction between the gene and the environment in which it finds itself. If the environment favours pro social behaviour, then genes that favour these behaviours will be become more frequent within a population (Dawkins 2006). But why did humans develop to become like lions living in close social groups, rather than like cheetahs with loose social networks?

2.2.1 Size of a social group

Early research saw affiliation as an innate process akin to the herding instinct in animals (McDougall 1908 in Pennington et al 1999). However, this was seen as simply

describing the behaviour rather than explaining it. Relationships with others do appear to be essential to human survival strategy. The anthropologist Robin Dunbar (1996) suggests we have evolved to live in groups to protect against predation especially when we left the forest; to form alliances, to reduce infighting and to increase the chance of finding food and water. Social animals are in a perpetual balance between 2 forces: a centripetal force (from fear of predation, feelings of sociability) and a centrifugal force (needing ones own space). The more predators or more difficult the environment, the more centripetal they become. The availability of food appears to be important in the size of group that subsequently develops. Terborgh (1983) studied 5 types of new world monkeys that were all omnivores with a diet of fruit and small prey. Notwithstanding their common diet, they differed widely in group size and social systems. Concentrated resources provide opportunities for many animals to feed at once and to live in large social units, but highly dispersed resources are efficiently harvested only by animals in small social units. Although many animals form social groups as a means of reducing per capita risk of predation, the tendency to seek safety in numbers is frequently in conflict with the number of individuals that can feed on a typical patch without causing strife.

A natural group size for human societies appears to be about 100 to150. Dunbar calculated this figure from comparing neo-cortex ratio to group size for various primates and early hominids (in De Waal 2001). It is too many individuals to groom but not too many people to speak to. One of Dunbar's key hypotheses is that language developed as it was a more effective communication method than grooming and accounts for brain size differences. One hundred is also roughly the number in a typical hunter gatherer band, in the average address book and the number in an army company (Dunbar 1996). This is also the number of people that most people could ask to do a small favour (e.g. forward a letter). Tight social groups in humans are obviously smaller. When asked to list the people whose death tomorrow would be devastating, 11 or 12 is a very constant figure (Bury & Larsa 1979). A similar number (10-15) is number of people that most participants contact socially each month (Milardo 1988).

2.3 How do human social relationships develop?

What causes one person to like another is an ancient question. According to Aronson (1984), it was probably considered by one of the first social psychologists who when sitting in his cave wondered what he could do to make the man in the next door cave like

him or at least not bash him over the head. Back in 1937, Carnegie wrote a book 'How to win friends and influence people' that became a best seller (Carnegie 1937). Today, the sales in this field of popular psychology are enormous showing that individuals are still looking for advice in an area they consider to be important.

Fuhrer et al (1999b) found that women have more people that they rank as 'close' than men, but men have larger social networks. Relationships are sustained not only by people's personal feelings for one another but by their routines, their presence in one another's spheres of life, by the actions of other mutual friends and their culture of normal strategic behaviour intended to sustain their relationship (Duck, 1999). Such a friendship is open-ended and fluid.

2.3.1 Proximity

Apart from physical attractiveness and cultural similarities; people tend to make friends with those with whom they are in proximity. Jean-Louis Pan Ké Shon (1998) has shown that the source of friends varies with age. Younger people are more likely to have friends who are students, middle-aged people have friends who are or were work colleagues. Friendship with neighbours increases with age. Segal (1974) asked students to list their three closest friends and found an extremely high correlation between the initial letter of the student's surname and those of their friends. The seating arrangements in the college were in alphabetical order, placing those with names close in the alphabet in physical proximity. It could be that interacting with someone provides the opportunity to discover more about them which is normally a rewarding experience or it may be simply that to be exposed to someone can lead to attraction because of familiarity.

Generally, interaction more often leads to attraction than dislike (Rosenbaum 1986). Interaction provides an opportunity to share personal problems and to validate beliefs. It also gives a sense of acceptance, simulation and warmth (Pennington et al 1999).

2.3.2 Exchange

Interpersonal relationships involve the exchange of different types of resources such as information, money, love, practical help and status (Foa & Foa 1980 in Pennington 1999). The social exchange model proposes that human relationships are a series of deals with each person attempting to maximise their benefits whilst minimising the cost to themselves. Walster et al (1998) suggest that social exchange is governed by equity. Equity theory is not the same as equality. It is not necessary for both people to

contribute an equal amount, rather if one person contributes more but also receives more, the relationship is equitable. For social relationships and therefore social support to be sustainable in the long term, the relationship must be equitable.

2.3.3 Influencing others in the group

To look how a group can influence the decisions of its members, in 1951 Asch devised a classic experiment in which a participant was asked to compare the length of a line on a card to three other lines (Asch 1995). A naïve participant joined a group of people who were in fact colleagues of Asch. When the other group members agreed, the participant deliberately gave the wrong answer in order to conform to the group's option during one-third of the test trails. Stang (1973) using a similar light box conformity tool, found that people with high self-esteem conformed less than individuals with moderate or low self-esteem. When trying to explain why people conform, there appears to be both informational and normative influences. Informational influence occurs when the views of others are considered reliable, normative influence occurs from the need for approval and maintenance of a positive self-image (Pennington et al 1999).

These studies show how important it is for people to feel part of a group. They are prepared to ignore their own judgement in order to be seen as conforming to the group's view. This appears to be particularly true for those with low self esteem.

2.4 Types of social support

Social support is one component of successful interpersonal relationships (Pennington et al 1999 p234). Social support is often used in a broad sense, referring to any process through which social relations might promote health and well-being (Cohen et al 2000). When reviewing the social support literature, Beauregard & Dumont (1996) found a lack of consensus in a definition of social support. They felt that it was a multidimensional concept that covered three notions; the social network, received social support and, finally perceived support. In an address in 1976, Sidney Cobb presented social support as information belonging to 3 classes:

1. the subject believing that he is cared for and loved,
2. that he is esteemed and valued,
3. that he belongs to a network of communication and mutual obligation.

He sees the process as starting in-utero and at the breast. As life progresses, this support comes from different sources, firstly family members, then peers at work etc (Cobb 1976). A large Danish study noted that social networks, as well as some aspects of social support, reduce with age (Due et al 1999). Feelings of loneliness also appear to increase with age Pan Ke Shon (1999). These findings may be affected by cultural norms as Saczynski et al (2006) found that 32% of Japanese men living in Honolulu report more social engagement in later life than occurred in mid-life (compared to only 15% who reported less social contact in old age).

There appear to be some evidence of gender differences. The Whitehall studies showed that employed men have a bigger social network of acquaintances than women. Women, however, have more people that they classed as 'close' (Fuhrer et al 1999b). Badoux (2007) however, found no gender difference when studying a small French population.

Social support can be seen to have 'structural' and 'functional' features (House et al 1988). Equally, Due et al suggest 'social relations' and Berkman 'social networks' can be split into these same two headings (Due et al 1999; Berkman & Glass 2000) .The 'structural' features of social support include the way in which social relationships are organised. Do individuals have a 'network' of friends and family, how frequently are they in contact with other network members, do they live alone, do they participate in voluntary activities? The 'functional' features of social support cover the qualitative and behavioural aspects. This could be giving practical help, bolstering self-esteem etc (Cooper et al 1999).

The functional features of social support can be further divided into (House et al 1981):

- Practical (also known as instrumental, material i.e. financial help to set up a business, care for a relative…)
- Emotional (being cherished, valued by others)
- Appraisal (receiving feed back, aid in decision making)
- Informational (being advised).

The later three are often difficult to disaggregate (Berkman & Glass 2000). These features are obviously similar to Foa & Foa's features of relationships described earlier. The impact on health of network structure versus the functional features will be described in the next chapter which looks at the social relationships and health.

2.4.1 Direct effect or buffer

Social support may have a direct effect on health or may buffer the negative effects of life events. Directly, social support may increase our sense of control over the environment. In this way, it may dampen physiological arousal. Indirectly, support may alter the appraisal of threatening events (Fuhrer et al 1999b). Cobb (1976) describes the buffering effect of social support on health. He quotes a study where men with high social support after job loss had significantly less arthritis than those with low support. Alloway & Bebbington (1987) reviewed over 30 early studies in this field. They found that the results were inconsistent probably indicating that the buffering effect of social support was not of dramatic proportion if it existed at all.

Stansfeld et al (1998) found no evidence of a buffering effect amongst men or women who experienced life events or chronic stresses. He found that the direct effects of emotional support are predictive of good mental health. Melchior et al (2003a) found the GAZEL cohort supported the direct effects rather than the buffer hypothesis of the way social relations affect health.

2.5 Social cohesion

Social cohesion refers to the extent of networks and solidarity amongst groups in society. High social cohesion implies the presence of strong social bonds, high levels of trust and strong norms of reciprocity (European Commission 2003). Stansfeld et al (1998) sees social support as the resources provided by other persons; and social networks as the number and frequency of contacts of a group of persons. Social cohesion however, recognises the type of network contacts (rather than simply the frequency). A "vertical network, no matter how dense... or important to its participants, cannot sustain trust and cooperation" (p174 Putman 1993). Social cohesion specifically refers to the extent of connections and solidarity within a society (Berkman & Kawachi 2000). For these authors, social cohesiveness is:

1) the absence of latent social conflict: wealth inequality, racial tensions…
2) the presence of strong social bonds –measured by levels of trust; an abundance of associations that bridge social divisions (pg175).

The term 'social cohesion' has become frequently used in France particularly after the 2005 city riots. A law passed on the 31st March 2006 covers three main areas:

employment, social housing and equal opportunities. The employment section mainly relates to supporting young people and the long-term unemployed back into work. The social housing part obliges local authorities to increase the amount of social housing. The third section relating to equal opportunities puts special emphasis on supporting primary schools in educational priority areas. It stresses the need to promote links between people and reduce racial discrimination.

The 2006 social cohesion law created a new agency to promote social cohesion 'l'Agence nationale pour la cohesion sociale et l'egalité des chances' (ASCE). Its mission is to improve the effectiveness of government actions in priority suburbs, and towards immigrants and people from immigrant families. It also aims to improve literacy and prevent delinquency (2007 www.lacse.fr). An example of the practical measures the agency is taking includes funding audio-visual projects that celebrate diversity and a training course for youth workers about drug prevention. A national government and local authorities' partnerships have led to Urban Contracts of Social Cohesion (Contrats Urbains de cohesion sociale). These contracts allow state funding for local authority actions in priority areas of the city. They cover the fields of housing, employment, education and health.

2.5.1 Individual or collective concept

Berkman and Kawachi (2000) view social cohesion as a collective dimension of a society, which should be distinguished from social support and social networks which are characteristically measured at the individual level. The individual and social levels are interconnected however. People's characteristics vary by where they find themselves. "If you are surrounded by hostile people, it is perhaps no surprise that your sunny disposition changes. The fifth time you are jostled out of your place in a line, you start to display adaptive behaviour" (p170 Marmot, 2004). In an area that is highly socially cohesive with low levels of crime, all individuals may feel safer, even those who themselves have a limited social network (Stafford et al 2004). An individual's participation in a voluntary group, such as a parents-teachers association, will be a societal characteristic if this participation leads to benefits for other families living in area.

The same debate occurs in the social capital literature, with Van Der Gaag and Webber producing a chapter on individual measures of social capital. Social capital at 'this individual level remains quite close to its original analogy with more traditional notions of financial and material capital' (p29 Van der Gaag & Webber 2008). In her meta-analysis

of 21 studies when reviewing the association between mental health and social capital, De Silva et al (2005) looked for individual social capital amongst other indicators. She believes that individual and ecological social capital may measure different aspects of the social environment.

2.6 Social capital

The first definition of social cohesion in the previous section by the European Commission shows the over lap between the concepts of social cohesion and social capital. The use of the term social capital, and interest shown in this field since the 1990's by political scientists, has brought the findings of those researchers interested in social networks and cohesion to a much wider audience.

Berkman and Kawachi (2000, p175) see social capital as "a sub-set of the broader concept of social cohesiveness". Putman (1995, p 67) defines social capital as the 'features of a social life such as networks, norms and social trust that facilitate co-ordination and co-operation for mutual benefit'. His influential book 'Making Democracy Work' sees social capital as similar to the notions of physical and human capital (Putman, 1993). Social capital refers to the features of social organisation that increase a society's productive potential. Colman (1994, p302) writes that like other forms of capital, social capital is productive, making possible the achievement of certain ends that would not be attainable in its absence.

Social capital has been defined as those features of social structures that facilitated the actions of members within them. According to Coleman (1994) three examples of the forms of social capital include: levels of trust within a social structure, social organisations' norms and sanctions, and information channels. Kawachi et al (1997) see the core concepts of social capital as civic engagement and levels of mutual trust amongst community members. For INSEE, Paris, the forms of social capital, and therefore its subsequent measures, can be grouped under two options: a propensity to form various relationship and a propensity to trust others. In the first option, practices will be measured and in the second, perceptions are measured (Ponthieux 2002).

Another eminent thinker in this field is Pierre Bourdieu, the French sociologist. He has written extensively about cultural capital as well as social capital. He has showed how groups were able to use cultural symbols as marks of distinction, signalling their position

in the social structure (Bourdieu1979). Culture involves shared knowledge and powerful cohesive forces with a social group and these together give rise to the immaterial products of social constructions like money, justice and science (Plotkin 1997). He was essentially interested in social capital as a method to understand social hierarchy which will be developed further in the following section.

2..6.1 Bridging, bonding and linking social capital

Social capital can be seen as bonding (within a group) or bridging (connecting between groups) (Baum & Ziersh 2003). Bonding networks occur within a community and tend to reinforce exclusive identities. They can promote homogeneity, however they can be helpful in mobilising local solidarity and loyalty (Field 2003). Bonding social capital can potentially be destructive as can be shown by cartels and gangs. Bridging connections are seen as more inclusive as they cross communities and tend to connect people across social divisions. They are better for linking with external assets. Building 'bridging' social capital however can prove difficult as it depends on the capacity to communicate with people different to oneself.
Robert Putman was one of the first to argue that structures such as soccer clubs and professional guilds have reinforced trust in the economically successful north of Italy. In contrast, the south of the country has been based on closed units such as family and a 'godfather' culture. He sees social capital in the north of Italy as not only encouraging social trust but also reducing inequalities and promoting opportunities for all (Putman 1993).

Woolcock (2001) proposes another form, that of linking social capital. It is characterised by connections between those with differing levels of power or social status e.g. links between people of different social classes or the political elite and the general public. This type of social capital could be particularly useful to reduce inequalities. During the riots near Paris in the autumn of 2005, and the subsequent presidential election campaign, the distance between the national politicians and the general public was perceived as a problem. The lack of 'linking social capital' in France was frequently evoked in the media even if this term was not employed directly. A potential measure of this type of social capital could be the occupation of the subject's best friend as is shown in Table 2.5 later in this chapter.

Social capital, although generally a positive force, should not be perceived as a universally 'good thing' in all situations. Not only can an excess of bonding social capital lead to prejudice and gang violence but social capital can promote inequality. Access to different types of networks is very unequally distributed; "everyone can use their connections as a way of advancing their interests, but some people's connections are more valuable than others" (p74 Field 2003). This criticism is not unique to social capital. Similar arguments have been made of health education and health promotion. Although health education is seen as good for health, it is possible to increase inequalities when the "worried well" actively participate in programmes such as screening that would be of more benefit to the passive 'at risk' population. There is no question of abandoning all health education, however greater care is needed with the design of intervention programmes. The same awareness is required if programmes to develop social capital are implemented.

2.6.2 Social capital: a useful concept?

Fassin (2003) has criticized social capital for being unclear and for not being used as one of its original authors, Bourdieu, intended it to be used. "The concept of social capital is largely a repackaging of old ideas such as community capacity, empowerment and social support" (Pearce & Davey Smith 2003 p129).

Labonte (2004 p116) criticizes both the terms social capital and cohesion; "social cohesion resides more in the realm of moral philosophy than the grit of human relations". He describes how an intervention was judged as unsuccessful as it resulted in the community pulling together to confront politicians and neighbouring white communities. Social capital fares little better as he sees it as a 'pot pourri' of variables, and that there is disagreement as to its aim. He sees social capital as only a concept which can help to describe a situation. Like with all political or economic approaches, there may be divergent points of view of how to alter the situation. Labonte prefers the terms social inclusion/exclusion. He believes they address the fundamentals i.e. "to what extent do efforts at social inclusion accommodate people to relative powerlessness rather than challenge the hierarchies that create it" (p117). The importance of emphasising social inclusion in an intervention programme can't be denied but using the terms 'social cohesion/capital' does not necessary mean that hierarchies will be ignored.

Whatever the critics might say, in recent years the concept of social capital has had an impact on the major development agencies such as the World Bank and the

Organisation for Economic Co-operation and Development (OECD). The OECD produced an executive summary which states “our social objective is not simply to increase economic growth; it is also to improve well-being”. The paper describes the evidence of social capital and its implications for policy development (OECD 2001).

The World Bank is a major player in the field of global health improvement as its financial influence outstrips other international organisations such as WHO or UNICEF. However its influence of health status has been much criticised as there is some correlation of worsening mortality and morbidity rates in countries who have re-structured their economies following World Bank advice. The World Development Report 2000/1 recognises there is no automatic link between economic growth and improving life-quality for the poor. Chapter 7 of the report is entitled 'Removing Social Barriers and Building Social Institutions' specifically describes the importance of building social capital. From the theory about the difference between bonding and bridging networks, it states that a key lesson for policy makers is the importance of using existing forms of bridging social capital in poor communities as a basis for scaling up the efforts of local community based organisations (p130 World Bank 2000).

2.7 Social Relations in France

A report about social capital data availability found that there were 14 nationally representative surveys between 1996 and 2002 that contained indicators relevant to social relations/capital and cohesion undertaken by the National Statistical Institute (INSEE) alone (Ponthieux 2002).

2.7.1 International comparisons

Forty-two percent of French adults see their parents at least once a week. A total of 45% of adults live within 30 minutes travelling time from their parents, but distances increase higher up the professional status gradient (Vivas 2007). Some writers have indicated that social relationships are notably better in France than in other countries (Berkman & Melchior 2006), however it appears that the evidence is mixed. Out of 22 countries participating in the European Social survey, France ranked 14th for social trust (Poortinga 2006). Data from the World Values survey in Table 2.3, indicated that French people do not value family relationships as much as some other countries. They report lower rates than the more market-dominated Anglo-Saxon countries. In France, friends

are valued more highly than the average for the countries sampled. Some countries, notably the US, GB and Sweden have above average replies for both the importance of family and friends. In Italy, family is far more important than friends. Russia has below average scores for both indicators presumably linked to the extreme economic reforms that have occurred in the last 20 years. Poland shows a different pattern however, with family links still remaining important.

France has 15.4% single person households, this is slightly more than the EU average of 13.4% in 2008 (Table 2.3). Generally, the wealthier EU countries have a greater proportion of their population living alone. The percentage for Spaniards living alone is particularly low suggesting either a cultural preference to live with others or a lack of affordable housing.

Using early Eurostat data, Paugam (1999) showed that social ties in France were close to the EU average. He analysed the difference in social isolation between those in stable employment and the unemployed. No difference in level of isolation relating to employment status was found in some countries. In others, he noted that the unemployed were actually less socially isolated e.g.; Spain, Italy and Portugal. In France, the long term unemployed reported considerably higher social isolation. Paugam explains these differences by concluding that the stigma associated with unemployment is higher in some countries such as France leading to unemployed people withdrawing from the social scene.

	Average	FRANCE	US	GB	Sweden	Japan	Italy	Russian Fed	Spain	Poland
How important would you say **Family** is in your life. % replying 'Very Important' (1)	**91.6**	86.4	94.6	93.6	92.2	92.7	93.3	89.8	89.1	93.9
How important would you say **Friends** are in your life. % replying 'Very Important' (1)	**51.4**	58.8	59.7	68.8	71.3	48.1	45.7	47.3	49.4	34.8
% of **single person** households (2)	**EU average 13.4**	15.4	-	13.5	17.6	-	12.3	-	6.6	9.0

Table 2.3: The importance of family and friends, and percentage of single person households

(1) World Values Survey 2005-6 http://www.worldvaluessurvey.org/ Based in Stockholm, the World Values Survey operates in 80 countries. The above results are based on 1000 to 1400 interviews per country.

(2) Eurostat : European Community Household Panel Survey, 2008 (60,000 households) http://epp.eurostat.ec.europa.eu/

2.7.2 Participating in voluntary groups

In 2002, 45% of people over the age of 15 were members of a voluntary group (Febvre and Muller, 2003). Higher levels of participation are seen amongst men and in the just retired group from 60-69 years. It showed that the level of participation was closely related to education and income levels. Updated information from 2005 in Table 2.4, clearly shows that those from the highest occupational grades participate more and take more responsibility for running voluntary groups.

As was discussed firstly in the previous chapter of this thesis, there is debate as to whether the level of participation is determined by the availability of material (financial) resources or by psychosocial determinants such as an individual's level of social confidence that enables him to feel able to join. Febvre & Miller do not think the financial lever is significant for most people as the average annual membership fee was only 30€ (£20), which is less than 3€/month. The fact that 43% of the people involved in running the voluntary organisations come from the richest quartile (Febvre & Miller 2003) may also suggest that social confidence has a role as there is no extra annual fee to manage a voluntary organisation. A gradient between profession category and voluntary group membership is shown in Table 2.4 using 2005 INSEE data.

Professional grade	% member of a voluntary group/club
Senior managers/Academics	58
Intermediate Professionals (nurses, teachers)	51
Employees (secretarial..)	35
Manual Workers	30

Table 2.4 : Membership of voluntary groups by professional group
EPCV 2005, INSEE web site www.insee.fr/fr/ffc/chifcle_fiche.asp?ref_id=NATSOS05517&tab_id=458

2.7.3 Types of solitude

Pan Ke Shon (2006) describes three 'types' of solitude. The first are those people who live alone. These might be divorced or widowed adults or younger people who choose to live alone. Jean Paul Kaufmann, a French sociologist, labelled this group as 'monohabitants'. The next are those people who have few contacts with others, the 'socially isolated'. Typically they would have few people to provide support if a difficulty occurred. In this group no distinction is made between those people who choose to be isolated and those who find themselves in this situation. The final group are those who 'feel lonely'. They may live by themselves or with others; they may report having friends however they still have the negative feeling of being alone.

The census figures in France have shown that the percentage of people living alone 'mono-habitants' has increased from 6.1% in 1962 to 12.6% in 1999 and is expected to continue to increase to 17% in 2030 (from INSEE in Pan Ke Shon 2006). Between the ages of 25 to 55 slightly more men live alone than women but after 65 years, far more women are on their own. This is explained by the longer life expectancy of women than men in France. Taking an indicator of social isolation to be less than four 'non-work or household related' contacts per week', Blanpain & Pan Ke Shon (1999) found that social isolation was directly related to age. Only 20% of 25-39 years old reported isolation compared to nearly 50% of 80+ year olds. Social isolation did not seem to immediately relate to household structure as widowers, single parents and couples with 3 or more children all reported the same i.e. slightly higher levels of isolation compared to all other groups. It seems reasonable to assume that couples with children are having more 'household' contacts than say widowers, even if these same couples with many children have less contact outside the household. People on lower incomes, having less schooling or being born in another country, were all linked to more social isolation.

2.7.4 Social integration / social isolation

Fuhrer et al (1999a) and Antonucci et al (1997) studying 3,777 older French people found no gender differences in satisfaction with social support. However women (26%) reported more social isolation than men (14.1%). The authors believe that this is accounted for by the much higher proportion of men living with their spouse than women. The respondents generally had more than 8 people in their networks which consisted mostly of family members. They generally felt understood by most of their network members.

Berkman et al (2004) using data from nearly 17,000 members of the GAZEL cohort showed that there was a significant association between occupational grade and social integration for both men and women. There is a particularly marked difference between the unskilled workers and higher graded colleagues. Social integration was calculated from three indicators: 1) marital status/cohabitation, 2) contact with close friends and family and 3) affiliation with voluntary associations. Another study of the same population, (Melchior et al 2003b) found that low social support at work was most prevalent amongst clerks (the lowest grade). Men had an inverse relation between social networks and occupational grade but the higher grades reported more personal social support and social relation satisfaction. Women managers had greater social relations satisfaction but there was no association between occupational grade and personal social support or networks. The greater geographical mobility required of the senior staff might explain their smaller social networks. This suggestion appears to be confirmed by a UK survey where close contact with friends and relatives was measured

against length of time living in an area. For those men who had lived in the same area for more than 10 years, 76% reported having close contacts, this dropped to 60% for those living in the area less than 1 year. The respective percentages for women were 82% and 70% (Cooper et al 1999).

2.8 Social intelligence and social status

Humans like all group-living primates collate information on the identity of other individuals, their attributes (age, sex, kinship, relative power, etc.) their past behaviour, and their current intentions (Barton & Dunbar 1997). Social information is vital to establishing long term relationships within a group and for recognising the social status of group members. Social intelligence is also used to identify who is a friend and who is a foe, which then conditions the type of relations that will develop. Rituals in all social groups of all species have developed to acknowledge status but avoid continuous physical harm. Wolves greet those of higher rank by licking their mouth, Rhesus monkeys present their behind, chimpanzees and humans bow. When an important leader enters the room, all heads turn and discussions come to a halt. Yet power is not an individual attribute, it is a relational one. For every powerful person there are others supporting that superiority. Karl Marx wrote that society could be based on status signals without reciprocity (a simple dominance hierarchy) or on reciprocity without status signals (an egalitarian utopia) (in Miller 2000 p 303).

The theory of Machiavellian intelligence is about being smart or streetwise in order to achieve personnel aims (Whiten & Byrne 1997). It appears that primates also use Machiavellian intelligence or smartness. In controlled conditions, it has been shown that primates are not only aware of their own position in a social hierarchy but also that of other members of the group (not just in relationship to themselves). They live in a web of social complexity and are socially knowledgeable. If attacked by a dominant, they have been observed to ‘redirect’ their frustration on to weaker, innocent parties (De Waal 2001).

Byrne (2001) observed a young baboon ‘crying wolf’ by calling a distress cry to his mother if he saw a lower ranked member with interesting food. His mother would chase off the ‘aggressor’, and the youngster would get the food. The young baboon is demonstrating social intelligence, in this case it shows an awareness of other baboons’ social status, in order to achieve its aim. Although relatively rare, Byrne has found that this type of deception tactics occurs in many species of monkeys and primates.

Animals, like humans, are acutely aware of hierarchy (Coe & Rosenblum 1984). A female monkey may pick up a stray baby when carrying her own. She will then cuddle the stray with her own as if they were twins for several minutes before releasing the stray. It is of note that, nine times out of ten, a mother will pick up the baby of a higher ranking female. It is as if she is trying to provide some bonding for her infant to that of a high ranking infant (De Waal 1996). The monkey mothers not only know where all the adults are in terms of social hierarchy but also all the infants.

2.9 Social support and social class in humans

Bourdieu (1979) considers how social hierarchies developed their own social norms and cultures to reinforce hierarchies. One example is that of classical music. Listening to classical music is a coinage amongst a particular social group; not only can it reinforce the links between members of the group but also exclude other group members who don't listen to this type of music. Social capital represents an aggregate of resources that accrue through possessing a durable network of relationships (Bourdieu 1980). He summarises 'habitus' the upper class reinforcing its cohesion by developing a culture of 'distinction' via eating habits, access to particular music, authors, theatre etc. People from middle incomes were more likely to appreciate others who conform, for example have 2 children etc. Those from the working classes were more likely to share conversations about football, vegetable gardening and television. An action of an individual will be affected by his 'habitus' (the norms for his social group) and the pressure of the current situation. Social norms are seen in terms of hierarchies but the hierarchies vary depending on the setting (Bourdieu, 1979). For example, a person could be high on the financial scale, yet low on the cultural one or vice versa (e.g. the stereotype banker who is wealthy but is not interested in books; compared to a teacher or librarian who may be on a modest income yet has a passion for the arts).

Stansfeld (2005 pg 162) has written that "relatively little work has attempted to relate macro-social variables such as social class to social support". In the Whitehall II study, high grade civil servants reported more social support at work, and more practical and emotional support than their lower grade colleagues (Stansfeld et al1997). There was a greater difference reported by men than women. He later found that higher grade staff had more friends and lower grade staff had more contact with family (Stansfeld et al 1998).

Higher levels of perceived support were associated with higher social professional class in 1394 adults living in Toronto, Canada (Turner & Marino 1994). The only exception to the gradient from 'major professional to unskilled' was the 'skilled/manual'. This group reported

higher levels of social support than would be predicted by their position on the social ladder. Social support has also been found to generally increase with greater educational attainment (OR 1.27 $p<0.05$) in a study of over 3000 US adults (Barger 2006). Antonucci et al (2003) found in a sample of people over 40 living in Detroit, USA that less education was associated with smaller networks. There were no differences, however, in the likelihood of confiding in or receiving financial support from one of their children. This is in contrast to Herpin & Déchaux's (2004) French sample that showed that higher social class parents were more likely to financially help their children once they had left home, and were more likely to receive help from their children, than manual worker families.

In Australia, levels of participation in social and civic community life are significant influenced by individual socioeconomic status (Baum et al 2000). Low levels of civic participation (writing a letter to the council, attending meetings) and social participation (member of a self help group or sports cub) were associated with lower education attainment and lower household income. Similarly in Germany, using education and income as markers of social status, the social gradient is clearly associated with social networks and support. The findings were adjusted for age and gender. Participation in groups, telephone contact, having a confident and instrumental and emotional support were associated to higher social status (Weyers et al 2008).

At the neighbourhood level, low social cohesion has been highly correlated with material deprivation. When looking at 254 neighbourhoods in the UK, most structural aspects (friends, participation in organised activities) and all cognitive aspects (tolerance, practical help) of social cohesion were associated with the Carstairs index of derivation p121(Stafford et al 2004). The correlation between material deprivation and family ties was very weak and not linear. Very low contact with family was equally common in the most and least deprived areas. Kennedy et al (1998) found less membership of voluntary groups and lower levels of social trust (markers of social capital) in areas of greater income inequality even after controlling for poverty.

Kubzansky et al (1998) did not find that social support increased with schooling. Their study of 1192 US residents 70-79 year old found no difference in emotional support and perceived adequacy of support by education attainment. In fact, low education was associated with less negative aspects and greater instrumental support, more ties and more visual contacts. It could be that education attainment was no longer a relevant marker for this elderly population or, as the authors mention, it may be that as low SES is associated with premature death, study participants who were poorly educated may be the healthy survivors. It could also be that

people from low SES are less likely to move away, which may result in more visits from younger family members to their elderly relatives.

Pan Ke Shon (1998) has shown that senior professionals in France have on average 9.3 friends compared to 5.9 friends reported by employees and manual workers. The number of friends also follows the household incomes levels with the richest households reporting 8.5 friends compared to 4.9 from the poorest. Pan Ké Shon compared best friends' social class (see Table 2.5). This table clearly shows that best friends are far more likely to belong to the same social class. For example, 50% of cadres (the highest occupational category – senior management, academics, doctors etc) will have a best friend from the same occupational category and only a 7% likelihood of having a manual worker as a best friend.

Occupational category of interviewee	**Occupational category of best friend**		
	Manual	Employee	'Cadre'
Manual worker	55.1%	9.7%	3.5%
Employee/Clerk	19.4%	30.2%	9.0%
Senior professional (Cadre)	7.0%	6.4%	50.5%

Table 2.5. Occupational categories of best friends (Pan Ké Shon 1998)
Only main occupations shown here; not shown for farmers, shopkeepers, military personnel etc which explains why the rows do not add up to 100.

Pan Ke Shon (1998) found that not only 'cadres' have bigger networks but that they are more likely to use them. They are more likely to ask someone from their network to lend a tool or recommend someone to give financial advice. Herpin & Dechaux (2004) showed that senior professionals are more likely to have has financial help from their family network than those who are manual workers (67% to 58%). The manual workers who have a parent of higher social class were more likely to have received financial support than those who have working class parents.

2.10 Conclusion

Philosophical debate has raged for centuries as to whether man is basically nice if not corrupted or basically nasty if not tamed. In his 'natural' state, do humans prefer a society based on a totalitarian hierarchy or one based on friendship and equality? Thomas Hobbs argued in the mid 17th century that a strong state was needed to prevent continual infighting and that people are inherently hedonistic and selfish (in Ridley 1997). Jean- Jacques Rousseau stood against this idea. In his 1755 presentation 'Discours sur l'origine et les fondements de l'inégalité parmi les hommes' , he emphasizes the idea of the noble savage

that humans are basically virtuous. He argues until the invention of property and government, people had lived in equality and freedom (Rousseau 1996).

This dichotomy of opinion still exists today. Whiten & Byre and colleagues (1997) believe that primates have 'surplus' intelligence to their everyday needs for feeding and ranging. So, since evolution is unlikely to select for surplus capacity, primates must be using their intelligence for something else. Group living must benefit all individuals, otherwise it would not occur, however individual benefits drive evolution. Whiten & Byre's specific contribution is to say that primates manipulate others to ensure individual benefits, wherever possible without the other group members realising what has occurred. De Waal's (1996) observations of primates give a more optimistic picture. He sees acts of kindness towards others in all populations. A chimpanzee stroking a victim of attack or sharing food with a hungry companion shows attitudes that are hard to distinguish from a person comforting a crying child or working a soup kitchen (p210). He believes that pro-social behaviour is the norm in primate and human societies. He sees humans and other animals having been endowed with a capacity for genuine love, sympathy and care for others.

Ridley (2004) believes our behaviours have been built by 'selfish' genes, but there is no contradiction to also be social, trustworthy and cooperative. Human beings come into the world equipped with predispositions to learn how to cooperate, to exchange goods and information, and to divide labour. He believes we owe our success as a species to our social instincts. Our societies and our minds evolved together, each reinforcing trends in the other. "No other species has gone so far down this evolutionary path, for no other species has built a truly integrated society except among the relatives of a large family such as an ant colony. Our societies and our minds have evolved together, each reinforcing trends in the other. The instinctive cooperation is the very hallmark of humanity and is what sets us apart from other animals", Ridley (1997 p249).

Every community, society and culture comprises inter-linkages between the groups of people that compose it. These "social relationships are sustained not merely by personnel feelings but by routines, actual presences and the culture of normal strategic behaviour "(Duck 1999 p84). This helps to explain international differences. The experiments of Stang and other psychologists have demonstrated the pressure for people to confirm to group norms, felt particularly by people with low self esteem. Bourdieu demonstrates how social norms reinforce social class divides. Pan Ke Shon and others have shown that friendships are more likely to form between people in close proximity and between people from the same social class. This does not promote the type of social capital that Woolcock sees as particularly favourable, that

of linking social capital. As Field has noted, some people's contacts are more valuable than others.

This chapter has shown the importance of social relationship to humans. Humans appear to have an inbuilt need to be part of a social group and within that group to know that we are a valued member. During evolution, it has been essential for survival to be a good hunter, story teller, or mother and therefore to benefit from group protection. Higher social ranking within the group provides greater possibilities to secure food and to reproduce. Ranking can be ensured not just by physical dominance but also via social skills. The following chapter will look at how social ties impact on health today.

Chapter 3: Social ties and health

"social relations are not an optional extra, they are crucial to maintaining good health" p143 (Marmot 2004)

Over a century ago, Durkheim, the French father of sociology, noted the importance of social isolation as a contributory factor in suicide (Durkheim 1967). Since this early observation, strong social networks, high levels of social support and participating in local activities have been shown to be generally associated with good health, regardless of how health is measured: self-report, mortality or morbidity (Fuhrer et al 1999b; Cohen et al 2000). Figure 3.1 suggests that social relations have a greater effect on mortality than smoking, flu vaccine, excessive alcohol consumption or physical activity (Holt-Lumstad et al 2010). However, there is an on-going debate as to the effect of networks themselves and the types of social support that influence health. For example, the consequence of family relationships on health and of the different types of social ties, bridging or bonding. Social cohesion is more often described as an ecological construct but authors do also use it (as well as the concept of social capital) to describe individual's behaviour (De Silva et al 2005;Van der Gaag & Webber 2008).

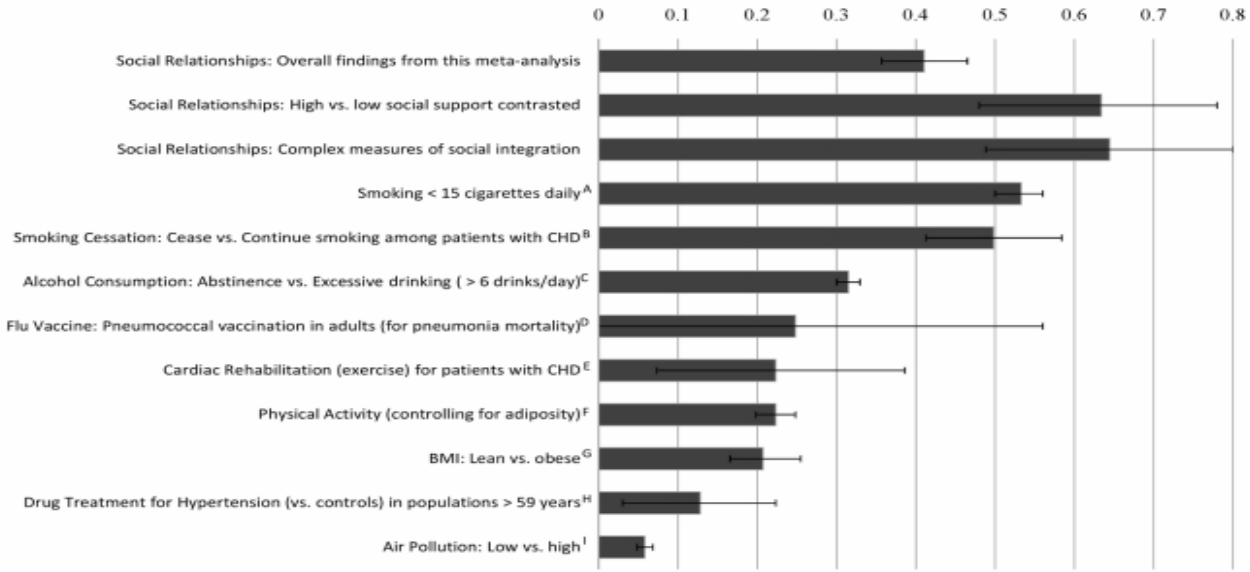


Fig 3.1 Comparison of odds of decreased mortality across several conditions (including social relations, smoking, alcohol consumption, BMI, air pollution) –estimated from meta analyses. (holt-Lumstad et al 2010)

The importance of social relationships and definitions of social cohesion/capital can be found in Chapter 2.This chapter will analyse the link between social ties and cohesion with health, at the individual level and at the societal level. Investigation at the individual level considers if a person's network or supportive relationships are associated with their level of health. An ecological approach examines the association of living in a cohesive society on health, regardless of a particular individual's social network. The potential causal pathways

linking social cohesion and health will be described with particular emphasis on the possible biological pathways. Finally, the literature relating social ties to social health inequalities will be reviewed.

3.1 Evidence of the effect of social relationships on health

3.1.1 Individual – social networks/ social relationships

Single, widower and divorced people are observed to have higher rates of mortality than married people in a review of 16 countries (Hu & Goldman 1990). The loss of a spouse along with inadequate emotional support, are the dimensions of social relationships which are the most associated with depression (Oxman et al 1992).

Berkman & Syme (1979) show that mortality increased with a lack of more general social relationships not just the absence of a spouse. The study focused on the structural component of social networks (marriage, close friends and relatives, church membership, and group associations). Nearly 7000 adults were followed during 9 years and a higher risk of mortality was found for people with few social and community ties (age-adjusted relative risk of 2.3 for men, 2.8 for women). The results were still significant after controlling for social class and behaviours such as smoking. The Tecumseh study in Michigan found a similar result with relative risks of 2.0 to 3.0 for men and 1.5 to 2.0 for women. These results are particularly interesting as participants had a health check-up on entering this study which allowed the authors to control their findings for even more variables including biological differences (House et al 1982).

Orth-Gomer and Johnson (1987) found that the third of the population with the least social networks had a higher total mortality compared to the rest of the sample. The rate ratio adjusted for age and education was 1.46, (CI 1.25-1.72) and after adjusting for risk factors such as smoking and chronic illness the rate ratio remain 1.36 (CI 1.06-1.69). House et al (1988) reviewed 5 prospective studies including those cited above. The association of lowest to highest level of social integration for men is shown in Fig 3.2. The results for women showed a similar pattern but were less significant for four of the five studies.

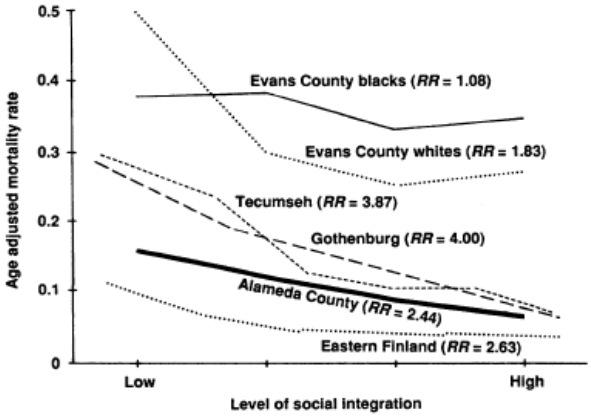


Fig 3.2 Level of social integration and age-adjusted for males in 5 prospective studies (p 540, House et al 1988)

The fact that House et al compared 5 studies in 1988, and the 2010 meta-analysis by Holt-Lunstad et al covers 149 studies illustrates the massive increase in the number of social relationship and health investigations. Research confirms that social cohesion is positively associated with health and this appears to hold true for all cultures and ages. In France, the GAZEL study has shown the influence of social integration in mortality with men. The fully adjusted rate ratio (including age and occupation) was 2.70. Adjusted models show that isolated men are three times more likely to die from cancer, accidents or suicide than their more integrated colleagues (Berkman et al. 2004).

Seeman et al (2004) found amongst elderly Taiwanese, that ties to close friends and/or neighbours were significantly related to lower allostatic load (an index of cumulative biological dysregulation). In Australia, a cohort of people aged over 70 years indicated that a large network of friends and having a close confident was protective for health but contact with family members was not important amongst older people (Giles et al 2005). There appears to be some cultural variations as to the importance of family for the health of older people. Living with the extended family (rather than alone or with the nuclear family) was found to be health protective for elderly Japanese (Turagabeci et al 2007).

Some other social relationship studies have taken a life course approach. Saczynski et al (2006) found that low social engagement when older was associated with a risk of dementia but there was no association between the risk of dementia and quality of relationships when younger. Due et al (1999) looked at social relationships at different ages. Like others, they found that social network weakens with age but that relationship strain (measured by number of conflicts) also declines. The weakening of the social network with age did not seem to affect the level of emotional support available to this Danish population. Focusing

on the younger end of the age spectrum, children who felt highly involved with their school were less likely to smoke even after adjustment for SES (Rasmussen et al 2005).

Social cohesion even appears to give some resistance to the common cold. Cohen exposed 276 healthy volunteers to the cold virus. Although all the subjects were exposed to the agent, not everyone developed a cold. He noticed that the volunteers with few social ties were three times more likely to develop colds than those with diverse social relations (Cohen et al 1997a). He controlled for health behaviours, diet etc. but still found that volunteers with the strongest social relations were the most resistant to the cold virus. In a Copenhagen cohort, social cohesion has been associated with less ischemic heart disease (adjusted hazard ratio = 0.82, CI 0.67-1.00) (Barefoot et al 2005). The results were controlled for education as a marker of SES. This study also found that contacts with parents, children, family members, and friends were all associated with better health. The presence of a spouse or partner was protective for men. Barefoot et al suggest that most types of contacts that occurred at least monthly were just as protective as those occurring more frequently.

Social cohesion can be split into structural and functional aspects. The structure relates to the frequency and diversity of contacts, for example the existence of a partner, friendships or participation in organised groups. The functional, also known as cognitive, aspects relate to the quality of the social support received via positive feedback, useful information etc (Due et al 1999; Stafford et al 2004). Functional aspects can also be described as cognitive variables as they relate to how a person perceives his/her relationships. From GAZEL cohort data, Melchior et al (2003) found that a lack of social support and dissatisfaction with social relations increased the probability of poor health. Health was not linked to size of social network. The study suggests that functional aspects of social cohesion are more important than frequency of social interactions. This confirms Henderson's findings in a small detailed study, that it is not the lack of relationships but the perception of these being inadequate which has the stronger association with neurotic symptoms (Henderson 1981). Similarly the Whitehall II London cohort found that social support at work and sufficient emotional support were associated with good mental health but size of social networks and the availability of practical support were not (Fuhrer et al 1999b).

The only other identified social cohesion and health cohort in France apart for GAZEL found the opposite result, that the structural features of social cohesion appear to be more important than cognitive ones. A total of 3,777 retired people were followed for 5 years. The PAQUID study found that French older adults generally had more than 8 people in their networks, which consist mostly of family members (Antonucci et al 1997). Subjects with few

social network connections had an increased risk of mortality: age-adjusted rate ratio = 2.69 for men and 1.56 for women. Satisfaction with social support had a small but non-significant effect on mortality risk (Fuhrer et al 1999a).

Social support is defined as information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations (Cobb 1976). Reviewing the evidence, Cobb found that social support can protect people in crisis from a wide variety of pathological states: from low birth weight to death, from arthritis through tuberculosis to depression, and alcoholism. Furthermore, social support was seen that it may reduce the amount of medication required and could accelerate recovery.

Early work about the impact of social support and networks was concerned about the buffer versus direct effect on health of these concepts. House (1988) and others (e.g. Cohen et al 2000) have looked to model the impact of support against a stressful event. Brown et al (1986) found that the lack of support from a close tie at the time of a crisis was associated with an increased risk of depression i.e. that social support had a buffer effect to reduce the impact of an adverse event. Melchior et al (2003) did not find a similar buffering effect in the GAZEL cohort.

Chistakis (2004) has written of the potential collateral health effects of social networks. One person's weight loss may trigger an increase interest in dieting in that person's friends. He does not, however, discuss the potential negative impact of networks such as the spread of risk-taking behaviours such as illegal drug taking.

3.1.2 Ecological – social cohesion /capital

The impact of social ties on health can also be measured at an area level. Coming from the field of the political sciences, social capital became a very popular concept in social epidemiology in the late 1990s. A description of social capital can be found in the chapter 2 of this report. Kawachi et al (1997) states that a wealth of studies in the field of social capital show that more egalitarian areas are more socially cohesive, leading to greater levels of trust and cooperation, less psychosocial stress, and consequently to better health status. Using data from 16,000 individuals with self-rated health as the outcome, Kawachi et al (1999) found a contextual effect of low social capital on poor health. Individual factors were important, but after adjusting for them (9 in all) an effect was still found. Measures of neighbourhood reciprocity and trust were the strongest (respectively, low v high OR 1.48, CI 1.41-1.57; and OR 1.41, CI 1.33-1.50). Group participation was less strong, but still

significantly associated. In a cross-sectional study in 150 sub-regions of Hungary, social capital (measured as trust, reciprocity and membership of organisations) was associated with mortality (Skrabski et al 2004). Fone et al (2007) found that poor mental health was significantly associated with low social cohesion.

Other studies have found a mixed picture. The UK Health and Lifestyles Survey found that the influence of social capital on health is much weaker than the influence of socioeconomic factors (Cooper et al 1999). The relationships differed for men and women. Their results suggest that the association between poor general health and low social capital can be largely explained by the greater amount of stress experienced by women living in poor quality neighbourhoods.

A more recent review of the social capital and physical health literature concluded that fairly consistent associations between physical health and trust, one of the common indicators of social capital. However this association was stronger at individual-level perception than at area level. Group/club membership was also consistently associated with better health (Kawachi et al 2008 p183). A qualitative study found that social capital is better understood in a broader social context not necessarily located at neighbourhood level. When considering social capital, “an exclusive research focus on deprived neighbourhoods is not helpful” as they were not the most important source of people’s social connections concludes Stephens (2008).

De Silva et al (2005) see social capital as both an individual and ecological construct. She found evidence of an inverse relationship between individual social capital and common mental health disorders from 14 studies but the 7 ecological studies were too diverse to be able to draw a meaningful conclusion. Other studies have not found a powerful impact of area social capital once composition factors such as occupation were included (Lindstrom et al 2002; Engstrom et al 2008). Chaix et al (2008) however, found that mortality was inversely associated with neighbourhood cohesion in Sweden even after adjustment for individual factors such as income and health status. The effect persisted after adjusting for physical environmental factors such as the distance to hospital, as well as population density and proportion of non-nationals. Neighbourhood cohesion particularly appears to have an impact on survival rather than incidence.

Marmot and Syme (1976) designed a study to investigate the hypothesis of a sociologist Matsumoto that the socially cohesive nature of Japanese society protected against stress. They compared heart disease rates for Japanese men living in California. Those men who

remained close to the Japanese culture had lower rates of health disease compares to the more Westernised men. These findings were independent of diet, blood pressure, cholesterol and smoking rates. Examining the effect of cultural norms and biological factors such as Cohen's cold virus study can help to elucidate causal pathways.

3.2 Causal pathways of how social relations may impact on health

In Chapter 1, Mackenbach's model relating to the social determinants suggested that psychosocial as well as material factors influence health. Many authors see the psychosocial environment as one of the mediators on the causal pathway between social status and health (e.g. Sapolsky 1990; Kawachi & Kennedy 2002; Wilkinson 2005). Berkman & Glass (2000) describe the 'upstream' and downstream factors of how social networks impact on health in Fig 3.3. Within the macro social structural conditions and the existence of social networks Berkman et al (2000) have described several psychosocial mechanisms. These are the: provision of social support; social influence; social engagement, close person to person contact and access to material resources. They in turn influence health behaviours and physiologic pathways.

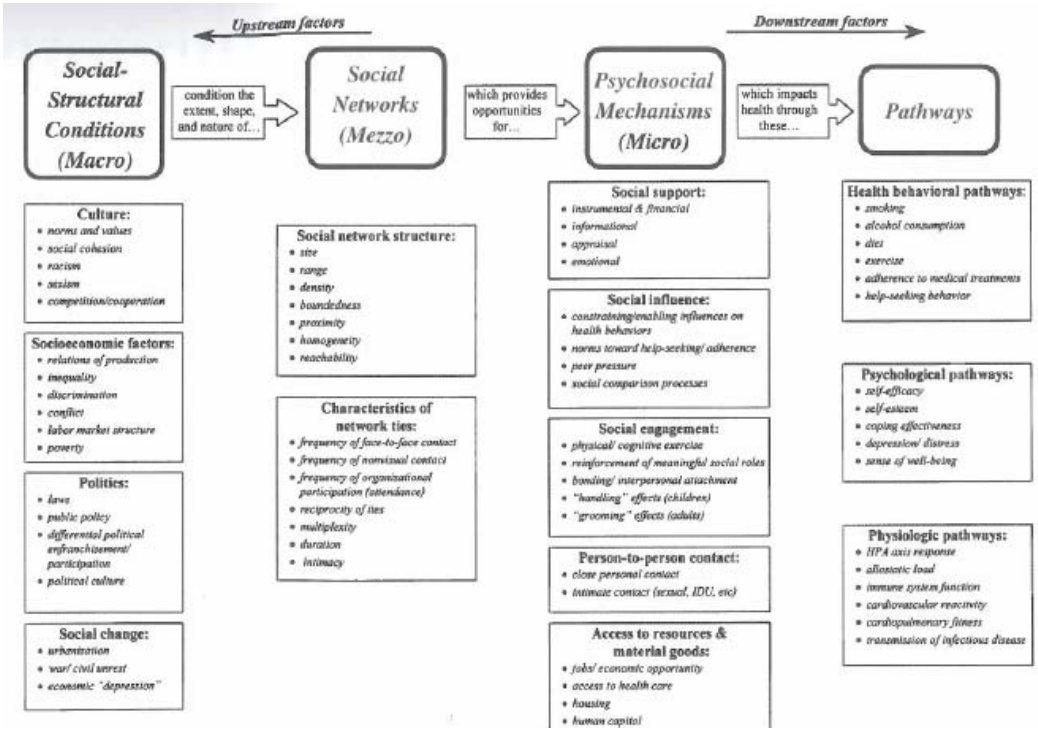


Fig 3.3 Conceptual models of social networks on health (Berkman & Glass 2000 p143)

Sheldon Cohen & colleagues (2000) have called for the importance for studies to have theoretical causal pathways to explain their findings. They describe 5 possible theoretical perspectives of how social support could affect health. The first is via social cognition – perceived support is important for an individual's perception of self; the second is via symbolic interaction; in this case, social support provides a way of making sense of ourselves and our role in the world e.g. how a father, employer etc should react. Two other perspectives come from that which Lakey and Cohen (2000) label as 'stress and coping'. The first relates to the actual assistance that social support provides to reduce the negative impact of stress. The second 'appraisal', provides protection from stress, as positive 'appraisal' means a person will interpret stressful events less negatively. The fifth perspective is one the authors call 'the relationship perspective', it is a rather vague concept that can be summarized as social support and can not be discriminated from the general social environment such as companionship, intimacy, and low conflict. This whole package is interrelated and it has an effect on health.

Reverse causality referring to people who become ill and then lose their social networks, was ruled out by House et al's (1988) early review. It only included prospective studies specifically to avoid this confusion. In France, having parents that increasingly suffer from incapacities does decrease the frequency of visits from their family members (Vivas 2007). Other studies have looked at people with specific illnesses. They have shown that ill people's social relationships remaining approximately constant (McCabe & Di Battista 2004) and that people with few close friends get more 'instrumental' support, mainly from organisations (Fyrand et al 2001).

The influence of the childhood environment on adult health is well documented in the health inequality literature. Even after controlling for current social status, people who grew up in a manual household fair less well than those who had more privileged parents (Singh-Manoux et al 2004; Maty et al 2008; Cambois & Jusot 2010). There appears to be less published evidence on the impact of childhood environment on adult social relations. In a longitudinal study of 7000 Americans, moving house frequently as a child was documented to reduce children's social relationships and to be associated with significantly increased mortality in adulthood (Oishi et al 2010). More generally, it may be that childhood environment impacts on social confidence and also the ability to make friends which later affects social ties in adulthood. It is also possible that people with few social relationships are genetically different and produce less oxytocin, for example. They may find social contact more stressful and so avoid it.

Reviewing the evidence in the mid 90s, Seeman & McEwen (1996) stated that the available evidence regarding links between social environment characteristics and neuroendocrine regulation documents show a link between the social and biological realms that may have important consequences for health and longevity. The following section describes the possible biological processes between both social cohesion and SES on health, as a lack of either generates biological stress.

3.2.1 Impact of social isolation and SES on biological processes

Not having friends or a confident can be socially uncomfortable but this section investigates how a lack of relationships affects the body's biological processes resulting in an increase in mortality and morbidity. Cassel (1976) suggests that the way social relationships protect against illness is by increasing host resistance. The outcome of an infection depends on the germ (the causal agent) but also the resistance of the host to fight the germ. This is a development of an idea proposed by Hans Selye who researched stress and illness. He noted that patients who were suffering stress were more likely to be susceptible to disease. Anything that affected the body's stress reaction could, in theory, change the susceptibility to disease. The study about susceptibility to cold cited earlier appears to confirm this hypothesis (Cohen et al 1997b).

Kim et al (2010) observed more coronary artery calcification amongst women in neighbourhoods with low social cohesion (after adjusting for individual factors). Coronary artery calcification is a risk factor for coronary heart disease. The inflammatory marker, interleukin-6, is also an indicator of coronary heart disease. It has been significantly inversely associated with social integration for men. This was after adjusting for potential confounders including smoking, blood pressure, body mass, depression and SES. These results came from 3267 participants of the Framingham Health Study (Loucks et al 2006). The same research team also looked at fibrinogen concentrations among 800 older adults (Loucks et al 2005). Elevated fibrinogen concentrations predict coronary health disease as it is associated with larger and more rigid thrombi within blood vessels. They found lower fibrinogen levels were associated with higher levels of social integration in men, but this association was not present for women. Social integration was measured by marital status, contacts with family and friends, religious service attendance and participation on voluntary activities. Similar results have been found for younger populations (Helminen et al 1997; Davis & Swan 1999), for example, Davis and Swan found a similar association in 80 young women. Brunner (1997) found that fibrinogen was also closely linked to employment grade.

Knox and Uvnas-Moberg's (1998) paper outlines how social support can influence the prevention or progression of cardiovascular disease via neuroendocrine pathways. They review data which suggests that lack of social support is etiologically related to coronary artery lesion development through two mechanisms: sympathetic-adrenomedullary influences on platelet function, heart rate and blood pressure in the initial endothelial injury; and pituitary-adrenal cortical factors involved in smooth muscle cell proliferation during progression of the lesion after injury has taken place. It hypothesizes that the effect of social support on the cardiovascular system is mediated primarily through mechanisms associated with the release of oxytocin. Oxytocin was originally known as the neuropeptide important for giving birth and breast milk production. It now appears that its role is much more important in developing social bonding (Kendrick 2004). For example, female mice with reduced oxytocin are very aggressive (Ragnauth et al 2005). Vasopressin regulates water excretion and is a potent vasoconstrictor, it is also implicated in aggressive behaviour (Santangelo & Bass 2006). Oxytocin and vasopressin are increased by socially pleasant sensory experiences such as comforting touches and smells. Studies with nonhuman animals have shown that when levels of these hormones are high, animals increase positive social interactions and social bonds are formed. Bonds are formed in species where receptors for these neuropeptides are highly expressed in dopamine-producing reward centres. In humans, these systems become activated when we see people we love (Kendrick 2004). Brain scans of people looking at pictures of their children, loved ones and others, showed that both maternal and romantic love activates parts of the brain associated with reward. These parts of the brain are rich in oxytocin and vasopressin receptors (Bartels and Zeki 2004). Neuroimaging shows individual differences in the way people's brains process social events. Lonely young adults appear to be less rewarded by social stimuli of pleasant depictions, as evidenced by weaker activation of the reward centre of the brain (the ventral striatum). For unpleasant depictions, social individuals showed greater activation of the temporo-parietal junction, consistent with the notion that they are more likely to reflect spontaneously on the perspective of distressed others (Cacioppo et al 2009).

Neglect in early life may cause abnormal bonding systems to develop. This can compromise interpersonal relationships and commitment to societal values (Pedersen 2004). A study looking at the levels of hormones in young children, found that those children who had lived in an orphanage compared to those living with their birth families had lower baseline vasopressin and oxytocin (Fries et al 2005). This suggests that social deprivation may inhibit the development of vasopressin and possibly oxytocin. Those children who had been in an orphanage, had all been adopted for at least 3 years before the study. Despite this fact,

after cuddling with their mother, the adopted children produced significantly less oxytocin than the other children. The authors believe that early deprivation of social contact can have a long term effect on brain-behaviour development.

Dysfunction in these systems also appears to lead to problems such as autism (Kendrick 2004). People with autism have great difficulty in establishing relationships. Wu et al (2005) showed through genotyping that the oxytocin receptor gene appears to have an important role in susceptibility to autism.

Kosfeld et al (2005) took the study of oxytocin in humans a step further using a double blind experimental study to investigate trust. Their team administered intranasal oxytocin or a placebo, then asked the subject to participate in a gambling game where if he trusts his co-players and his trust is returned, he receives a pay-off. Those subjects who had received the nasal oxytocin were more likely to trust others than the controls. In trying to explain their results, Kosfeld et al suggest that oxytocin affects subjects' trust and promotes behaviours to approach others (social confidence). They cite animal studies that show that oxytocin promotes pro-social behaviour by inhibiting defensive behaviours. This study is of real interest but needs to be confirmed as it only concerned 121 students.

3.2.2 SES and Stress

Sapolsky (2005) has investigated the social relationships between wild baboons. He analysed their brains, as well as challenged hippocampus cells to stress hormones in the laboratory. He has clearly shown the adverse effect on brain functioning of excess cortisol and other hormonal stressors which are found in increased amounts in subordinate and in social isolated individuals.

It seems likely that the same mechanisms that have been suggested to explain the biological pathway of the effect of social inequality may be similar to those of social support. If we accept that humans have evolved to recognise that social support, friendship etc are important for survival, it is logical to suppose that without social cohesion humans become biologically stressed. Inequality also produces chronic biological stress. The following section describes the impact of stress on the body whether it comes from isolation or low status (as often these conditions occur simultaneously).

The stress mechanisms are protective in that they promote short-term adaptation to the environment (allostasis). In another respect, however, these stress mechanisms can lead to

a long-term dysregulation and maladaptive wear-and-tear on the body and brain under chronically stressful conditions (allostatic load), which compromises stress resilience and health (McEwen & Gianaros 2010).

Sloan et al (2005) suggest that the parasympathetic nervous system may be a mechanism linking the stress of low SES to increased morbidity. A summary of sympathetic and parasympathetic systems can be seen in Fig 3.4. High frequency heart rate variability has been linked to cardiac parasympathetic regulation. They found significantly more high-frequency variability in middle and high income white people (i.e. more parasympathetic system activity). The same trend was present for black people but it was less marked. Since low levels of parasympathetic activity predict the development of heart disease, diminished inhibition of inflammation, and insulin sensitivity and fat metabolism, this study suggests that parasympathetic regulation may be one of the mechanisms through which lower SES confers increased health risks.

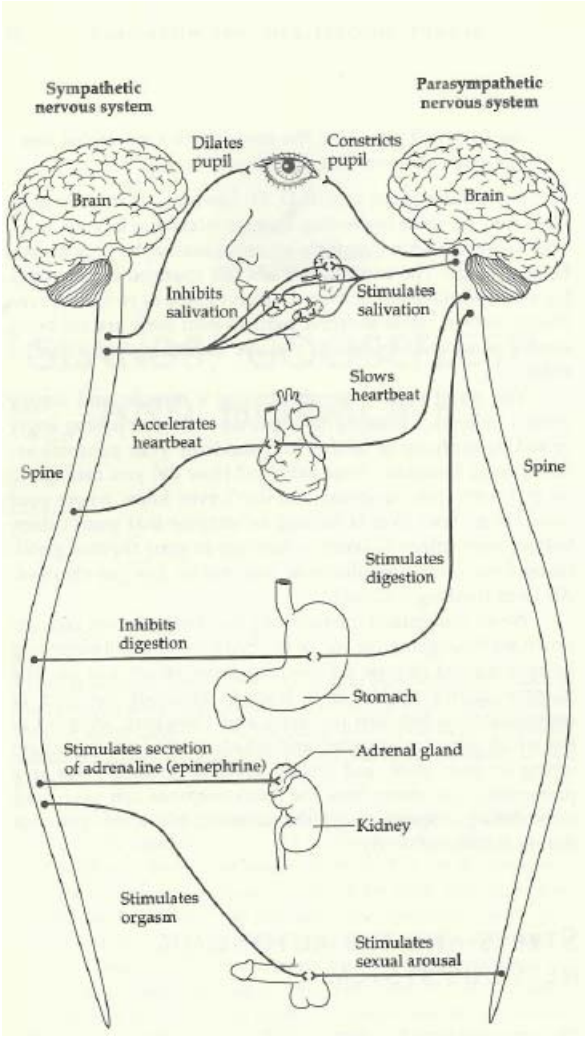


Fig 3.4 The impact on the body of the sympathetic and parasympathetic nervous systems (Sapolsky 2004)

A key pathway for the production of hormones is that of the hypothalamic-pituitary-adrenal (HPA) axis. The hypothalamus in the brain sends messages to the pituitary gland just below the brain, which in turn activates the adrenal glands (above the kidneys) (Brunner & Marmot 1999) . The adrenal gland produces cortisol. Other hormones described above, such as oxytocin and vasopressin, are produced directly by the pituitary.

In response to continual stress, the HPA axis produces excess cortisol. In the short term, cortisol can be of benefit as it prepares the body for action but long-term, it is extremely damaging (Brunner 1997). Cortisol has an effect on all the vital organs including the heart and the immune system. It also increases blood sugar levels to provide the muscles with energy (Rhen & Cidlowsk 2005). A meta-analysis of 208 laboratory studies showed that cortisol levels changed in response to a wide range of stressors but tasks containing social-evaluative elements were associated with the largest cortisone changes and the longest recovery times (Dickerson & Kemeny 2004).

An early study of 767 middle-aged adults found that salivary cortisol levels were positively associated with occupational status (Brandtstadter et al 1991). Highest levels were found for executives and the relationship was more pronounced in women. More recently, most studies have found the opposite results i.e. cortisol is associated with lower SES and appears to be more significant for men than women. For example, Kristenson et al (2001) found in 150 men that low social class associated with high salivary cortisol. Steptoe et al (2003), using data from 200 adults in the Whitehall cohort found that cortisol levels were higher for lower grade men but no differences were found for women. Cohen et al (2006) assessed samples from 193 adults over 3 days. Low SES (income and education) was associated with higher levels of cortisol and epinephrine (adrenaline) and marginally higher levels of noradrenaline. A gradient existed between the levels of SES.

However, Dowd & Goldman (2006) did not find evidence to support the hypothesis that chronic stress was a mediator in the relation between SES and health. The study considered various neuroendocrine markers (cortisol, adrenaline, noradrenaline and serum dihydroepiandroste, DHEA – a marker of hypothalamic-pituitary-adrenal functioning) for 972 subjects living in Taiwan. SES was measured by income quartile and level of education. They found no association between the neuroendocrine markers and SES. As the production of these neuroendocrine markers are all related to each other, it is not surprising that as an association was not found for one, it was not found for any of them. It may be that there is really no effect but the lack of association may be due to Dowd's sample only including people over 54 years (with an over representation of people over 70). Older people

have been seen to be less associated with SES differences as they are no longer active in the work place (see Chapter 1). The authors themselves state that the social stressors themselves may be different in Taiwan compared to Western populations (eg living with a married child is seen as highly desirable in this culture).

Cohen et al (2006) found that lower SES (income and education) is associated with higher levels of cortisol and adrenaline and marginally higher levels of noradrenaline. These associations are independent of race, age, gender, and body mass. Low SES is also associated with a greater likelihood of behaviours such as smoking and with less diverse social networks. This analysis provides evidence consistent with the hypothesis that these behavioural and social variables mediate the link between SES and stress hormones.

Chronic stress and the hormone oxytocin appear to be another important link. Stress increases cortisol and cortisol production is regulated by the hypothalamic-pituitary-adrenal (HPA) axis as mentioned earlier. One of the roles of oxytocin appears to have is to mediate the HPA cycle (DeVries et al 2003). Via its release by various types of sensory stimulation such as touch, or being an empathic environment, oxytocin induces anti-stress effects such as the reduction of blood pressure and cortisol levels. It also increases pain thresholds and healing (Uvnas-Moberg & Petersson 2005).

There are other hormones that affect social behaviour. Testosterone, for example, is linked to increased aggression (Giammanco et al 2005). Serotonin is a neurotransmitter in the brain that has been associated with depression. It is also known to be associated with social status (Matthews et al 2000) but it appears to have other effects. In a small blind cross-over trial, serotonin inhibitors modified social behaviour in humans (Tse & Bond 2002). Mice that had been socially isolated for a month, only had half the brain enzyme responsible for producing the stress relieving hormone allopregnanolone (Agís-Balboa et al 2007). Aggressive mice have noticeably higher levels of serotonin than more passive ones (Bloom & Lazerson 1985). Giving a serotonin uptake inhibitor to socially isolated, aggressive mice normalises their brain. It reduces social isolation-induced aggression and makes the mice more sociable (Matsumoto et al 2005). As well as having a role in relationship development, serotonin appear to be important in shaping dominant-subordinate relationships in fish (Lepage et al 2005).

Other biological explanations for social behaviour exist. For example, a rare genetic disorder called Williams Syndrome is linked to the absence of 20 genes on chromosome 7. This results in mild to moderate mental retardation and cardiovascular deficiencies but also

hyper-social behaviour. Sufferers enjoy elaborate story telling and show acute understanding and empathy with the characters in their stories (Bellugi & St George 2001).

In primates, Sapolsky (2004) has noticed that resting levels of glucocorticoid rise when dominance hierarchies are unstable, particularly amongst males. This may, in part, explain the increased level of Russian male mortality at the time of political change (Men et al 2003).

Some authors reviewing the evidence feel the link between physiological stress, SES and social support is inconclusive (p18 Steptoe & Marmot, 2002) but others feel there is sufficient evidence to support the hypothesis that longevity results, at least in part, from the positive influences of social ties in reducing neuroendocrine reactivity (Seeman & McEwen 1996). Understanding is increasing rapidly to identify the exact biological processes linking social isolation, hierarchy and stress to mortality. Chronic stress appears to have a clear effect on hormone levels that in turn can stress vital organs such as the heart and the brain (McEwen & Gianaros 2010). Rather than the acute, consequences, further research needs to focus on the longer term effects of stressors such as isolation (Dowd & Goldman 2006). In future, there is likely to be more evidence on how therapies involving support, empathy and touch are health promoting (Uvnas-Moberg & Petersson 2005).

3.3 Other links between social cohesion, socioeconomic status and health

The interest in social capital and health emerged at an exciting time with the renewed interest in mechanisms that link social inequalities and health (Hawe & Shiell 2000). Although social cohesion has been associated with good health, relatively little work has attempted to relate macro-social variables such as social class to social support (Stansfeld 2005). In one study in France, Jusot et al (2007a) suggest that as access to social trust, support and sense of control at work are not equally distributed in the population, these psychosocial factors can explain part of the social inequalities in health.

Socioeconomic status (SES) and social participation appear to have an independent impact on fruit and vegetable consumption (Lindstrom et al 2001). The evidence that individuals of lower SES have less support is contradictory but that they have smaller social networks is more consistent (Baum et al 2000). Turner and Marino (1994) found a summary of support measures (from spouse, relatives, friends and co-workers) was related to higher SES (Table 3 p 202) however discounted the hypothesis that social distribution of mental health was attributable to social support differences. The Whitehall II study found an association

between higher SES groups and more emotional support. They also found more contacts with friends amongst those with higher employment grades and more contact with family amongst those in lower grades (Fuhrer et al 1999b).

When comparing regions in Hungary, Skrabski et al (2004) noted that income & education were significantly negatively correlated with social distrust, competitive attitude, collective efficacy, religion and were positively correlated with group membership. SES and social capital (trust, reciprocity, membership of an association) explained two-thirds of the variance in male mortality but less than one-third of the variance for women.

Antonucci et al (2003) found that in general, people over 40 with less education had smaller social networks however, men with less education who had larger networks and perceived support had lower scores on a health problems index. This study of 330 men suggests social relationships may be a protective factor for the health of men from low SES. The authors did not find the same effect for women. Income deprivation and social cohesion measured at community level were seen by Fone et al (2007) as potentially important joint determinants of mental health. High social cohesion significantly modified the association between income deprivation and mental health. The difference in the predicted mean area mental health scores at the 10^{th} and 90^{th} centiles of the income distribution was 3.7 in the low cohesion group and only 0.9 in the high cohesion group.

In contradiction, Melchior et al (2003) using data from the Gazel cohort, found that amongst men who reported low social support, those with high occupational status had an increased risk of reporting poor health (high SES odds ratio 1.54;CI 1.23-2.11 compared to low SES odds ratio 1.15;CI 0.71-1.86), but the overlapping confidence limits of the odds ratios suggest there could be some room for doubt in the results. This same effect was not found for women and dissatisfaction with social relations was not associated with health across the occupational strata.

A study looking at neighbourhood social cohesion in the UK found that material deprivation was associated with low levels of trust, low sense of attachment to an area, a lack of practical help from neighbours, and little tolerance of others (Stafford et al 2003). This has been seen as the double whammy. Material deprivation was also associated with higher levels of contact with other family members but low numbers of friends. Some benefits (particularly practical help) increase with increasing family ties in the neighbourhood, but that there may be negative aspects as well. Tolerance or respect for others, are negatively correlated with strong family ties. Interestingly, this study chose one set of residents to report

on their perception of social cohesion and a difference set (living in the same neighbourhood) to report on their health. This method avoids affect bias.

In Stockholm, structural and functional social capital was closely associated with self-rated health, however no contextual effect was found. The authors believe that this was due to the fact that area social capital was very closely associated with area income, when income was controlled for, the social capital and health association disappeared (Engstrom et al., 2008). In a systematic review of 42 studies, (Islam et al., 2006) found that an association between social capital and health was much more consistently reported in countries with large economic inequalities. One potential explanation of the generally null findings from multi-level studies of social capital and self-rated health in more egalitarian societies is that these countries have a stronger provision of safety nets and higher spending on public goods such as health and unemployment insurance.

Marmot sees the degrees of control and social participation as the features that underlie the status syndrome. “Autonomy – how much control you have over your life – and the opportunities you have for full social engagement and participation are crucial for health, well-being and longevity” p2 (Marmot, 2004). Although this sounds simple, he admits it took him 25 years of research to reach this conclusion. Wilkinson (2005) has linked the social cohesion and inequalities by suggesting a pathway of how greater inequality leads to poor social relations. In egalitarian societies, cooperation, sharing and reciprocation are much more common than in strongly hierarchical societies (Wilkinson, 2000). His pathway is summarized below (Wilkinson, 2005):

Greater income inequality
Increased social distances between income groups

↓

Less sense of common identity

↓

More dominance and subordination
Snobbery and downward discrimination
Increased status competition

↓

(less social cohesion/ bridging social capital *)
Shift to more anti-social values
Emphasis on self-interest and material success

* my added note

3.4 Conclusion

Durkheim's study on suicide and essays (Durkheim 1897 /1967) on social cohesion often appear in modern social epidemiology literature without any criticism. He quotes very precise figures without qualifying his conclusions that the figure may be erroneous. It may be that the high rates of suicide noted from the Protestant Anglo-Saxon countries are due to the fact that it is more socially acceptable to record a death as suicide in some cultures than others. Durkheim's views about women reflect the norms of the late 19th century and would be seen as untenable today. However, his overarching concept that 'society is greater than sum of its parts' and that social crisis or change results in a lack of social cohesion which is damaging in its self have been born out by the wealth of studies finding that social isolation is damaging to health (Tucker 2002; Men et al 2003).

If humans have evolved to need social support from others and to see social cohesion, friendships etc as positive; it seems logical that without these things we are likely to become biologically stressed. The hormonal pathways linking chronic stress to increased vulnerability to diseases are being identified (McEwen & Gianaros 2010).

Although research is limited, it appears that higher SES people have, or at least perceive, more social cohesion. Marmot (2004) concludes that "supportive relations are less common as the social hierarchy is descended" p164. A review of 47 studies of social capital and physical health found a consistent association between social cohesion in unequal societies with weak financial safety nets compared to more egalitarian countries (Kim et al 2008).

Social cohesion appears to affect heath at both the individual and the community level and it has both functional and structural components. The associations are consistently strong at the individual level (Kim et al 2008). For example, those who were active members in two or more social organisations and those who count a medical doctor among their friends report better health (Gele & Harslof 2010).

There has been criticism in France of the lack of clarity of the concept of social capital as a health determinant (Fassin 2003). Hawe & Shiell (2000) suggest that although the relation properties of social capital are important (e.g. trust, networks), the political aspects are under recognised. The same authors also believe that social capital research has so far inadequately captured the underlying constructs, in particular the qualitative difference between the macro/context level and the micro/individual level. Some studies have

combined apparently different variables without fully explaining the reasons for putting those variables together eg friendship with political participation in order to form a summary index of social capital (Kim & Kawachi 2006) or discussing social capital and binge drinking where the only measure of social capital is volunteering rates (Weitzman & Chen 2005). Part of the difficulty of the concept of social capital is that it has been borrowed from other disciplines. Wilkinson (2000) suggests that we need to think what might lie behind it that could affect health.

The literature is unclear as to what should be done to increase social capital and social ties in order to improve public health. Lett et al (2009) suggests identifying coronary patients at increased risk due to a lack of social support. In a small controlled study lasting one month, Hott-Lunstad et al (2008) found that promoting 'warm-touch' amongst married couples enhanced levels of salivary oxytocin in both husbands and wives. Husbands in the intervention group had significantly lowered their systolic blood pressure compared to the controls. Pearce and Davey Smith (2003) believe that "intervening in communities to increase their level of social capital may be ineffective…and to take such an approach may be to blame the victim…whilst ignoring the health effects of macro-level social and economic policies". An intervention study to promote social support after coronary heart disease had little effect on subsequent mortality (Burg et al 2005). It has been suggested that this intervention probably came too late to benefit the trial's participants. Sapolsky (2004) suggests that such an intervention will only have an effect if the individual is really motivated to change. Other approaches such as healthy urban planning do appear to have had more success (Barton et al 2009), albeit on a small scale. An example is the improvements to the social environment in Oslo that were associated with better mental health (Dalgard & Tambs 1997).

The biological effects of stress from low SES and social isolation are currently being identified. McEwan (2010) suggests that stress-induced changes in the brain are largely reversible. The brain is quite plastic, more so than other vital organs, however a life course approach suggests that long-term chronic stress does leave an imprint (Pedersen 2004; Fries et al 2005).

There is a consensus that social links (whether measured as cohesion, networks or support) are positive for health. "That social cohesion enhances wellbeing is by now a well established fact…but what is missing from recent epidemiological studies of social relationships and health is the social context in which people lead their lives" (Kawachi & Kennedy 1997). Other authors have expressed similar sentiments (Berkman & Glass 2000;

Stansfeld 2005). My study aims to investigate the impact of social relationships on health within the context of social status. Specifically it will look to see if the impact of social ties on health is greater for people at the bottom to the social gradient.

Chapter 4 - Study 1
Associations between self-rated health, socio-economic status and social ties

4.1 Background and aims

The following three chapters have the methods and results of three analyses undertaken to explore the connections between social ties, SES and self-rated health in France. Chapter 7 contains a discussion of the findings of the three studies and compares the results to the published literature.

The aim of Study 1 is to investigate the associations between self-rated health (SRH), social ties and socioeconomic status (SES). Chapter 1 showed how SRH, like other measures of health, is closely associated to socioeconomic status (Cambois & Jusot 2010, Kondo et al 2009). Although catching up fast, currently there is less information about the health inequality gradient in France than exists in the Scandinavian and Anglo-Saxon countries. It is therefore important to analyse existing French general population data sets for health inequalities. We hypothesize that self-rated health will follow the socioeconomic gradient. Our analysis will test the association between SRH and different SES measures: notably income, occupation and education to see if the health gradient is equally as steep regardless of the measure. Studies appear to show differences depending on the measure of SES (Monteil & Robert-Bobée 2005; Menvielle et al 2007).

As described in Chapters 2 and 3, social relationships appear to be very important for human well-being (Kim et al 2010, Holt-Lunstad 2010). Study 1 will also consider the relationship between social ties and SES, and will then look at social ties and self-rated health after adjusting for SES. Animal studies have shown that high status members appear to have more social ties (De Waal 1996, Byrne 2001). Equally most human studies appear to show that high status individuals have more social ties, however there are exceptions with Kubansky et al (1998) showing that low education was associated with more social ties and support. In France, senior professionals report having more friends than manual workers (Pan Ke Shon 1998) and senior professional's children receive more family support (Herpin & Dechaux 2004).

We hypothesize that the social tie variables will be associated with health. Berkman & Melchior (2006) have suggested that France is a country that is "pro-relationship", which makes it a particularly interesting place in which to study the impact of social ties on health. The French cohort 'Gazel' found that poor social integration was associated with increased male mortality and that dissatisfaction with social relations rather than size of

network was associated with poor health (Berkman et al 2004; Melchior et al 2003). Apart from the Gazel studies, the only other published cohort that we identified focusing on social ties and health in France, consists solely of elderly participants. Amongst this population, Fuhrer et al (1999b) found that few social networks (not dissatisfaction with social support) were associated with increased mortality and this was more marked for men than women.

Specifically, we wish to see if the health and social ties associations are maintained after adjusting for SES in this general population sample. This will suggest a real effect of the social ties rather than only confounding by the SES composition of sample. Also we wish to see if different types of social ties (friendships, family relationships, club membership, living alone…) are all equally associated with health. We will test to see if the associations are more evident for the younger members of the sample (as mortality inequalities are generally found to be more pronounced in working-age populations). As the literature is inconclusive as to whether men's or women's health are more influenced by social ties, we wish to specifically examine this point (Fuhrer 1999b, Badoux 2007).

To investigate the aims, an existing dataset was found with health, with SES variables and social ties which had not been analysed. The 1997 EPCV (Enquete permanente sur les conditions de vie ; Permanent survey of household living conditions) was chosen as it:

- contains health and SES variables and also has an exceptionally rich source of social tie variables,
- covers a reasonably large sample.
- is nationally representative of France,
- and was available at no cost to French researchers.

The data is anonymised and available to all academic researchers in France so no ethics committee permission was necessary for this study.

The article published in the journal Public Health, a copy of which can be found in Appendix 1 (Heritage 2009), is a summary of the results presented here.

4.2 Methods and Variables

The data used in this study was gathered during May 1997 by the National Institute of Statistics, Paris (INSEE, Institut National de la Statistique et des Etudes Economiques) as part of the Permanent Survey of Household Living Conditions (EPCV, Enquête

permanent sur les conditions de vie des ménages). The EPCV surveys occur three times a year during the months of January, May and October. In May 1997, the questionnaire covered health issues, socio-demographic data, household income, SES and relationships with family, friends, neighbours and work colleagues.

The INSEE Bretagne provided a copy of the complete questionnaire. The data was obtained via the Centre Maurice Halbwachs, part of the Quetelet network, in the form of 4 separate data files. The variables that were definitely irrelevant were dropped, and the files were combined using the unique individual identification reference.

For each EPCV survey, a total of 8,000 representative households from mainland France are randomly selected. In May 1997, 5,691 responded positively when visited by interviewers. Up to 3 adults per household were asked to respond to questionnaires (10,959 individuals in all). (If more than 3 adults lived at the address, 3 were chosen randomly by the interviews via birth days closest to the interview date). People 15 years and over were classified as adults.

Using STATA, we randomly selected one adult per household (5,691) for this study. Key data were missing for 289 individuals (5.1%), which left 5,402 participants. Of these, 2,424 were men and 2,978 were women, and 5 046 were over the age of 25 years.

4.2.1 Health variables

The main outcome variable for this study is self-reported health. Self-rated health (SRH also known as self-reported health) was measured on a 6-point Likert scale from very good to very poor health. The replies were dichotomised. Less than good (or poor) SRH was defined as those reporting average (1 186, 23.5%), mediocre (279, 5.5%), poor (173, 3.4%) or very poor (83, 1.6%) health. People with good SRH were those who replied that their health was very good (1 053, 20.9%) or good (2 272, 45.0%).

Other health related variables were available. The number of cigarettes smoked per day was dichotomised into: none smoked/any number smoked. The frequency of practicing any sport activity (either collectively or individually) was given as x times per day/week/month/year. They were multiplied to give a number of sessions per year, and then were dichotomised into playing sport at least once a week/ no regular sport. The replies to the question relating to having regularly seen medical staff due to any chronic illnesses (or accident/ handicap) were dichotomised as yes or no. The same was done for the question relating to having consulted a GP or specialist doctor during the last 12 months.

4.2.2 Socioeconomic variables

The socioeconomic measures in the study are :

- equivalised household income
- occupation
- educational attainment
- perception of adequate income
- and a composite socioeconomic status (SES) score.

Equivalised household income

Individuals were classified according to income. The survey asked the total net annual income for the household in one of 13 categories. In France, net household income refers to income after all social security charges have been deducted but before income tax and local taxes have been paid. To adjust the income for the number of people living off that income, there are a number of methods that can be used (Blakely et al 2001; Jusot 2004; Machenbach et al 2008; D'Souza et al 2008). It is preferable to use per capita household income as it attempts to adjust for the lower costs per head of sharing housing costs such as heating and utilities, as well as other costly items of expenditure such as cars. We used the conversion method of the Luxemburg Income Study. We calculated an equivalised income for each individual by dividing the mean of each income category by the square root of the number of people in the household. In the results section, income is presented as quartiles (upper income, upper-middle, lower-middle and lower income).

Occupation

Occupational status was declared as senior professionals and managers (in French these are called "cadres"); intermediate professionals; routine employees/clerks and manual workers (known as "ouvriers"). We created another category which combined data from farmers, shopkeepers and craftsmen. Last previous occupation was used to classify currently retired people or not-working people. 189 people, mostly women, described themselves as 'inactive' (people who have probably never worked).

Education attainment

Education attainment was the most difficult to identify as the questionnaire asked a number of different questions about current education, academic and professional qualifications. In the results section, the upper education category consists of people who have a university or tertiary education qualification. A 2nd category was made up of those who have obtained the baccalaureate (examination at age 17 or 18 years) but had no further academic qualifications. A 3rd group was a composite of a number of short

professional qualifications. A small group consisted of people who had passed the certificate (the name of this qualification has changed over time) that is taken at 14 or 15 years, at the end of the 4th year of secondary school. The final group consisted of people who had no academic qualifications or only a primary school diploma.

Perception of adequate income

A single question asked if the respondent would say that their household was financially either 'comfortable'; 'OK' ; 'it is just Ok if we are careful' ; 'it is difficult' or 'you can't get to the end of the month without increasing your debt'. These last 2 categories were combined as they contained very few responses. It was labelled 'in difficulty'.

Composite SES score

For part of the analysis we wanted to investigate the health inequalities of different SES variables, but we also wanted to combine them to form a composite SES score. This composite score would be used to adjust for SES when considering the social tie and health associations and later to stratify the sample. The income, occupation and education variables were combined to produce a composite SES score. The equivalised income variable was divided in quintiles (ranked 1 for the highest income to 5 for the least). The occupational status variables were ranked as follows: 1= senior professionals and managers (cadres); 2=intermediate professionals; 3= farmers/shopkeepers /craftsmen; 4= routine employees and 5= manual workers. The education attainment variable was available in 5 categories (from 1, a university degree to 5, only primary school certificate or no qualifications).

The scores for each of 3 variables were added together (giving a highest possible score of 3, and a lowest of 15) and then collapsed into 3 categories. Those individuals for whom we had no data (education 31, income 159, and occupation 17 participants) or who were classified as professionally inactive (189), were allocated the average of the 2 variables for which there was information. For 17 participants, data was only available for 1 variable and they were coded as 'Missing'.

4.2.3 Social relationship variables

Seven single measures of social ties were selected from the questionnaire, and the replies dichotomised (see Box 4.1). We recorded whether or not the respondent lived alone. This came from a question asking how many other people lived in the household. Respondents were asked if they were married, divorced, a widower or single; and another question asked if they were living with a partner. We coded the replies as married and currently living with a partner versus single, widow, divorced (and not living

with a partner).

Another variable relates to a feeling of loneliness: “thinking of yesterday, did you feel alone/supported by others/not one nor the other”. We coded ‘felt supported by others’ versus the other replies. The other variables were more factual: ‘During the last 8 days, did you receive at least one personnel telephone call ?’ replies Yes/No. Also, ‘Have you friends, men or women, outside your immediate family?’ Yes/No. There were a number of replies possible for the question “Who do you normally eat weekday lunch with?” – spouse, children, other family members, colleagues, others. They were dichotomised into eating alone versus eating with others. A variable for club membership was created from two questions. The first asked ‘Are you part of an association or similar structure (sports, cultural, scientific, musical or regional traditions club etc)?’ and the second referred to membership of a school parents association, humanitarian NGO, religious group, political party or trade union. If the respondent said they had participated to either question, they were classed as a member of a club.

Box 4.1: The variables analysed reflecting social ties

Single questions

Subject reported that he or she was :-

- Married / living with a partner
- Lives with other people
- Felt alone yesterday
- Received a personal telephone call during the previous 7 days
- Usually eats lunch with others on weekdays
- Has at least one friend
- Is a member of a sports, cultural, or musical club, or parent-teacher association, or religious group, or trade union

Composite measures

- Family relations (marital status; frequency of seeing siblings living outside the household; frequency of seeing parent/child; frequency of seeing other family members)
- Friendships (number of friends; frequency of seeing friends; practical support e.g. childcare from friends)
- Neighbour relations (quality of relations with neighbours – like them, conflict etc; practical support e.g. could borrow a garden tool from neighbours)
- Colleague relations (see colleagues outside work; can speak freely during work time; play sport with them; use the familiar pronoun ‘tu’ most of the time)

4.2.4 Social relationship composite scales

The wealth of details about family, friends, neighbours and colleagues were combined into composite scales which are summaried in Box 4.1. They were calculated after

studying published papers that had used social relation indexes. Berkman and Syme (1979) created a social network index from 4 items referring to the number of social ties (married, contact with friends, belong to a church or to a group). Intimate contacts were given extra weighting. Kaplan et al (1988) used a social connections index of 5 equally weighted items (ex: married, frequency of visit to friends, number of people seen per day). Cohen et al (1997) allocated 1 point to each category of person (spouse, other family, workmates, fellow volunteer etc) that the subject had spoken to during the previous 2 weeks. He also scored the total number of people spoken to during the same time period. Melchior et al (2003)'s social network index had 6 items most of which contained 5 or 6 sub-items. Some were doubled to ensure equal representation of contact within and outside the family. They also created a social relations scale based on satisfaction of current relationships and a 5 item social support index which included a question about feeling lonely.

The method used in this study was to note the replies to each question from a maximum of +5 to -5 (missing values as '0'). There was no weighing of different variables within a scale. The composite measures were then divided into 3 values to reflect high, middle and weak relationship categories. Generally, the 3 categories were created to be of approximately equal size but if there was a cluster of scores, they were kept together and all allocated to the same category.

For family scale, "currently living with a partner" was coded as +5, being single as 0 and having lost a partner (widowed or divorced and not currently living with a partner) as -5. A 2nd variable for this scale was created by considering how frequently the respondent sees either a brother or sister who lives outside the household. A total of +3 was allocated if the respondents sees at least 1 brother or sister at least once a year; +5 if a sibling is seen at least twice a week, 0 if the respondent does not have a sibling and -5 if the respondent has a sibling but is not in contact with at least one sibling, at least once a year. In identical fashion, a 3rd variable was produced relating to seeing a parent or a child who does not live with the household. Finally a 4th variable was created 'seeing other members of the family' (cousins, aunts, uncles, grandparents…) using the same scoring method. The four family variables were added together giving a score with a potential range from +20 to -20. The sample was divided into 3 categories relating to high (close), medium and low (weak) family relationships.

The friends composite scale combining 3 variables. The first related to number of friends (of either gender) reported: +5 if the respondent said they had 10 or more friends; +4 = 3 to 9 friends; +2 = 1 or 2 friends; 0= missing; and -5 =no friends. The second related to

the frequency of seeing friends: not having friends or not seeing a friend at least once a month was coded as 0; +3 = 1 or more visits to a friend per month; +5 = seeing a friends at least twice per week. (No information was available that specifically related to telephoning/emailing friends). The third variable in this friendship scale relates to having friends who could provide any type of practical support, for example helping occasionally with childcare, pet care or lending tools. Five extra points were awarded if a positive reply was giving to any of the practical support questions. The 3 friendship variables were added together giving a potential score from +15 to -5. The sample was divided into 3 categories relating to high (close), medium and low (weak) friendships.

The neighbours' composite scale also had 3 components. The first related to perceiving neighbours as friends or as enemies. Five points were allocated if at least one neighbour was seen as a friend, +3 points if the person knew a neighbour; 0= missing data; -3 = in conflict with 1 neighbour; -5 = in conflict with more than one neighbour. The second variable described the amount of contact with neighbours. Five points were allocated if the respondent had visited a neighbour's house (or the neighbour had visited theirs) during the last year, 0 if no visits had occurred and -5 if the respondent would like less contact with their neighbours. The final variable related to neighbours providing practical support. As with the friendship scale, 5 points were added if neighbours had provided any practical support during the last 2 years. The three neighbour variables were added together giving a potential score from +15 to -10 and the sample was divided into 3 categories.

Only those people who had work colleagues were included in the colleagues' composite scale (2,408 respondents). A total of five variables were combined. The first asked if colleagues were seen (voluntary) outside work hours. Five points were allocated if the reply was positive. The number of work colleagues who were considered as friends constituted the second variable. Replies of 3 or more colleagues as friends were allocated 5 points: a score of +3 to those with 1 or 2 friends, 0 =missing and -5 if none of the person's colleagues were considered as friends. The third variable was linked to undertaking any sports or cultural activities with work colleagues either regularly or occasionally (during or outside work hours). Five points were allocated if the reply was positive. The fourth variable is specific to France as it asked if the respondent used the familiar pronoun 'tu' when speaking with colleagues at work. The reply 'almost always use tu' was coded as +3, the reply 'it depends' was coded as 0 and 'never' use tu as -3. The final variable related to the freedom to speak to colleagues. Those who said they could speak freely to colleagues were coded as +3 and those that could not speak to colleagues (or only during break times) were coded as -3. Again the 5 variables were

added together giving as total possible score of + 21 to -11 which was divided into 3 categories.

4.2.5 Calculation of the results

The EPCV survey data was compared to the census to check if it is representative of the whole population. The correlation between various confounders was also considered (see the end of this methods section).

The main SES and social ties variables were described by age and gender. The social ties were also described by SES. Using Stata v10.1, logistic regression models were used to calculate the odds ratios reflecting the association between self-rated health, and 4 different measures of socioeconomic status (income, occupation, education and perception of income and with a composite measure of SES. The 7 single and 4 composite measures of social relationships were also described and logistic regression models were estimated by age (under 65s v 65 years and over) and by gender. The association between less than good health and social ties were adjusted for age, gender and SES.

4.3 ECPV 1997 :A representative sample?

To check if the ECPV sample is representative of the whole French population, each age and sex group was compared to the 1999 census data from France 'metropolitan' as the ECPV survey only covered this geographical area. (France metropolitan is that part of France inside Europe excluding its overseas territories known as the DOM-TOMs). The proportion of the census age group by sex was divided by the equivalent age/sex group for the EPCV. In comparison to the census population, the EPCV sample is slightly older than the general population and contains a greater proportion of women.

	EPCV 1997		**Census 1999**		**Ratio of each age gender group in EPCV sample compared to census**		
AGE	Men	Women	Men	Women	Men	Women	Comments
15-19	0.02	0.02	0.04	0.04	0.39	0.47	VERY under represented
20-29	0.06	0.08	0.08	0.08	0.77	0.99	Men slightly under represented
30-39	0.09	0.11	0.09	0.09	1.02	1.23	Women over represented
40-49	0.08	0.09	0.09	0.09	0.94	1.06	
50-59	0.06	0.07	0.07	0.07	0.91	1.00	
60-69	0.07	0.08	0.05	0.06	1.24	1.24	Over represented
70 +	0.06	0.10	0.06	0.09	1.15	1.15	Slightly over represented

Table 4.1a Comparing the 1997 ECPV sample to the 1999 census by age and sex groups.

Table 4.1a shows that the under 19 year olds are severely under represented, and the under 29 year old men are slightly under represented. Women are slightly over

represented in the 30-39 year age group; and both genders are overrepresented in the over 60 age groups. Overall, 52% of the population in France is female but women represent 55% of the ECPV sample. Although all the geographic regions were not compared, at the time of 1999 census 18.7% of the metropolitan population lived in 'Ile de France' (the region around Paris). This is equivalent to 18.2% of the ECPV sample.

Comparing EPCV and census occupational groups

The social professional groups from the EPCV and census can not be compared directly as the census classifies a greater proportion of the population as inactive i.e. unemployed or out of the workforce in order to care for young children on the day of the census. The EPCV only classifies someone as inactive if the person has never worked (i.e. students). However Table 5.1b shows that for men, the comparison ratio is close to 1, except for an over-representation of retired men (explained by the fact that there are slightly more older people in the EPCV survey). There is also a slight over representation of routine employees. (This group is equivalent to the UK SC III non-manual).

% MEN	Farmers	Shop-keepers/ Artisans	Senior profs (Cadres)	Intermid profs	Routine Employees	Manuel workers	Retired	Other inactive	Not known
EPCV	2.05	4.78	8.83	12.60	10.31	25.08	29.78	6.42	0.16
1999 census	1.90	5.10	8.90	13.00	7.90	24.40	22.60	16.20	
Ratio of EPCV/census	**1.08**	**0.94**	**0.99**	**0.97**	**1.31**	**1.03**	**1.32**	**0.40**	
% WOMEN									
EPCV	1.33	3.18	5.84	11.79	30.13	10.78	25.00	11.46	0.49
1999 census	0.80	1.90	4.40	11.10	23.90	5.70	21.70	30.40	
Ratio of EPCV/census	**1.66**	**1.67**	**1.33**	**1.06**	**1.26**	**1.89**	**1.15**	**0.38**	

Table 4.1b Proportion of people replying to the EPCV and the census by gender and occupational group.

As the EPCV classifies very few as inactive, all the female professional groups in the ECPV are rather over represented. It appears that those who have or have had the most physically demanding jobs, (farmers, artisans/shopkeepers and manual workers) are the most likely to be classified as 'inactive' at the time of the 1999 census.

4.4 Correlation between the socioeconomic status variables

The study had details of education attainment, occupational class and equivalised individual income. Five categories of each of these variables were added to form a composite SES variable. The correlations between the SES variables are shown below in Table 4.2a. As expected, the composite SES variable is closely correlated to its component variables. It is slightly more correlated to the education and occupational

variables, probably due to the variation in their values sizes rather than that of income which was divided into quintiles

	Composite SES	Income	Occupation Class	Education
Income	0.74	1		
Occupation class	0.80	0.39	1	
Education	0.81	0.35	0.50	1

Table 4.2a Correlations between SES variables

The survey also asked about subjective wealth via the question 'How well off is your household?' The correlation between the possible replies and equivalised income levels was 0.49. This is higher than with education and occupational group at 0.21 and 0.28 respectively.

4.5 Variables which are associated with self-rated health

In the results section, the relationship between self-rated health (SRH) and social ties will be examined. Beforehand a number of factors (age, sex etc) were examined to see if they had an important association with self-rated health in order to control for them in later models.

The odds ratios for each variable were calculated (see Table 4.2b) and then those that were not significant were removed to see which have the greatest impact on health. Age and SES are kept in categorical form to be more similar to the binomial variables such as gender, smoking etc. This model explained a total of 19.7% of the variation in the binomial self-rated health replies.

	Odds Ratio	P (significance level)	95% Conf. Intervals
Age	2.81	0.000	2.57 - 3.08
SES	1.94	0.000	1.79 - 2.13
Smoking	1.22	0.017	1.04 - 1.44
Gender	1.12	0.111	0.97 - 1.28
Play sport	1.99	0.000	1.69 - 2.34
Consult doctor	0.24	0.000	0.18 - 032

Table 4.2b Associations between variables and less than good self-rated health
(Note: The details of the associations with SRH will be described fully in the results. In this table, less than good SRH is associated with older age, low SES, smoking, women, not playing sport and consulting a doctor during the last year.)

As smoking and gender were the two categories with the weakest association with SRH, they were removed. In the new model without smoking and gender; all 4 remaining variables (age, SES, sport, consulting doctor) remained highly significant, and fit only

reduced by 0.1% to 19.6%. The fit reduced to 18.4% when sport was removed, to 17.6% when consulting the doctor was taken away, to 16.1% without SES and it went down to only 10% when age was not included. If the process is reversed, it becomes clear that age alone accounts for a greater association (14%) with self-rated health than the other variables.

To check that age had a liner relationship with SRH, a likelihood ratio test of 2 nested models (age and age squared) with SRH was calculated. The result was not significant suggesting that the quadratic equation (indicating age and SRH have curved relationship) was not a better explanation than a liner relationship between the 2 variables.

The above exercises have shown that it is important to adjust the findings for age. It is the convention to also control for gender, although its impact does not appear to be very important among this sample. Age and SRH are assumed to have a liner relationship.

4.6 Age and gender differences

Comparison with the census in the methods section shows that the EPCV sample was, in general, representative of the French population. Due to the under representation of young people in the ECPV sample, and also the difficulty of obtaining accurate socio-economic data (as over half of this age group were still in education), all the following results only relate to respondents aged at least 25 years. Key data was available for a total sample of 5 046, aged 25 and over. Of these, 2 260 (44.8%) were men who had a mean age of 50.6 years (CI 95%= 49.9 - 51.2). The 2 786 (55.2%) women had a mean age of 51.8 years (CI= 51.2 - 52.5).

Table 4.3 shows that 1 032 (20.4%) of the sample are aged over 65. There are fewer men in the older age group, but this is in line with the census. In all 73.1% of respondents are non-smokers and 27.7% play sport regularly. Younger people and men are more likely to be smokers, and these same groups are also more likely to play sport regularly. Working-age men are less likely to have visited a doctor in the last year than women of the same age, but there is no gender difference amongst the over 65s. The likelihood of having a chronic illness or handicap increases substantially, with a 5 times increase from the under 45 years compared to the over 65 years. There is no significant gender difference.

In all, 66% report their health as good or very good, and 34% report it as ‘less than good’ (for brevity, ‘less than good’ is sometimes referred to as ‘poor’ health). Less than good self-rated health (SRH) increases with age (from only 14% amongst the under 45 years to 58% amongst men of retirement age). It is also more likely for women to report poor health (31% men to 37% women). The difference between the genders increases with age. There is a 3-5% gender difference in those reporting poor health amongst the under 65s but an 8% difference between those over 65.

4.7 Socioeconomic status (SES)

People under 45 years are twice as likely as the retired to have a university degree or similar (Table 4.3). There are more men than women in the upper income and senior professional categories. Although at a younger age, women are nearly as likely to be in senior professions as men, older women are absent. The categorisation by professional

group includes those currently retired as well as those still working. The gender difference is particularly marked for the over 65s in the upper income categories where a 10% difference can be seen. The 45 to 65 years old are the wealthiest age group with the highest equivalized incomes.

	25 to 44 years	45 to 64 years	65 + years	Total	P
Frequency total	2 086	1 618	1 342	5 046	
Men	44.9% (936)	48.0% (776)	40.8 % (548)	44.8% (2 260)	**
Women	55.1% (1 150)	52.0% (842)	59.2% (794)	55.2% (2 786)	*
Health					
Less than good health (SRH) (b) Men	14.2% (133)	31.2% (242)	58.0% (318)	30.6% (693)	**
Women	17.0% (196)	36.1% (304)	66.5% (528)	36.9% (1 028)	**
Missing = 0					
Non smokers					
Men	55.6% (520)	68.6% (532)	87.2% (478)	67.8 % (1 530)	**
Women	61.8% (711)	82.8% (697)	94.6% (751)	77.5% (2 159)	**
Missing = 2					
Play sport at least once/week Men	38.9% (364)	26.4% (205)	24.9% (136)	31.2% (705)	**
Women	30.5% (351)	26.6% (224)	14.7% (117)	24.8% (692)	**
Missing = 4					
Seen doctor in last 12m Men	80.0% (749)	81.7% (634)	92.0% (504)	83.5% (1 887)	**
Women	92.7% (1 064)	93.0% (783)	94.8% (753)	93.4% (2 600)	-
Missing = 2					
See doctor due to serious or long term illness /handicap Men	11.6% (108)	29.3% (227)	57.3% (313)	28.7% (648)	**
Women	11.3% (130)	33.2% (279)	55.0% (437)	30.4% (846)	**
Missing = 7					
Social economic status					
Highest composite SES category Men	38.7% (362)	37.6% (291)	28.9% (158)	35.9% (811)	**
Women	37.1% (426)	30.7% (257)	18.9% (149)	30.0% (832)	**
University or other higher education qualification Men	26.6% (247)	17.4% (134)	13.0% (71)	20.1% (452)	**
Women	28.2% (323)	16.0% (134)	10.3% (81)	19.4% (538)	**
Senior professionals (Cadres) Men	13.8% (129)	14.2% (110)	13.5% (74)	13.9% (313)	-
Women	10.5% (120)	5.7% (48)	4.4% (35)	7.3% (203)	**
Equivalised upper income category Men	58.4% (536)	62.4% (473)	49.4% (258)	57.7% (1 267)	**
Women	53.1% (597)	59.9% (480)	38.9% (294)	51.0% (1 371)	**
Highest subjective income category Men	9.0% (84)	11.0% (85)	17.7% (97)	11.8% (266)	**
Women	7.7% (89)	9.6% (81)	8.4% (67)	8.5% (237)	**

Table 4.3 Percentage (& number) of the main health and socioeconomic data by age & gender

Notes a) probability of significant difference across all categories of the variable calculated using Person's chi.[2]
*= p> 0.05, **= p>0.001
b) Explanation: 14.2% men aged 25 to 44 years reported less than good health. 14.2% of this group equals 133 replies

In general, Tables 4.3 & 4.4 show that the better paid and better qualified are younger. The farmers/shopkeepers are an exception as they are, on average, considerably older than the other professional groups.

Further analysis by gender from Appendix 2 shows that women have a greater age range across the SES variables than men. For example, in the highest income category, the mean age for women is 48.5 years compared to 55.2 years in the lowest (a range of 6.7 years) whereas for men the average age is 50.5 years in the upper income stratum compared to 51.3 years in the lowest income group (range of only 0.8 years). Only the education variable shows a similar, but large, age range for both genders. The mean age of those in the university group is 45 compared to 62 years for those with no or only primary school qualifications (Table 4.4).

The composite 'SES' variable unsurprisingly follows the trends of the income, education and occupational variables with men doing better than women after the age of 45. Also the over 65s are more likely to be disadvantaged. The subjective income variable does not follow the real income trends. Older men are twice as likely (17.7% to 9.0%) to say they have a comfortable income than younger men, the opposite to actual income. The percentage of women reporting a comfortable income remains constant with age (Table 4.3).

4.8 Health by socioeconomic status

The number and percentage of people reporting less than good self-rated health and other health indicators by income, professional category, education and the composite socioeconomic status indicator are shown in Table 4.4. The small number of missing SES values is indicated in the table. Income has the most missing replies, and this is only 159 (3.1%) of the sample, the next largest is for education (31 replies, 0.6%). The table shows that the people for whom a value is missing appear to be the same as the other respondents; except for those for whom no income information is available who are slightly older. As there are so few missing values and that for age and health they do not appear to be atypical, they will be disregarded in all later analyses.

The indicators of self-rated health and playing sport follow the expected SES gradient for income, occupation, education, perceived income as well as the composite SES indicator, and are all statistically significant for trend. People with lower socioeconomic status report worse health and play less sport. Smoking does not show a clear gradient,

if anything, lower SES groups are more likely to be non-smokers. Visiting the doctor for a chronic illness or handicap (see Appendix 2) follows the same social gradient as self-rated health but is slightly less extreme. For example 23% of people from the highest SES group reported having a chronic condition/handicap compared to 41% of people in the lowest SES (for SRH, the range is from 19.6% to 54.8%).

	Total in category	Mean age (yrs)	% men	**% reporting less than good SRH** missing= 0	% non smokers missing= 2	% play sport regularly missing= 4
SES						
Highest	1 643	47.9	49.4	**19.6**	73.6	37.5
Middle	2 135	50.2	42.9	**33.1**	71.7	26.6
Lowest	1 251	57.4	42.3	**54.8**	74.7	16.8
Missing	*17*	*59.3*	*23.5*	*47.1* **	*76.5* -	*5.9* **
Income						
Upper	1 251	49.5	48.8	**19.6**	73.9	36.9
Upper-middle	1 387	49.7	47.7	**29.3**	74.3	29.1
Lower-middle	1 068	51.7	44.8	**39.0**	73.8	25.8
Lower	1 181	53.7	38.3	**49.4**	69.4	18.6
Missing	*159*	*57.4*	*39.6*	*42.8* **	*78.6* -	*22.0* **
Occupation group (1)						
Senior professional	516	48.4	60.7	**16.7**	74.4	39.1
Intermediate prof.	889	49.3	48.5	**22.2**	72.4	36.4
Farmers/Shopkeepers	646	61.0	50.3	**46.3**	83.0	19.5
Routine employees	1 442	47.9	22.1	**33.0**	71.1	27.7
Manual workers	1 347	52.3	63.1	**41.6**	69.3	22.9
Inactive	189	53.3	10.6	**52.4**	82.5	18.0
Missing	*17*	*49.9*	17.6	*23.5* **	*64.7* **	*11.8* **
Education						
University/Tertiary Educ	990	45.0	45.7	**16.4**	73.8	38.5
Baccalaureate	578	43.1	46.9	**18.9**	67.3	37.2
Short prof. qualification	1 297	44.1	53.1	**25.8**	63.2	30.3
Secondary educ certificate	282	51.1	35.5	**25.2**	73.8	28.4
None/primary edu.	1 868	62.0	39.5	**55.2**	81.4	17.0
Missing	*31*	*52.6*	*48.4*	*41.9* **	*64.5* **	*32.3* **
Subjective income						
Comfortable	503	53.9	52.9	**25.6**	79.1	36.8
OK	1 568	51.4	45.1	**26.9**	77.4	30.0
Just OK	2 099	52.0	43.9	**36.1**	74.7	26.7
In difficulty	868	47.7	41.2	**47.2**	57.8	20.5
Missing	*8*	48.5	*75.0*	*25.0* **	*87.5* **	*37.5* **

Table 4.4 Self-rated health and other health related behaviours by various socioeconomic indicators.
(1) Retired people classified by previous profession P for trend *= p< 0.05, **= p< 0.001

The mean age confirms that the lower SES groups are generally older. This in part explains the lower SES groups' poorer health, the presence of more non smokers and that they are less likely to play sport. One exception to the expected health/SES gradient is the farmers/shopkeepers occupational group but again their older mean age seem a likely explanation.

An illustration of the association between poor SRH and income by age can be seen in Fig 4.1a. The frequency of reporting poor health clearly increases with age. In each age group, the lowest income group report the most 'poor' health. Fig 4.1b shows the association of poor health with income for men and women. The gradient is clear for both genders but the slope is slightly steeper for women. The composite SES and occupation variables also show a steeper gradient for the health variables for women than men (see Appendix 2 for details).

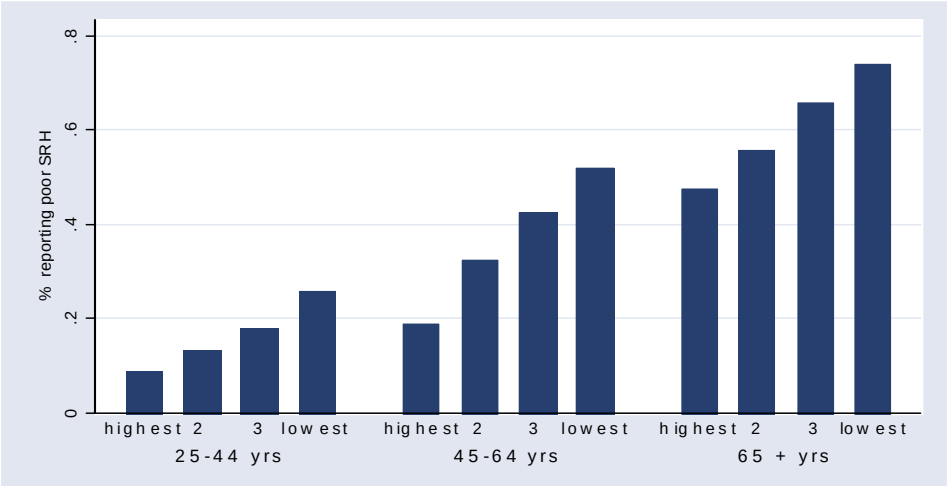


Fig 4.1a Percentage reporting less than good health by income for 3 age categories

Fig 4.1b Percentage reporting less than good health by income for men & women

There is also a steep health gradient in relation to the subjective income variable (Table 4.4). People who feel their income to be 'comfortable' are less likely to report poor SRH despite that fact that they are, on average, older.

Overall, tables 4.3 & 4.4 confirm that the composite SES is an accurate reflection of the income, education and occupation variables. It therefore can be used in later calculations with social relations to adjust for SES.

4. 9 Analysing for social health inequalities

Table 4.5 shows the association between the socioeconomic indicators and poor health after controlling for age and gender. The percentage of replies by SES can be found in Table 4.4. The same results for the whole population can be found in the Table 1 of the article published in Public Health (Appendix 1).

A clear, significant gradient can be seen between self-rated health and all the SES variables. Poor SRH is associated with lower SES and a gradient, rather than threshold, can be observed. The gradient is steeper for those of working age (under 65s) than those of retirement age. In general, the association between poor health and socioeconomic status shows a steeper gradient for women than men (after adjusting for age). For example male manual workers have an odds ratio for poor health of 3.06 compared to 4.56 for female manual workers, the lowest income women have an odds ratio of 4.13 compared to 3.37 for men.

The inactive professional group appears to suffer particularly poor health, in particular for people under 65 years and women. Those who only have short professional qualifications report slightly worst health than those who only did not continue their studies after the compulsory secondary school certificate aged 15. However the secondary school certificate group has few respondents, only 140 women and 142 men.

The subjective income variable shows the same association with SRH as the more objective measures, in fact it shows the closest association of all the SES variables.

	By GENDER		By AGE	
	MEN	WOMEN	< 65 yrs	65+ years
Total	2 260	2 786	3 704	1 342
Total reporting less than good SRH	693	1 028	875	846
	OR (²) (95% CI)	OR (²) (95% CI)	OR (³) (95% CI)	OR (³) (95% CI)
SES Highest	1	1	1	1
Middle	1.93 (1.52-2.45)	1.99 (1.59-2.49)	1.81 (1.50-2.22)	2.33 (1.73-3.13)
Lowest	3.22 (2.48-4.18)	4.30 (3.67-5.50)	3.91 (3.14-4.87)	3.62 (2.66-4.92)
Income				
Upper	1	1	1	1
Upper-middle	1.76 (1.33-2.34)	1.73 (1.32-2.26)	1.93 (1.52-2.45)	1.40 (0.98-1.98)
Lower-middle	2.32 (1.73-3.12)	2.77 (2.10-3.65)	2.74 (2.14-3.51)	2.17 (1.52-3.11)
Lower	3.37 (2.50-4.53)	4.13 (3.17-5.38)	4.28 (3.37-5.44)	2.89 (2.03-4.11)
Professional gp (1)				
Senior professional	1	1	1	1
Intermediate prof	1.27 (0.85-1.88)	1.70 (1.50-2.76)	1.53 (1.02-2.28)	1.34 (0.82-2.19)
Farmers/Shopkeepers	2.37 (1.60-3.50)	3.13 (1.93-5.09)	2.80 (1.85-4.26)	2.33 (1.47-3.70)
Routine employees	2.95 (1.97-4.43)	3.15 (2.02-4.91)	3.23 (2.23-4.69)	2.24 (1.39-3.61)
Manual workers	3.06 (2.16-4.33)	4.56 (2.87-7.26)	4.19 (2.90-6.06)	2.73 (1.75-4.27)
Inactive	2.99 (0.87-10.3)	6.18 (3.60-10.60)	7.04 (4.19-11.8)	2.82 (1.45-5.52)
Education				
University /Tertiary Ed	1	1	1	1
Baccalaureate	1.05 (0.69-1.61)	1.73 (1.18-2.52)	1.43 (1.04-1.96)	1.32 (0.71-2.46)
Short professional qual	1.98 (1.44-2.72)	2.17 (1.60-2.96)	2.18 (1.69-2.81)	2.16 (1.30-3.58)
Secondary educ certificate	1.04 (0.58-1.83)	1.63 (1.07-2.48)	1.46 (0.97-2.19)	1.30 (0.71-2.36)
None / primary	2.80 (2.06-3.81)	4.06 (3.08-5.36)	3.65 (2.82-4.72)	3.40 (2.37-4.88)
Subjective income				
Comfortable	1	1	1	1
OK	1.17 (0.82-1.66)	1.34 (0.94-1.96)	1.40 (0.96-2.02)	1.10 (0.78-1.54)
Just OK	1.76 (1.26-2.47)	2.41 (1.69-3.43)	2.50 (1.75-3.55)	1.81 (1.30-2.51)
In difficulty	4.45 (3.07-6.70)	5.48 (3.72-8.07)	6.03 (4.17-8.70)	3.99 (2.59-6.13)

Table 4.5 Odd ratio associations for less than good self-rated health (and 95% confidence intervals) by various socio-economic indicators by gender and 2 age categories.
(1) Retired people classified by previous profession
(²) Odds ratio adjusted for age (³) Odds ratio adjusted for age and gender

4.10 Social ties by age and SES

Tables 4.6 and 4.7 describe social relationships by age and by social economic status.

The first 7 items are binary answers (living with a partner; answer is either yes or no).

The composite relationship scores are divided into 3 categories of high, medium and low.

	25 to 44 years	45 to 64 years	65 + years	Total	P for trend
Number in age group: Men	936	776	548	2 260	
Women	1 150	782	794	2 786	
Married or living with partner					
Men	68.9 (644)	77.7 (603)	69.5 (381)	72.1 (1 628)	**
Women	67.4 (775)	66.0 (556)	36.5 (290)	58.2 (1 621)	**
Missing = 2					
Lives with other people					
Men	75.0 (702)	78.6 (610)	71.7 (393)	75.4 (1 705)	*
Women	81.9 (942)	75.8 (638)	42.4 (337)	68.8 (1 917)	**
Missing = 0					
Did not feel lonely yesterday					
Men	68.8 (626)	65.6 (491)	64.5 (344)	66.7 (1 461)	-
Women	70.3 (802)	69.5 (572)	61.9 (480)	67.6 (1 854)	**
Missing = 115					
Received private telephone call during last 7 days					
Men	87.0 (793)	80.2 (600)	78.1 (416)	82.5 (1 809)	**
Women	90.8 (1 038)	90.8 (749)	87.7 (684)	89.9 (2 471)	*
Missing = 106					
Usually eats lunch with others on weekdays Men	75.0 (689)	73.8 (554)	73.6 (393)	74.2 (1 636)	-
Women	76.9 (880)	70.7 (585)	47.8 (375)	66.7 (1 840)	**
Missing = 85					
Participates in a club, group or association Men	37.0 (338)	38.3 (281)	31.8 (170)	36.2 (789)	*
Women	29.0 (329)	30.3 (247)	28.6 (221)	29.3 (797)	-
Missing =141					
Has at least 1 friend					
Men	92.1 (842)	84.1 (621)	77.2 (413)	85.8 (1 876)	**
Women	92.7 (1 060)	87.0 (717)	75.3 (589)	86.1 (2 366)	**
Missing = 110					
Composite relationship variables					
Family relationships (highest cat) Men	42.0 (393)	32.1 (249)	26.6 (146)	34.9 (788)	**
Women	44.5 (512)	34.6 (291)	12.7 (101)	32.4 (904)	**
Missing = 0					
Friendships (highest cat)					
Men	47.3 (443)	29.5 (229)	26.5 (145)	36.1 (817)	**
Women	42.3 (486)	28.7 (237)	21.8 (173)	32.2 (896)	**
Missing = 0					
Neighbour relationships (highest cat) Men	41.8 (391)	48.6 (377)	45.6 (250)	45.0 (1 018)	*
Women	45.4 (522)	46.7 (393)	44.2 (351)	45.4 (1 266)	-
Missing = 0					
Colleagues relationships (highest cat) Men	46.7 (360)	34.1 (148)	0	42.1 (509)	**
Women	36.0 (282)	28.6 (117)	0	33.3 (399)	**
Missing = 2 638					

Table 4.6 Percentage (& number) of various social ties by age p<0.05 = *, p<0.001= **

	Highest SES	Middle SES	Lowest SES	P adjusted age & sex
Married or living with partner	64.8% (1 064)	67.4% (1 440)	58.7% (734)	_
Lives with other people	69.6% (1 143)	75.3% (1 607)	68.7% (860)	**
Did not feel lonely yesterday	68.6 % (1 104)	68.8% (1 437)	62.7% (763)	*
Received private telephone call during last 7 days	93.9% (1 515)	88.1% (1 843)	74.5% (908)	**
Usually eats lunch with others on weekdays	73.0% (1 185)	70.4% (1 479)	65.7% (801)	-
Participates in a club, group or association	44.9% (724)	29.8% (615)	19.9% (241)	**
Has at least 1 friend	93.3% (1 511)	86.4% (1 799)	75.8% (923)	**
Composite relationship variables				
Family relationships				
High	36.6% (602)	36.2% (772)	24.9% (312)	**
Middle	32.5% (534)	29.6% (633)	25.7% (321)	
Low	30.9% (507)	34.2% (730)	49.4% (618)	
Friendships				
High	42.1% (691)	32.8% (700)	25.3% (317)	**
Middle	34.4% (566)	39.0% (833)	37.7% (472)	
Low	23.5% (386)	28.2% (602)	36.9% (462)	
Neighbourly relations				
High	49.8% (818)	45.7% (976)	38.8% (486)	**
Middle	23.3% (383)	27.0% (576)	30.3% (379)	
Low	26.9% (442)	27.3% (583)	30.9% (386)	
Colleagues relationships				
Total number in each SES	*1 048*	*1 056*	*302*	
High	44.5% (466)	33.9% (358)	27.5% (83)	**
Middle	28.3% (297)	28.8% (304)	29.1% (88)	
Low	27.2% (285)	37.3% (394)	43.4% (131)	

Table 4.7 Percentage (and number) of various social ties by social economic status (SES)
Significance estimated from linear regression adjusted for age and sex p<0.05 = *, p<0.001= **

Table 4.6 shows that 2/3rds of the sample are married or living with a partner except for women over 65 years where this drops to just over a third. As with living with a partner, about three quarters of men live with others and this remains roughly constant at all ages. The percentage of women living with others drops sharply from 82% of younger women to only 42% of older women. The difference for women under 45 years, living with others (82%) and married/partner (67%) is presumably due to single parents caring for their children and possibly living with and caring for their parents.

In general younger men and women gave very similar replies, for example, 70% did not feel lonely, nearly 90% had received a phone call and over 90% have at least 1 friend. Exceptions include that women are less likely than men to participate in a club or have

close relationships with colleagues, however they are slightly more likely to get on well with neighbours.

Older people have less social ties than younger people. There is a noticeable difference in the replies from men and women over 65 years. In general, older people are slightly more likely to have felt lonely yesterday; but this is particularly noticeable for women. The percentage of people eating lunch with others on weekdays closely follows the numbers of those married/living with a partner; i.e. older women are the most likely to eat alone. Perhaps because of living alone, they are slightly more likely to have contact by telephone than older men. The likelihood of participating in a club or group remains constant with age for women at nearly 30%; for men, however, participation drops after retirement (from 37 to 32%). The number of people declaring they have at least one friend declines with age for both genders, from 92% to 76%. Older women report having fewer 'high/strong' family and friend contacts but neighbourly relationships remains the same. These gender differences can not be explained simply by mean age. Although there are more women in the over 65 age group, the average ages of men and women in this group only differ by about 1 year.

For the under 45s, 69% did not feel alone on the day before the survey. Middle age women are slightly more likely not to feel lonely (70%) compared to men (66%) but the trend reverses after retirement. Feeling lonely is associated with living alone. Of those who live alone, 52.2% felt lonely compared to 73.2% of those who live with other people ($p<0.0001$). This result does not vary with age.

Table 4.7 shows the social ties by 3 socioeconomic status categories. Fig 4.2 a & b illustrates the social isolation components of the same variables by high, middle and low SES. 'Living alone' and 'married/with a partner' show a trend with SES but the other social tie variables are associated. Higher SES is associated with a greater likelihood of receiving a telephone call, eating lunch with others, participating in a club and having a friend. Not feeling lonely does not show a difference between high and middle SES (69%) but is less frequent in the low SES category (63%). The p value indicating the significance of the social tie and SES association, was adjusted for age and gender. It shows that all the social ties (except living with a partner and eating lunch with others) are significantly associated with SES.

The composite variable for friendship reflects the same drop in close friendships with age, and composite family variable follows the same trend (Table 4.6). The reduction with age of close family relationships appears to be particularly steep for women going

from 44% to only 12%. Approximately 45% of people report close relationships with their neighbours, this percentage remains constant with age for women but slightly increases after the age of 45 for men. For those respondents currently in employment, good relationships with work colleagues appear to be more common for younger people and for men (42% of men are in the highest category for relationships with work colleagues compared to only 33% of women).

The 4 composite relationship variables or indexes show an association between SES and social ties. High SES is associated with strong family, neighbour and colleague relationships. The trend exists but appears to be less pronounced for friendships. Weak social relationships are more likely to be reported by the low SES group.

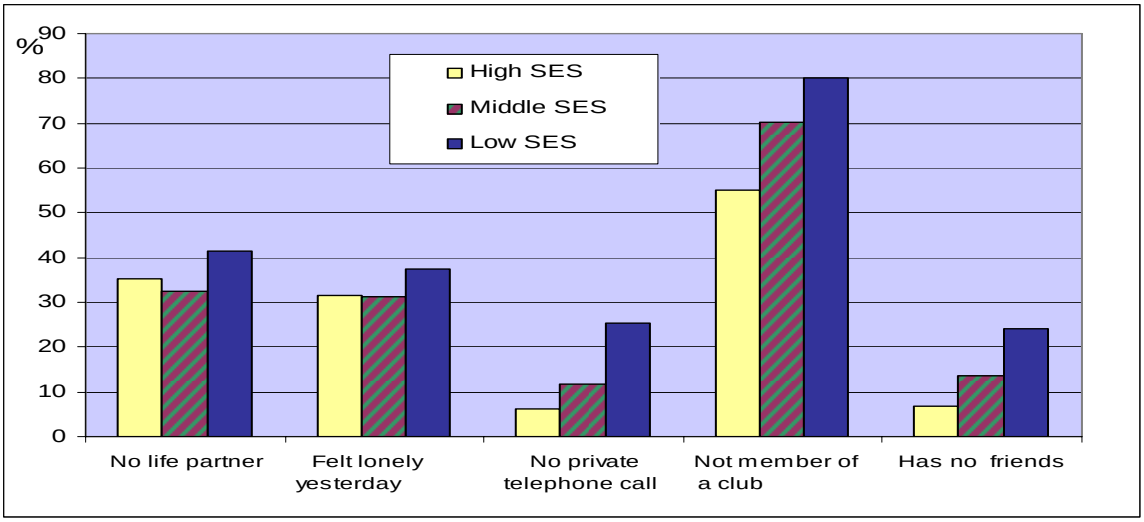


Fig 4.2a Five measures of social isolation by socioeconomic status

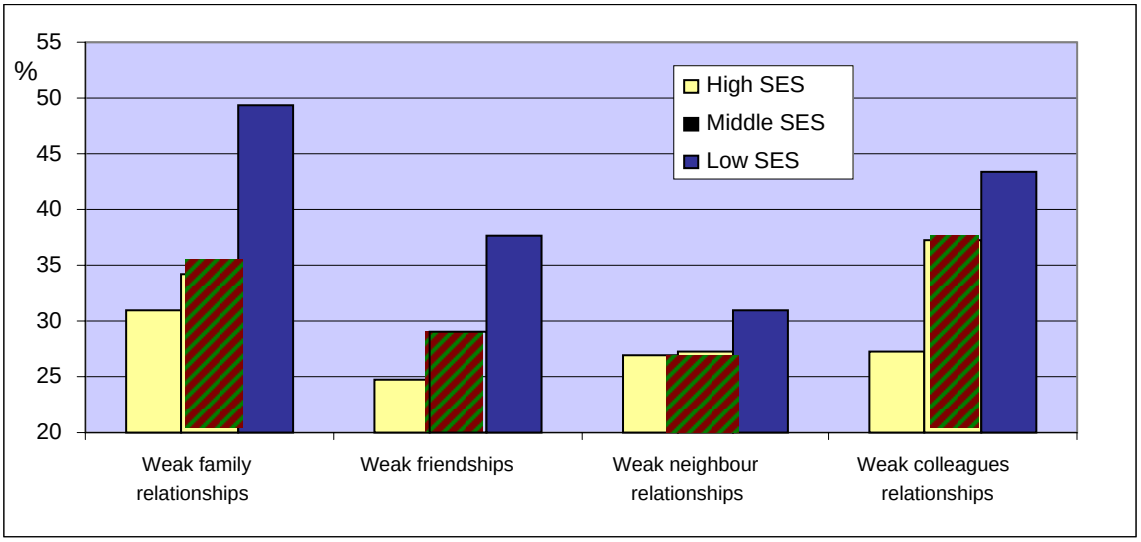


Fig 4.2b Indexes for weak social relationships by socioeconomic status

Total number of people in the lowest SES reporting having work colleagues is only 302, due to the older mean age of this SES group (most of the people in the low SES

category are no longer working). The possible error for this group is therefore large. The high and middle SES groups (which have a similar number of respondents,1 048 & 1 056 respectively) show that close relationships with colleagues are more likely to occur amongst people with higher SES.

Further analysis of income categories (Table 4.7 & Appendix 2) by gender shows that married men and women generally have higher incomes than single people (despite using equivalised income which adjusts for household size). Currently unmarried women have a far greater income gradient and more likely to be in the lowest income category than unmarried men (18% of married men or women are in the lowest income quartile compared to 28% of single men and 40% of single women). The other SES variables (occupational groups and education) do not show a link with being single, except for ‘inactive’ occupational group. For men, 80% (16 out of 20) of the inactive group were single, where the opposite is true for women, with 79% of those classified as inactive are married.

4.11 Social ties and health

Table 4.6 confirms the mean age and gender differences in the replies for social ties described earlier. The number of respondents with missing data for the social ties is generally small (the largest number is only 141, 2.8% for the club membership). As the mean age suggests that the respondents with missing replies do not appear to be exceptional, they will be ignored in later tables.

Less than good health is constantly more frequent amongst people who are socially isolated (Table 4.8). Married people report better health than those who are not married/living with a partner (11% difference); this increases to a 13% difference between those who live with other and those who live alone. About 30% of married people of both genders and single men report poor health, compared to 45% of single women. There is a 10-11% increase in reporting poor health if the subject felt lonely yesterday, usually eats lunch alone or is not a member of a club. This increases to a 15% difference if a personal phone call has not been received during the previous week, and 23% if the person does not have at least 1 friend. Reporting poor health is associated with a lack of family and friendships, and to a lesser extent with low contact with neighbours and colleagues.

Smoking or not did not seem to be associated with most of the social ties. However, non smokers were slightly more likely to participate in clubs and have poor neighbourly relations. Some replies appear contradictory, non smokers are more likely to have no friends but report more frequent friendship contacts.

Playing sport at least once a week is clearly associated with more social ties. Participating in a club (which could be a sports club), having at least 1 friend, frequent contact with friends and family, as well as not feeling lonely, are all more numerous.

As has been seen earlier, frequency of social ties goes down with age. The regression models for social ties and poor self-rated health in Table 4.9 have been adjusted for age and sex. Model 1 shows that most social isolation variables remain significantly associated with less than good health. Not being married; feeling lonely; not receiving a phone call, not participating in a club and not having at least 1 friend are significantly associated with poor health, as are low family, friendship and neighbour relations. These 3 composite indexes show the expected gradient from high to low frequency of contacts. Relationships with work colleagues show no association with health.

	Total number	Mean age yrs)	% men	**% less than good SRH** **missing= 0**	% non smokers missing= 2	% play sport regularly missing= 4
Married or living with partner				**	-	-
Yes	3 249	49.4	50.1	**30.1**	73.7	28.1
No	1 795	56.7	35.2	**41.4**	72.0	26.6
Missing=2						
Lives with other people				**	-	-
Yes	3 622	48.9	47.1	**30.4**	72.8	27.8
No	1 424	57.4	39.1	**43.6**	74.0	27.4
Missing=0						
Felt lonely yesterday?				**	-	-
Not lonely	3 315	50.3	44.1	**30.6**	72.7	30.0
Yes, lonely	1 616	53.0	45.1	**41.1**	73.7	23.8
Missing=115		*53.3*				
Received private phone call during last 7 days				**	-	**
Yes	4 280	50.7	42.3	**32.1**	73.5	29.5
No	606	54.6	58.0	**47.1**	70.3	17.6
Missing=106		*52.9*				
Usually eats lunch with others on weekdays				**	-	**
Yes	3 476	49.4	47.0	**30.9**	73.0	28.9
No	1 485	55.6	38.2	**41.4**	73.2	25.3
Missing=85		*54.0*				
Participates in a club, group or association				**	**	**
Yes	1 586	50.8	49.8	**26.6**	77.6	48.5
No	3 319	51.4	41.9	**37.4**	70.9	18.1
Missing=141		*53.5*				
Has at least 1 friend				**	**	**
Yes	4 242	49.7	44.2	**30.7**	72.1	30.1
No	694	60.6	44.8	**53.6**	78.2	14.0
Missing=110		*53.3*				
Family relationships				**	-	**
High	1 692	45.8	46.6	**23.9**	27.5	32. 0
Middle	1 494	49.0	51.6	**32.2**	28.3	30.2
Missing= 0 Low	1 860	58.0	37.7	**44.9**	25.1	21.8
Friendships					**	**
High	1 713	46.3	47.7	**25.0**	32.7	34.7
Middle	1 875	51.4	41.7	**34.6**	25.7	27.5
Missing= 0 Low	1 458	57.1	45.3	**44.1**	21.5	19.7
Neighbour relationships					**	**
High	2 280	51.6	44.6	**31.5**	23.7	30.8
Middle	1 338	51.8	43.9	**36.5**	28.7	24.3
Missing= 0 Low	1 411	50.3	46.0	**36.0**	30.3	25.9
Colleagues relationships					-	**
High	907	30.1	56.1	**15.1**	34.9	37.4
Middle	689	40.7	48.0	**17.2**	34.5	33.9
Low	810	42.3	45.6	**19.3**	32.3	24.9
Missing=2 638		*60.9*				

Table 4.8 Self-rated health and other health related behaviours by various social ties.
Persons chi2 test for trend *= p< 0.05, **= p< 0.001

	Model 1		Model 2	
	Less than good self-rated health (adjusted for **age & sex**)		Less than good self-rated health (adjusted for age, sex, **& SES**)	
	OddsRatio	95% CI	OddsRatio	95% CI
Not married nor living with partner	1.22*	1.06-1.40	1.23*	1.06-1.41
Live alone	1.12	0.97-1.30	1.20*	1.03-1.40
Lonely yesterday	1.49**	1.30-1.71	1.44**	1.25-1.66
Not received phone call	1.83**	1.52-2.20	1.36**	1.12-1.65
Has lunch alone	1.15*	1.00-1.32	1.13	0.97-1.31
Does not participate club	1.70**	1.47-1.96	1.35**	1.16-1.57
Has no friends	1.68**	1.41-2.02	1.36**	1.13-1.64
Family relations				
High	1		1	
Middle	1.31**	1.11-1.55	1.30*	1.09-1.55
Low	1.44**	1.23-1.69	1.33**	1.12-1.56
Friendships				
High	1		1	
Middle	1.27*	1.09-1.49	1.16	0.99-1.37
Low	1.49**	1.26-1.76	1.32**	1.11-1.56
Neighbour relationships				
High	1		1	
Middle	1.27*	1.09-1.49	1.16	0.99-1.37
Low	1.36**	1.16-1.57	1.26*	1.07-1.47
Colleague relationships				
High	1		1	
Middle	1.07	0.82-1.41	0.99	0.75-1.30
Low	1.13	0.87-1.46	0.94	0.72-1.23

Table 4.9 Odd ratio associations for less than good self-rated health by various social ties controlled for age, sex, and social economic status. *= p< 0.05, **= p< 0.001

Also seen in the previous section is that social ties are associated with socioeconomic indicators. Regression model 2 of Table 4.9 adjusts for SES. Although the odds ratios are reduced, the same social isolation variables remain significantly associated with poor health (feeling lonely; not receiving a phone call; not participating in a club, and having no friends. The same 3 composite indexes still show a gradient, with low frequency of relationships remaining significantly associated with poor health (for family, friends and neighbours). A slight change after adjusting for SES is that living alone is now associated with poor health. Models adjusting for age, sex, smoking and sport can be found in Appendix 2. Adjusting for these extra health related behaviours does not have an important impact on the results but the association between not being a member of club

and poor health is reduced (probably because to the majority of people who play sport will do so within the context of a club).

	By AGE				BY GENDER for under 65s yrs only			
	Age < 65 yrs		**Age 65 + yrs**		**MEN**		**WOMEN**	
	OR (1)	95% CI	OR(1)	95% CI	OR (2)	95% CI	OR (2)	95% CI
Not married or living with partner	1.32**	1.11-1.57	1.01	0.79-1.30	1.46*	1.11-1.91	1.23	0.98-1.54
Live alone	1.32*	1.08-1.60	1.03	0.80-1.32	1.28*	1.02-1.62	1.16	0.94-1.42
Lonely yesterday	1.47**	1.24-1.75	1.38*	1.07-1.77	1.39*	1.08-1.80	1.55**	1.23-1.95
Received no phone call	1.41*	1.11-1.77	1.25	0.88-1.76	1.51*	1.17-1.94	1.33	0.94-1.90
Has lunch alone	1.17	0.97-1.39	1.04	0.81-1.35	1.17	0.89-1.06	1.16	0.91-1.48
No participation in clubs	1.25*	1.03-1.50	1.54**	1.19-2.00	1.40*	1.06-1.85	1.13	0.87-1.46
Has no friends	1.38*	1.08-1.76	1.30	0.97-1.74	1.59*	1.13-2.32	1.21	0.86-1.70
Family relations								
High	1		1		1		1	
Middle	1.30*	1.06-1.59	1.11	0.89-1.82	1.30	0.96-1.74	1.28	0.98-1.68
Low	1.41**	1.16-1.72	1.06	0.80-1.53	1.54*	1.14-2.07	1.33*	1.02-1.73
Friendships								
High	1		1		1		1	
Middle	1.10	0.90-1.33	1.35*	1.00-1.83	1.24	0.95-1.63	1.05	0.81-1.35
Low	1.27*	1.03-1.57	1.46*	1.08-1.98	1.51*	1.11-2.05	1.16	0.87-1.54
Neighbour relationships								
High	1		1		1		1	
Middle	1.28*	1.04-1.56	0.97	0.74-1.28	1.37	1.03-1.84	1.21	0.92-1.58
Low	1.26*	1.04-1.52	1.24	0.93-1.67	1.14	0.85-1.52	1.37*	1.06-1.77
Colleague relationships								
High	1				1		1	
Middle	1.01	0.76-1.32			1.02	0.69-1.51	1.00	0.68-1.47
Low	1.00	0.76-1.30			0.89	0.61-1.33	1.10	0.76-1.59

Table 4.10 Adjusted odd ratios for less than good health by various social ties for 2 age categories and both genders (under 65 years only).
(1) Adjusted for age, sex & socioeconomic status (2) Adjusted for age & socioeconomic status
*= p < 0.05, **= p<0.001

Table 4.10 displays the results of modelling the same social tie variables associations with poor self-rated health for working age and for retired-age people (again adjusted for age, sex and SES). People under the age of 65 generally show a more significant association between social isolation and poor health than older people (ex: not being married; feeling lonely yesterday, not received a phone call, low family and neighbour relations. Not being a member of a club and infrequent contact with friends appear to be

more closely associated with poor health for people over age 65 than for working-age people).

When the gender differences for the under 65s are considered in table 4.11, it can be seen that social isolation appears to be more associated with poor health for men than for women. All but one of the single item indicators of social isolation are more associated with poor health for men. The only exception is ‘feeling alone yesterday’ which is more significantly associated with poor health for women. Good relations with neighbours appear to be important for the health of women in this age group but not men, the opposite is the case with the frequency of contact with friends (which are more associated with men’s health). Family relationships are also slightly more associated with men’s health than women’s.

A discussion of these results can be found in Chapter 7 after the presentation of the results from studies 2 and 3.

Chapter 5 Study 2 : Do social relationships have a differential impact on health depending on a person's position on the social gradient?

5. 1 Background and aims

This second analysis is a continuation from the more general results of Study 1. It addresses the specific hypothesis which is central to this PhD thesis:

- do social ties have a bigger impact on the health of people who are lower on the socio-economic gradient compared to those above them?

There has been a call for more studies to relate macro-social variables such as socioeconomic status to social support (Stansfeld 2005). A number of studies have found more social cohesion amongst the better educated/ paid which is also associated to better health (Stansfeld et al 1998; Bargner 2006; Stafford et al 2004, Weyers et al 2008). But few studies have specifically looked to see if the impact of social ties on health is different at various points on the social gradient. Ferrer & Palmer (2004) found the expected gradient between self-rated health and income. However, they also found that most of the variability is found in the middle and lower centiles rather than the upper portion of the income distribution. We wish to see if there is more variation between social ties and health in particular portions of the distribution. In Wales, areas with high social cohesion were found to reduce the association between income deprivation and mental health (Fone 2007). In a study of 330 US men, Antonucci et al (2003) found that men with little education who had large social networks reported better health. The few other studies that have compared the impact of social ties on health at the top to the bottom of the social gradient are described in Chapter 3.3, but none were found in France.

The association between social ties and health will be compared for people in three SES categories. We will look to see if social cohesion shows a greater association with the health of people of low SES than with those higher up the SES gradient. High SES may protect against some of the negative impact of social isolation. In countries with marked social inequalities, people at the bottom of the gradient may not feel valued by society but having a supportive network of family and friends may reduce feelings of disempowerment (Wilkinson 2005). Positive relationships with spouses, extended family, work colleagues may all boost self-confidence as well as provide practical help (e.g. share childcare responsibilities) which may be particularly important for people who are devalued socio-economically. From the hormonal evidence summarised in Chapter 3.2, it may be that people with low SES suffer a double whammy of biological stress if they are

also socially isolated which may result in a negative impact on their health. The hypothesis will be investigated using data from the whole population and more specifically for those of working age (less than 65 years).

The article published in BMC Public Health in Appendix 1 (Heritage et al 2008) is a summary of the results presented in this chapter.

5.2 Methods and Variables

The data for this study has been previously described in study 1, chapter 4. The data came from the May 1997 Permanent Survey of Household Living Conditions (EPCV, Enquête permanent sur les conditions de vie des ménages). It concerns a total of 5, 046 representative, randomly selected participants aged 25 years or more, living in mainland France. Of these, 3 704 were aged under 65 years. A full description of the variables can be found in the previous chapter. In brief, the outcome measure used for this study is self-rated health, recorded on a 6 point scale from very good to very bad. The replies were dichotomised and 34% of the sample reported less than good health (23.6 % for the under 65 years).

A total of 5 single reply measures of social ties and 4 composite measures were used. They are listed in the Box 5.1 below. When compared to the previous study, two variables were cut. They were 'living alone' as this variable appears to be very similar to married/living with a partner. 'Eating weekday lunch with others' was also cut from the analysis as it appears to follow the general pattern but is not a particularly robust indicator.

Box 5..1: The variables analysed reflecting social ties

Single questions

Subject reported that he or she :-

- is married / living with a partner
- felt alone yesterday
- received a personal telephone call during the previous 7 days
- has at least one friend
- is a member of a sports, cultural, or musical club, or parent-teacher association, or religious group, or trade union

Composite measures

- Contact with family
- Contact with friends
- Contact with neigbours
- Contact with work collegues

The composite socioeconomic measure combines five categories of occupation, educational achievement and equivalised household income (see Chapter 4.2.2). It was stratified into three levels: high, medium and low. The characteristics of the individuals in the 3 SES categories are described in Table 5.1. Using Stata v10.1, logistic regression models were used to calculate the odds ratios for the different social relationship variables reflecting their association with self-rated health, for each of the 3 SES levels. To investigate with there was a significant interaction between SES and the social ties on SRH, main effects and interaction models were compared by calculating likelihood ratio tests. Adjustments were made for age and sex. The calculations were repeated for three stratified levels of income.

5.3 Describing the sample by age, gender and SRH

Of the original representative sample of 5 046 adults aged 25 years or more, socioeconomic status (SES) data were missing for 17 respondents (0.3%) and information about equivalised household income for 159 (3.1%). For the sample of people less than 65 yrs (3 704), 10 people were (0.3%) missing data about SES and 98 (2.6%) for income.

The following results will specifically examine if weak social ties are more strongly associated with poor self-rated health amongst people of low SES than high status. The number of replies and the general associations between SES and health, and also social ties and health can be found in the previous chapter (Tables 4.7, 4.8 & 4.9). The same information for income can be found in Appendix 1 (BMC article and the presentation at the FNORS 2008 conference, Marseille).

	Socioeconomic status		
	High	**Middle**	**Low**
Total number of individuals	1643	2135	1251
Average age (years)	47.9	50.2	57.4
Men (%)	49.4	42.9	42.3
Number (%) reporting less than good health	322 **(19.6%)**	707 **(33.1%)**	685 **(54.8%)**
Number of individuals **under 65**	1 336	1 619	739
Mean age (years)	41.9	42.6	45.6
Men (%)	48.9	44.5	45.6
Number (%) reporting less than good health	187 **(14.0%)**	377 **(23.9%)**	307 **(41.5%)**

Table 5.1 Characteristics of all individuals and those under 65 years, in each composite SES category

	Income		
	High	**Middle**	**Low**
Total number of individuals	1 666	1 629	1 588
Average age (years)	52.0	51.0	50.1
Men (%)	48.7	45.7	40.2
Number (%) reporting less than good health	416 **(25.0%)**	563 **(34.6%)**	672 **(42.3%)**
Number of individuals **under 65**	1241	1197	1168
Mean age (years)	44.5	43.1	41.1
Men (%)	45.5	46.1	43.3
Number (%) reporting less than good health	202 **(16.3%)**	286 **(23.9%)**	363 **(31.1%)**

Table 5.2 Characteristics of individuals in each income category

Following the analysis in Chapter 4, the table 5.1 summarizes the details of the 3 SES categories and Table 5.2 does the same for the income categories. There are slightly more men amongst the high SES & income groups. The number of people reporting poor self-rated health increases with reduction in SES & income. However, the gradient is considerably steeper between the 3 SES categories (25 percentage points) compared to the income groups (17%).The mean age is greater in the low status group of the composite SES variable but the total population mean age does not vary for the stratified income variable, in fact by income, the average age for the low income, under 65s is slightly younger than the wealthiest under 65s group.

5.4 Association between self-rated health and social ties for 3 levels of SES

After adjusting for age and sex, the associations between poor health and social ties for the 3 categories of socioeconomic status are shown below. Table 5.3, for the whole sample, does not show any significant interactions when the main effects and interaction models are compared using likelihood ratio tests. The expected gradient with the low SES group having the greatest association between health and social ties is not observed except for the married/living with a partner and felt alone variables.

Amongst the under 65s (Table 5.4), higher odds ratios amongst the low SES group (suggesting a greater association between social isolation and poor health) can be observed for 3 of the single-reply variables (‘not married’, ‘feeling alone’ and ‘not having at least 1 friend’). Not being married shows a significant interaction with SES (p equal or less than 0.1 is usually considered as significant for interactions). The composite variables do not show significant interactions except for workplace relations. Surprisingly, low SES people who have weak relationships with their work colleagues are more likely to report good health.

		High SES		Middle SES		Low SES		Inter-action
		OR (1)	95 % CI	OR (1)	95 % CI	OR (1)	95 % CI	P value
Married/ living with partner	Yes	1		1		1		0.18
	No	1.03	0.78-1.35	1.23	0.99-1.52	1.33*	1.03-1.73	
Felt lonely yesterday	Not lonely	1		1		1		0.90
	Felt lonely	1.41*	1.07-1.85	1.42**	1.15-1.76	1.54**	1.18-1.99	
Received phone call	Yes	1		1		1		0.12
	No	1.77*	1.10-2.85	1.07	0.78-1.46	1.69**	1.26-2.27	
Member of club	Yes	1		1		1		0.28
	No	1.62**	1.24-2.13	1.42*	1.13-1.79	1.16	0.84-1.55	
Has a friend	Yes	1		1		1		0.70
	No	1.71*	1.90-2.66	1.24	0.94-1.65	1.49*	1.11-1.92	
Family relations	Low	1		1		1		0.97
		1.26	0.95-1.66	1.15	0.93-1.42	1.11	0.86-1.06	
Friendships	Low	1		1		1		0.88
		1.35*	1.01-1.80	1.15*	0.93-1.43	1.23	0.95-1.59	
Neighbour relationships	Low	1		1		1		0.73
		1.27	0.96-1.69	1.20	0.96-1.50	1.11	0.85-1.44	

Table 5.3 Less than good SRH by various social ties, stratified by SES (all ages)
(1) Odds ratio adjusted for age and gender *p<0.05 ** p<0.001

		High SES		Middle SES		Low SES		Inter-action
		OR (1)	95 % CI	OR (1)	95 % CI	OR (1)	95 % CI	P value
Married/ living with partner	Yes	1		1		1		0.10
	No	0.99	0.71-1.39	1.25	0.96-1.61	1.71**	1.22-2.40	
Felt lonely yesterday	Not lonely	1		1		1		0.43
	Felt lonely	1.42*	1.02-1.98	1.34*	1.04-1.73	1.81**	1.30-2.53	
Received phone call	Yes	1		1		1		0.18
	No	2.04*	1.14-3.64	1.13	0.78-1.64	1.70*	1.19-2.43	
Member of club	Yes	1		1		1		0.87
	No	1.18	0.86-1.64	1.38*	1.05-1.81	1.25	0.82-1.95	
Has a friend	Yes	1		1		1		0.47
	No	1.20	0.59-2.45	1.31	0.91-1.89	1.66*	1.13-2.44	
Family relations	Low	1		1		1		0.92
		1.40	0.99-1.96	1.21	1.93-1.57	1.22	0.89-1.67	
Friendships	Low	1		1		1		0.94
		1.29	0.89-1.85	1.18	0.91-1.54	1.22	0.88-1.69	
Neighbour relationships	Low	1		1		1		0.95
		1.11	0.78-1.57	1.11	0.85-1.44	1.20	0.87-1.67	
Colleague relationships (2)	Low	1		1		1		0.04
		1.25	0.83-1.90	1.07	0.78-1.48	0.51*	0.28-0.89	

Table 5.4 Less than good SRH by various social ties, stratified by SES (only under 65 years)
(1) Odds ratio adjusted for age and gender (2) Data from working age (2 406); only 302 persons in low SES group *p<0.05 ** p<0.001

5.5 Association between self-rated health and social ties for 3 levels of income

When the sample is divided into 3 income categories (Table 5.5), no statistically significant associations are observed between health and the social tie variables for the high income group. However, amongst the low income stratum, highly significant associations are seen between poor health and 4 of the single question variables (feeling alone yesterday; not receiving a private phone call during the previous week, not a member of club; and not having at least 1 friend). The same association is observed for the friendship composite variable. For some of the social ties, having a friend and receiving a phone call, the low income groups odds ratios are different to the middle and high income categories. For other social ties (feeling alone or being a member of a club) the association between health and the social tie is stronger for both the middle and low groups compared to the richest category. Being married/living with a partner tested significant for interaction with the SES variable but the gradient is not observable been the stratified groups.

For the under 65 years old (Table 5.6), the stratified associations by income show similar trends to the whole population but are slightly more pronounced.

Tables 5.7 & 5.8 present the same analysis by income strata for men and for women. Only the 5 single question variables and 1 composite variable (friendship) that had shown differences when stratified are shown in these tables. When the replies by men and women are compared, similar trends are observed for ‘not receiving a phone call’ and ‘not having a friend’. ‘Not participating in a club or similar voluntary group’ shows as stronger association with poor health for low income men than women. Being married does not follow the gradient as the middle income group shows the greatest association between ‘not being married’ and poor health. However it is notable that for high income women, not being married is, in fact, associated with better health (this is not observed for men).

The results of this study will be discussed in chapter 7

		High income		Middle income		Low income		Inter-action
		OR (1)	95 % CI	OR (1)	95 % CI	OR (1)	95 % CI	P value
Married/ living with partner	Yes	1		1		1		0.005
	No	0.89	0.69-1.15	1.53*	1.17-2.00	1.30	1.03-1.65	
Felt lonely yesterday	Not lonely	1		1		1		0.57
	Felt lonely	1.31	1.01-1.69	1.57**	1.22-2.03	1.56**	1.23-1.98	
Received phone call	Yes	1		1		1		0.12
	No	1.20	0.77-1.85	1.36	0.97-1.92	1.98**	1.50-2.63	
Member of club	Yes	1		1		1		0.20
	No	1.33	1.03-1.71	1.60**	1.24-2.08	1.81**	1.37-2.39	
Has a friend	Yes	1		1		1		0.004
	No	0.97	0.65-1.42	1.38	1.00-1.92	2.17**	1.61-2.94	
Family relations		1		1		1		
	Low	1.17	0.91-1.52	1.23	0.96-1.58	1.22	0.96-1.54	0.79
Friendships		1		1		1		
	Low	0.94	0.72-1.23	1.25	0.98-1.61	1.65**	1.29-2.10	0.13
Neighbour relationships		1		1		1		
	Low	1.06	0.81-1.40	1.45*	1.12-1.87	1.17	0.92-1.49	0.28

Table 5.5 Less than good SRH by various social ties, stratified by INCOME (all ages)
(1) Odds ratio adjusted for age and gender

		High income		Middle income		Low income		Inter-action
		OR (1)	95 % CI	OR (1)	95 % CI	OR (1)	95 % CI	P value
Married/ living with partner	Yes	1		1		1		0.001
	No	0.77	0.55-1.07	1.79**	1.29-2.50	1.52*	1.16-2.00	
Felt lonely yesterday	Not lonely	1		1		1		0.56
	Felt lonely	1.29	0.93-1.78	1.60*	1.18-2.17	1.59**	1.21-2.09	
Received phone call	Yes	1		1		1		0.41
	No	1.21	0.68-2.12	1.55*	1.02-2.34	1.91**	1.34-2.65	
Member of club	Yes	1		1		1		0.06
	No	1.09	0.79-1.49	1.61*	1.17-2.21	1.86**	1.32-2.60	
Has a friend	Yes	1		1		1		0.006
	No	0.73	0.38-1.40	1.48	0.96-2.28	2.32**	1.63-3.30	
Family relations		1		1		1		
	Low	1.22	0.88-1.69	1.38*	1.02-1.88	1.35*	1.03-1.77	0.72
Friendships		1		1		1		
	Low	0.92	0.64-1.33	1.24	0.91-1.68	1.64**	1.23-2.18	0.04
Neighbour relationships		1		1		1		
	Low	0.86	0.60-1.24	1.45*	1.06-1.98	1.27	0.93-1.63	0.11
Colleague relationships (2)		1		1		1		
	Low	0.81	0.52-1.27	1.21	0.86-1.82	0.81	0.55-1.29	0.19

Table 5.6 Less than good SRH by various social ties, stratified by INCOME (under 65 years)
(2) Data from working age only, total number 2 406 *p<0.05 ** p<0.001

	High income		Middle income		Low income		Inter-action
	OR (1)	95% C I	OR (1)	95% C I	OR (1)	95% C I	P value
Married/living with partner Yes	1		1		1		
No	1.28	0.88-1.85	1.58	1.03-2.43	1.45	0.98-2.13	0.62
Felt lonely yesterday Did not feel lonely	1		1		1		
Felt alone	1.31	0.90-1.88	1.11	0.75-1.59	1.60*	1.11-2.31	0.45
Received phone call Yes	1		1		1		
No	1.50	0.89-2.53	1.54	1.01-2.35	2.12**	1.42-3.18	0.28
Member of club Yes	1		1		1		
No	1.56	1.08-2.25	1.62*	1.10-2.38	2.11**	1.37-3.25	0.29
Has a friend Yes	1		1		1		
No	0.96	0.55-1.65	1.36	0.86-2.19	2.38**	1.49-3.79	0.01
Family composite	1		1		1		
Low	1.46*	1.01-2.10	1.35	0.93-1.96	1.99	0.83-1.72	
Friendships	1		1		1		
Low	0.74	0.49-1.10	1.23	0.86-1.77	1.92**	1.32-2.79	0.001

Table 5.7: Association between less than good self-rated health and social ties for 3 different income levels for MEN
(1) Odds ratios adjusted for age *p<0.05 ** p<0.001

	High income		Middle income		Low income		Inter-action
	OR (1)	95% C I	OR (1)	95% C I	OR (1)	95% C I	P value
Married/living with partner Yes	1		1		1		
No	0.66	0.46-0.94	1.46	1.03-2.06	1.22	0.90-1.65	0.02
Felt lonely yesterday Did not feel lonely	1		1		1		
Felt alone	1.33	0.94-1.87	2.13**	1.50-3.02	1.53*	1.12-2.08	0.60
Received phone call Yes	1		1		1		
No	0.72	0.32-1.64	1.10	0.61-1.97	1.88*	1.27-2.79	0.03
Member of club Yes	1		1		1		
No	1.43	0.81-1.61	1.62*	1.14-2.32	1.63*	1.14-2.34	0.18
Has a friend Yes	1		1		1		
No	0.98	0.56-1.70	1.42	0.89-2.26	2.03**	1.37-3.01	0.03
Family composite	1		1		1		
Low	0.98	0.68-1.40	1.11	0.79-1.59	1.23	0.90-1.67	
Friendships	1		1		1		
Low	1.16	0.81-1.68	1.28	0.91-1.80	1.48*	1.07-2.03	0.34

Table 5.8: Association between less than good self-rated health and social ties for 3 different income levels for WOMEN (1) Odds ratios adjusted for age *p<0.01 ** p<0.001.

Chapter 6 - Study 3 : Association between mortality and departmental social ties and socioeconomic status: an ecological investigation

6.1 Background and aims

To complement the individual level study which had self-rated health as its outcome measure, the association between social relationships and social status with area mortality in France was investigated. Undertaking a cross-sectional ecological study enabled mortality to be used as the outcome indicator (mortality was not available at the individual level for Studies 1 & 2). As discussed in Chapter 1, premature mortality, in particular male avoidable mortality is high in France, compared to other European countries.

A second reason for undertaking an ecological study is that social relationships, cohesion and social capital, can be seen as properties of communities and not only of individuals (Putman 2000; Field 2003; Kawachi et al 2008; Pootinga 2006). Social stress may be lower for a person living in a 'friendly' community regardless of the individual's relationships (Marmot 2004). For effective population-level public health interventions, such as the healthy city programme, knowledge of an ecological effect is useful. Individual level studies may miss part of the picture. For example, income has been shown to be closely associated with mortality at the individual level but in rich countries, mortality appears to be more closely associated with area income inequality than total income (Wilkinson & Pickett 2006).

The main aims of the study are:

- to investigate the association between social relationships and standardized departmental mortality
- to examine if a greater association between social ties and mortality exists in departments with low socioeconomic status (SES) and high levels of deprivation compared to the other departments.

In order to undertake this part of the study, we needed to create a French deprivation index as none was found in the French public health literature when this analysis occurred in 2008. A description of the development of the index can be found at the end of the method section.

6.2 Methods & Variables

The following variables were used for the 95 French departments:

- 2 outcome measures:

  overall departmental mortality (all ages),
  premature departmental mortality (under 65 years)

- 7 measures relating to social relationships:

  membership of a club
  having friends
  contact with family
  contact with neighbours
  seeing colleagues outside the workplace
  receiving a telephone call
  feeling lonely.

- 2 SES/deprivation measures:

  percentage of manual workers in the department (a measure of SES)
  2 deprivation indexes (conceptual and correlation).

The French departments were chosen as the appropriate area for study as they are the smallest area for which data was readily available from the internet. They were also chosen as departments were coded in the surveys which contain the social relationship data allowing average departmental scores to be calculated. There are 95 departments in metropolitan France when Corsica (2A & 2B) is coded as one department. The mean average population of a department is 630 000, the range is from 73 500 for Lozère, the smallest to 2 554 400 for Nord the largest department. The median departmental population is 499 000.

As the last full census occurred in 1999 and the social relation data came from 3 EPCV studies in 1997, 1998, 2001; other data was collected from as close as possible to this time period.

<u>Mortality rates</u>

The mortality rates were obtained from the FNORS (Federation of Regional Health Observatories web site 'Score Santé'). Two 1999 rates are used in this analysis: total mortality and premature mortality (under 65 years). The mortality rates were standardised for sex and age, and the reference data for the standardisation came from 1999. All the correlations were also calculated for male premature mortality, but as the results were very similar to total premature mortality, they are not presented in the results.

Social relationship variables

Measures of social relationships were identified in three nationally representative surveys that occurred in 1997, 1998 and 2001. The EPCVs (Permanent Surveys of household living conditions) were undertaken by INSEE (see Chapter 4 for a detailed description of EPCV studies) provided the measures of social ties. Approximately 6 000 households are surveyed each year and up to three members of household are interviewed. Because people from the same household would have some social relationship in common, they would not be independent of each other. STATA was used to randomly select one person per household. The EPCV surveys did not gather data in 4 departments with small populations (Dept 12 Aveyon, Dept 15 Cantal; Dept 48 Lozère & Dept 90 Belfort). Corsica was considered as 1 department, leaving a total of 91 departments. We analysed data from adults aged 25 years and over. This left a total of 5,053 respondents to the May 1997 survey, 5,523 from October 1998 and 5,333 from April 2001, in all 15 909 respondents.

Data from the 3 surveys were combined in order to provide a more accurate estimate of departmental social ties. This was particularly important for the departments with small populations. For example, in 1998, only 10 people in the department of la Creuze were questioned about their participation in clubs, compared to 222 in the largest department, le Nord.

One criterion for choosing the social relationship variables was that the topic had occurred in at least 2 of the 3 questionnaires and that the questions were sufficiently similar for the responses to be combined. The replies to the questions were converted to be as comparable as possible. The original questions for each year and the converted dichotomised replies are listed in table 6.1. The 'felt alone' questions had 3 possible reply categories: yes, no and 'not one nor the other'. The variable was divided into "yes, felt alone" versus the two other possible replies. The membership of a club/association regrouped the possible membership of up to 14 different types of clubs. If the person replied that they were a member of any one of these clubs/associations, they were classified as a club member.

The "On average, how often do you meet friends, neighbours or family" questions were a little more complicated to convert. The person could reply x times per day/week/month/year. The number of meetings was multiplied by the number of days/weeks etc to give the total number of meetings per years. The new scales were then dichotomised (less than 52 equalled less than one visit/meeting per week).

ORIGINAL VARIABLES			
	1997	**1998**	**2001**
Club membership	Are you part of a sport, cultural, musical etc club? Are you part of a parent/teachers, humanitarian, union, political party or association?	How many clubs/ associations are you a member of: (list of 14 different types of groups e.g. PTA, housing, union…)	Are you a member of: list of 10 types of clubs or associations e.g. parents- teachers, tenants, sports…
Friendship	Do you have any male or female friends?	On average, how many times do you meet friends?	During the last week, how many different friends have you spoken too? (not including phone conversations)
Contact with family	Of the members of your family living outside your home, how often do you see - parents - children - siblings - others (i.e. cousins)	On average, how many times do you meet other members of your family? (others than those you live with)	During the last week, how many different members of your family (not part of your household) have you spoken to? (not including telephone)
Contact with neighbours	In the last year, have you or a member of your household been into a neighbour's house? Oppositely, has a neighbour been into your house?	On average, how many times do you meet your neighbours?	During the last week, how many different neighbours have you spoken to? (not including telephone conversations)
See colleagues out of work	Do you see colleagues voluntarily outside work?	Do you meet your work colleagues outside work hours?	*(question not asked in 2001)*
Received telephone call	In the last week, have you received a telephone call from someone who does not live with you (and is not work related)?	*(question not asked in 1999)*	How many private telephone calls did you make and receive during last week?
Felt lonely	Yesterday, did you feel lonely?	*(question not asked in 1999)*	Yesterday, did you have the impression of feeling lonely?

CONVERTED Binomial VARIABLES			
	1997	**1998**	**2001**
Club membership	Not member of any club/association	Not member of any club/association	Not member of any club/association
Friendship	Have no friends	Not met any friends in last week	Not spoken to any friends in last week
Contact with family (outside the household)	Not seen any family members in last week	Not met any family members in last week	Not spoken to any family members during the last week
Contact with neighbours	Not been into a neighbour's house or they not in yours during the last year	Not met any neighbours in last week	Not spoken to a neighbour during last week
See colleagues out of work	Don't see colleagues outside work	Never or rarely see colleagues outside work	-
Received telephone call	Received no private phone calls last week	-	Did not receive/make a private phone call last week
Felt lonely	Did feel lonely yesterday	-	Did feel lonely yesterday

Table 6.1: The original social relationship questions and the converted replies from the 1997, 1998 & 2001 surveys

The variables were then collapsed to reflect a departmental value (for the 91 departments). The departmental values were converted into z scores, and then averaged across the 2 or 3 years for which we had data. Z scores were used in order to standardise the distribution of replies, in order to combine the answers from different years and giving each year equal weight. Using z scores had the added advantage that different social relationship regression coefficients can be compared.

The 7 converted social relationship variables (club membership, friendship, contact with family members outside the household, with neighbours, with colleagues outside work hours, having received a private phone call during the last week and felt lonely yesterday) were correlated with mortality and premature mortality. The correlations were weighted by the population size of each department. Linear regression models adjusted for SES and for deprivation were also calculated for the 7 relationship variables with premature mortality.

The departments were then divided into 3 equal groups (of 30, 30 and 31 departments) relating to those with low, middle or high levels of deprivation or proportion of manual workers. Those social relationship variables that were significantly correlated with mortality were stratified across the groups of low, middle and high SES level departments. Separate correlations of the social relationship variables and premature mortality were calculated for each stratum.

Likelihood ratio tests for goodness of fit were performed to compare the interaction (SES x social tie) to main effects models, in order to check whether the difference in associations between the social ties and mortality rate across the SES spectrum were significant. For the likelihood tests only, all the continuous input variables (deprivation, SES and social relationships) were dichotomised in 2 equal groups (of 45 and 46 departments respectively, reflecting high and low club membership, feeling lonely etc). All calculations were performed using STATA 10.

6.3 Development of a departmental measure of socioeconomic status and a deprivation index

SES and deprivation measures were used, in order to control for SES/deprivation when looking at the relationship between mortality and social relationships, and also to stratify the departments into 3 categories. Although a single established deprivation index does not exist in public health in France, such indexes have been routinely used in other countries. As income is rarely available at ecological levels, an index can be used as a proxy for social status. Their composition and their use are very important in some countries such as the UK as they can be used for health service resource allocation (Morris & Carstairs 1991; Jarman 1983, Bellanger & Jourdain 2004) and for many area-based studies of health inequalities and the social determinants of health. This study used 2 different scales:

a) The percentage of manual workers in a department was used as a general measure of social status. This data was obtained from the IRDES's (Institution of Health Economic Research & Development) Eco-santé database and was originally collected during the 1999 census. The average departmental percentage of manual workers was 25.7% in 1999.

b) A deprivation index was created, based on those variables commonly found in other well known national deprivation indexes (Townsend, Jarman and Castairs). For example the Townsend index consists of 4 variables: unemployment, overcrowding, car ownership and house ownership. The Jarman index combines the percentage of pensions living alone, under 5 years, unskilled, single parents, unemployed, overcrowded housing and number of migrants.

A total of 10 possible deprivation indicators were identified from French data sources that were readily available online for the 1999 period. The possible indicators are listed in Table 6. 2.

Possible indicators of the deprivation index	Date	Source of data	Comments
Unemployment rate	1999	Ecosanté, IDRES	Percentage of registered unemployed
Receiving a state benefit covering medical insurance (CMU)	2000	Ecosante IRDES (Data collected by social security (CPAM))	The CMU benefit is awarded to those on a low income or benefit and enables the recipient to access free health care.
Home ownership	1999	Ecosanté, IDRES (From census data)	Proportion of households owning their main residence (variable 'non home owners' calculated from subtracting the percentage of homeowner from 100)
Car ownership	1999	BDSL - from census data	Households owning at least 1 car
Population density	1999	Ecosante IRDES	Number of inhabitants per km2
Proportion of under 5 years old	1999	Ecosante IRDES	Percentage of children aged 0-4 years
Single parent families	1999	INSEE	% of single parent households per total number of households
Failure at primary school	2000	BDSL (from the Academic Inspections)	Proportion of children over 11 years old at primary school. In France, educational difficulties lead to pupils having to retake a school year – being over age 11 in a primary school indicates pupils that have retaken at least 1 year.
Failure at secondary school	2000	BDSL (from the Academic Inspections)	Proportion of pupils over 16 years old at "college" (middle) school (see explanation above).
Overcrowded housing	1999	BDSL - from census data. (This database only had a chart of the departments of France with 5 categories of overcrowding. The average value of the category was attributed to each department.)	Proportion of households with severe overcrowding. Number of residents/number of rooms.

Table 6.2: Description of possible deprivation index indicators

6.3.1 Conceptual deprivation index

Five indicators were selected by studying the components of the existing deprivation indexes, correlating the possible indicators and using common sense (for example, car ownership has a stronger association with rural areas than house ownership. Car ownership is not necessary a sign of wealth but rather of lack of public transport (Christie & Fone 2003). The mean values of the selected indicators can be seen in Table 6.3.

In order to combine the five indicators equitably, they were converted into z scores (with means equal to zero and a standard deviation of one). They were then added together and averaged.

Indicators of the conceptual index	Mean	Standard deviation	Minimum value	Maximum value
Unemployment rate	10.9 %	2.44	5.9	17.4
Receiving a benefit covering medical insurance (CMU)	7.0 %	2.39	3.6	13.7
Not home owner	41.9 %	6.49	30.1	70.4
Failure at secondary school	20.3 %	6.19	8.6	39.5
Overcrowded housing	2.7 %	1.32	1.2	5.0

Table 6.3: Description of the indicators that were combined to form a "correlation" deprivation index.

6.3.2 Association of mortality and the conceptual deprivation index

The "conceptual" deprivation index that was based on 5 'classic' deprivation variables was found not to correlate with mortality or premature mortality at department level (Table 6.4).

	Correlation Coefficient	Sig level
Premature mortality	0.10	0.33
Total mortality	-0.03	0.75

Table 6.4: Correlation of standardised mortality and premature mortality with the "conceptual" deprivation index

Subsequent investigation showed that of the 5 components variables of the conceptual deprivation index; only one variable 'unemployment' was significantly correlated with overall mortality and 2 variables 'unemployment' and 'receiving CMU benefit' were significantly correlated with premature mortality (Table 6.5). Three variables were in fact slightly negatively correlated with departmental premature mortality (failure at secondary school, household overcrowding and house ownership).

Returning to the 10 original indicators identified as possible indicators of deprivation, correlations were calculated and suggested that 3 indicators were associated with premature mortality (Table 6.5). These were primary school failure, unemployment and receiving CMU benefits. Overall mortality (rather than premature mortality which is shown in table 6.5) was significantly correlated with primary school failure and negatively significantly correlated with population density.

	Correlation Coefficient	Level of Significance
Primary school failure	**0.42**	**0.0001**
Unemployment rate	**0.32**	**0.001**
Receiving CMU benefit	**0.25**	**0.01**
Single parent families	0.05	0.65
Not car owner	0.14	0.16
Overcrowding	-0.04	0.67
Under 5 years old	0.02	0.82
Population density	-0.03	0.76
Secondary school failure	-0.03	0.77
Not a house owner	-0.13	0.20

Table 6.5:. Correlation of the 10 possible indicators of deprivation with premature mortality.

6.3.3 Correlation deprivation index

As the conceptual deprivation index did not correlate with departmental mortality, the indicators that were associated with mortality were combined to form a second index of deprivation. This index was named the "correlation" deprivation index in order to identify it from the original "conceptual" deprivation index described above. The 3 indicators in the "correlation" deprivation index (unemployment, receiving benefits and primary school education failure) were converted into z scores, and added together for each department (see Table 6.6).

Indicators of the correlation index	**Mean**	**Standard deviation**	**Minimum value**	**Maximum value**
Unemployment rate	10.9 %	2.44	5.9	17.4
Receiving a benefit covering medical insurance (CMU)	7.0 %	2.39	3.6	13.7
Failure at primary school	4.6%	0.6	3.3	5.8

Table 6.6: Description of the indicators that were combined to form a "correlation" deprivation index.

Results

In this section, firstly the associations of mortality with the measures of social economic status and deprivation for the 95 departments are described (Results section A). Secondly, the findings for the associations between social relationships and area mortality are presented (Results section B) for the 91 departments for which we had data.

6.4 Results section A : Association of mortality with the proportion of manual workers and 'correlated' deprivation index

The mean overall standardised mortality rate in France for 1999 was 901 deaths/100 000 (standard deviation 71.5). For premature mortality, the mean rate for the same year was 219 deaths/100 000 (standard deviation 25.7). The lowest premature mortality rates are observed in the departments of Haute Savoie (182/100 000) and Haute Garonne (183). The highest rates are found in the north-east of the France (Aisne (283), Nord (292) and 301 in Pas de Calais).

Socioeconomic status was defined by the proportion of manual workers in the department. The average proportion of manual workers in 1999 in France was 25.7% (ranging from 10.3% to a maximum of 35.5% manual workers/ department). The departments with the highest levels of manual workers included Aisne, Ardennes and the Pas de Calais. Those with the least were Paris, Hauts de Seine and Alpes Maritimes.

As the "correlated" deprivation index components were 3 'z scored' variables inevitably its mean was zero. The most deprived departments according to this index were the Nord, Seine St Denis, Bouches du Rhône, Herault & Pyrénées Orientales. The least deprived were Yvelines, Haute-Savoie and Ain.

6.4.1 Association between the measures of deprivation and SES

Comparing the deprivation index and the percentage of manual workers (SES) shows that they are not measuring the same thing as the correlation between the 2 measures is low (0.06). To check this finding, the 95 departments were collapsed into 3 groups, only 37 departments were found to be in the same high, middle or low group for both

indicators. Twenty departments were extremely different as they are in the high group of one indicator and the opposing low group of the other.

It is justifiable to continue to use the SES measure and the deprivation index separately as they appear to be different indicators.

6.4.2 Association with mortality

The calculation of the regression coefficient between mortality with the measures of social status and deprivation shows that both are associated to mortality (Table 6.7). This is to be expected for the correlation deprivation index as it was created from variables that correlated with mortality. Despite this fact the percentage of manual workers (the general SES score) was much more closely associated with total mortality than the correlated deprivation index. The R-square suggests that SES explains 30% of the mortality model compares to only 6% for the deprivation index. Separate SES/deprivation indexes for men and for women did not show any gender differences in the association with sex-specific premature mortality (results not shown).

	Coefficient	Sig level p	95%CI	Ad R squ, explaining the model
Regression with total mortality				
SES (% manual workers)	7.87	0.000	5.45 to 10.28	30%
Correlated deprivation index	22.08	0.010	5.47 to 38.70	6%
Regression with premature mortality				
SES (% manual workers)	2.09	0.000	1.13 to 3.03	16%
Correlated deprivation index	11.63	0.000	5.93 to 17.34	14%

Table 6.7: Regression of mortality with a measure of SES (% manual workers) and the correlated deprivation index

6.5 Results section B: Social relationships

The overall number of replies describing the 7 different types of social relationship indicators i.e. membership of a club, in contact with family members etc are presented in table 6.8. This was calculated before the replies from the different years were converted into z scores and combined. As the questions were slightly different in each year, the percentage of replies varied but approximately the same proportion of the samples are socially isolated or integrated. Between 32.3% and 41.6% of the samples from the 3

studies were members of a club or association. 85.9% declared having at least one friend (1997 question) and 63.9% had seen a friend during the last week (1998 question). Two-thirds had contact with neighbours. Half the sample had no work colleagues (worked alone, retired people, housewives…), but of those who did, just over half (55.6 & 57.1%) had contact with their colleagues outside the workplace. In 1997, 86.6% of the participants had received a private telephone call in the last week, and in 2001, 95% had either received or made a call in the same period. Almost exactly the same proportion felt lonely 2001 as in 1997 (89.9% compare to 88.5%). Between 61.3 and 83.7% of those questioned had regular contact with family members outside their immediate household. The higher number of contacts with family in 1997 is probably due to the more explicit question with prompts (parents, children etc). The details of the question differences can be found in table 6.1.

		With social ties % (number)	Without Social ties % (number)	Missing Data
Club membership	1997	32.3 (1586)	67.7 (3319)	148
	1998	41.6 (2297)	58.4 (3226)	-
	2001	40.8 (2178)	59.2 (3155)	-
Contact with friends	1997	85.9 (4244)	14.1 (698)	104
	1998	63.9 (3191)	36.1 (1799)	533
	2001	79.1 (4212)	20.9 (1115)	6
Contact with family	1997	83.7 (4054)	16.3 (788)	204
	1998	61.3 (3068)	38.7 (1933)	522
	2001	78.7 (4200)	21.2 (1133)	-
Contact with neighbours	1997	67.0 (3378)	33.0 (1666)	9
	1998	75.6 (2775)	24.4 (897)	1851
	2001	63.3 (3373)	36.7 (1960)	-
Contact with colleagues outside work	1997	57.1 (1070)	42.9 (805)	3178
	1998	55.6 (1478)	44.4 (1178)	2867
Private telephone calls during previous week	1997	86.6 (4289)	13.4 (661)	103
	2001	95.0 (5066)	5.0 (261)	6
Felt lonely yesterday	1997	88.5 (4369)	11.5 (569)	115
	2001	89.9 (4795)	10.1 (538)	-

Table 6.8: Percentage and number of replies to the questions about social relationship from 3 EPCV surveys

The social relation variables were generally independent of each other. The variables do not demonstrate a significant correlation except:

- having a friend is correlated with being a member of a club (0.36, p<0.001) and also with not feeling lonely (0.34, p<0.001), but there is no association between being a club member and not feeling lonely.
- not speaking to neighbours is highly correlated with not speaking to family members (0.47, p<0.001) or work colleagues (0. 30, p<0.01), but contact with family members has no impact on relationships with colleagues.

6.5.1 Association between mortality and social relationships

The associations between mortality and the different measures of social relationships at the departmental level can be found in Table 6.9. The correlation between not being the member of a club and all age mortality is 0.20 and 0.39 for premature mortality. Significant positive correlations with premature mortality are found for no club membership, not receiving private phone calls and weak contact with friends. Having little contact with non-household family members was negatively correlated with mortality, which suggests that little contact with the extended family is associated with lower mortality. The same negative correlation can be observed for the indicators of weak contact with work colleagues and feeling lonely, but it was not significant.

	Mortality	**Premature mortality**
Not club members	0.20 *****	0.39 ******
No private telephone calls	0.18	0.25 ******
Weak contact with friends	0.12	0.24 *****
Weak contact with family	- 0.39 ******	- 0.20
Weak contact with neighbours	0.16	0.08
Weak contact with colleagues	- 0.08	- 0.02
Felt lonely	- 0.10	- 0.06

Table 6.9: Correlation between 7 measures of weak social ties with mortality for the French departments Significance levels: * p=0.05, **p = 0.001

As the results were approximately the same for both measures of mortality, the rest of the results are only presented for premature mortality. Table 6.10 illustrates the linear regression coefficient and an estimation of the amount the indicators explain of the variation in premature mortality (adjusted R^2). Club membership explains 14% of the model, for example. As z scores were used, the regression coefficients of the social ties can be compared. After introducing the SES measure (% of manual workers) and the deprivation index into the regression, 4 social relationship variables remain significant. Three indicators of social relationships do not appear to be associated with mortality in this ecological study and so were dropped from further analysis, these are: contact with neighbours, contact with colleagues outside work and feeling lonely.

	Model 1 Not adjusted				**Model 2** Adjusted SES			**Model 3** Adj deprivation index		
	Regress Coeff	95%CI		Ad R^2	Regres s Coeff	95%CI		Regress Coeff	95%CI	
Not club member	14.0 **	7.0	-21.1	**14%**	14.5**	8.3	-20.7	11.35**	4.5 -	18.2
No private telephone calls	8.8 **	1.8	-15.8	**6%**	4.55	-2.3	-11.4	10.5**	4.17-	16.9
Weak contact with friends	10.3 *	1.7	-19.0	**5%**	9.3*	1.4	-17.2	8.9*	0.8 -	17.0
Weak contact with family	- 7.5	-15.3	-0.2	**3%**	0.73	- 8.1	-8.2	- 7.6*	- 14.7-	-0.4
Weak contact with neighbours	3.0	-4.7	-10.8	0%	4.4	-2.7	-11.4	1.8	-5.5 -	9.1
Weak contact with colleagues	-0.8	-9.3	-7.7	- 1%	0.5	-5.5	-10.8	0.96	-8.8 -	6.9
Felt lonely	-2.2	-9.2	-4.9	- 1%	0.44	- 6.1	-6.9	-1.3	-7.9 -	5.2

Table 6.10: Regression of different social tie variables with premature mortality at department level Significance levels: * p< 0.05, **p< 0.001,

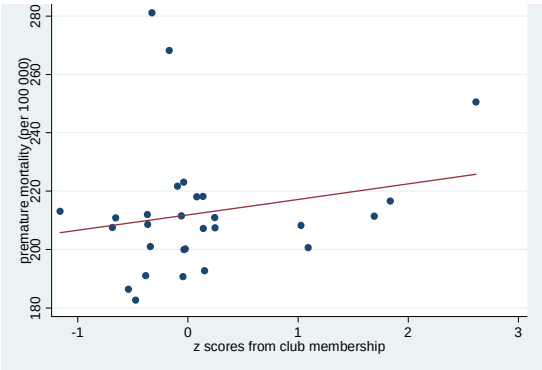
6.5.2 Stratifying the departments by SES

The 91 departments were divided into tertiles representing low, middle and high categories of SES or deprivation. The 4 social relationship variables found to be significant associated with premature mortality in table 6.10 can be found in the tables 6.11 and 6.12 below.

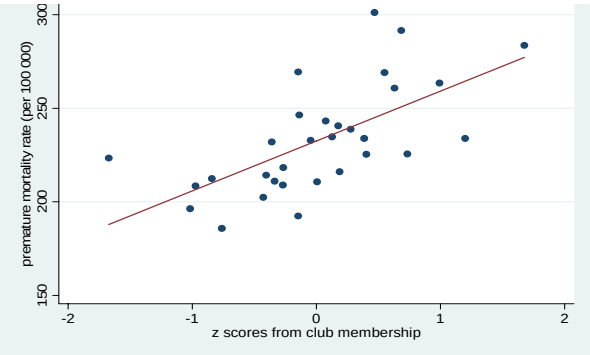
	Low % of manual workers in the department (high SES)	Middle % of manual workers	High % of manual workers in the department (low SES)
Not club member	0.24	0.35 *	0.64 ***
No private telephone calls	0.10	0.30	0.18
Weak contact with friends	0.16	0.27	0.35 *
Weak contact with family	- 0.28	0.11	- 0.03

Table 6.11: Correlation between with premature mortality and weak social ties by proportion of manual workers in the department Significance levels: * p<0.05, **p< 0.001

For the third of the departments with the lowest percentage of manual workers (i.e. high SES), no significant correlation was found between the social relationship variables and premature mortality. However in the departments with the highest proportion of manual workers



Graph 6.1: Premature mortality by club membership for departments with **low** proportions of manual workers (high SES)



Graph 6.2 Premature mortality by club membership for departments with a **high** proportion of manual workers (low SES)

significant associations were found between premature mortality and club membership, and contact with friends (see Table 6.11). This suggests that in departments with a high proportion of manual workers not being a member of club or not seeing friends are associated with higher mortality. These associations are not apparent in departments with a low proportion of manual worker (high SES). The scatter graphs above illustrate this finding. Graph 6.1 shows premature mortality and club membership for the high SES departments and Graph 6.2 for the low SES departments where the association between the 2 variables is closer.

The likelihood ratio tests comparing the interaction models to the main effect models for the SES and social relationship variables show that some models were significant. The

interaction is significant for club membership (p<0.01), contact with friends (p=0.01), and shows borderline significance for telephone calls (p=0.15). The interaction is not significant for family contact (p= 0.47)

6.5.3 Stratifying the departments by deprivation index

For least deprived departments in Table 6.12, no significant correlation was found between the social relationship variables and premature mortality. However for the departments with the highest levels of deprivation, significant associations were found between premature mortality and not receiving private telephone calls and also not being a club member. A significant negative correlation is observed between mortality and contact with non-household members of the family suggesting that in deprived departments, more contact with the extended family is associated with higher mortality.

	Departments with least deprivation	**Mid deprivation**	**Departments with highest deprivation**
Not club member	- 0.02	0.35 *****	0.53 *****
No private telephone calls	0.27	0.03	0.54 **
Weak contact with friends	- 0.05	0.25	0.32
Weak contact with family	- 0.17	- 0.16	- 0.44 *

Table 6.12: Correlation between with premature mortality and social isolation by level of departmental deprivation (using the correlation deprivation index)
Significance levels: * p=0.05 **p = 0.001

The likelihood ratio tests comparing the interaction to the main effects models for the dichotomised deprivation and social relationship variables show that three of the models were significant. The results for the club membership and deprivation interaction is significant (p=0.008) as is receiving telephone calls (p=0.07). Contact with friends shows borderline significant from the likelihood test (p=0.12). There was no significant interaction between deprivation and contact with family (p=0.57).

The “conceptual” deprivation index was also tested. It showed almost identical results to those presented for the correlation index in Table 6.12 (results for the conceptual index not shown). For the conceptual index, non-significant but slightly positive correlations were observed for three social isolation variables and mortality amongst the least deprived departments (no club membership, weak contact with friends and with family).

These same social relationship indicators were significantly associated with mortality in the most deprived departments' stratum.

Chapter 7. Discussion

After summarising the main findings from the three studies, the discussion will analysis the results in more detail and compare them to those from the published literature. It will also consider the strengths and limitations of our studies and then suggest various policy implications of the findings.

At the individual level, all 4 measures of socioeconomic status indicate health inequalities. At the departmental level, a high percentage of manual workers in a department (low SES) is associated with high departmental mortality. We also found that people higher up the SES gradient and younger people report more social ties.

Overall, social ties are associated with good health, and this remains the case after adjusting for the impact of SES on health. Living with a spouse, not living alone, not having felt alone yesterday, receiving a phone call, member of a club, having a friend and also the more general measure of friendship and extended family relationships are all associated with better individual self-rated health. After adjusting for deprivation, the ecological study shows that premature mortality is lower in areas where a greater proportion of people participate in clubs, receive private phone calls and have frequent contact with friends.

The cognitive variable of having ‘felt alone yesterday’ was significantly associated with poor health at the individual level but not the departmental level. Indicators of the structure of a social network such as having at least one friend, the composite friendship variable and also participating in a club or association are all associated with good SRH at the individual level, and lower mortality at the area level. All 3 variables show evidence of the double whammy as people living in low SES/more deprived departments and also individuals on low incomes are more associated with poor health if they don’t have friends or are not members of a club.

Our analysis shows that living with a spouse is associated with better SRH for all SES groups but stratification by the composite SES indicator shows the positive health impact of living with a partner is slightly more important for people of low SES. However when stratified by income, this finding was not confirmed. Only one indicator showed clearly showed that a lack of a relationship is associated with better SRH. Women in the wealthiest group indicate that not living with a spouse is conducive to better health. At the individual level, the general family relationship composite indicator confirms that good relationships are positive for health but again, this effect is not altered by position on the

socioeconomic gradient. The area finding was contradictory as frequent family contact may be generally associated with higher mortality, and that this effect appears to be more pronounced in deprived departments.

Positive relationships with neighbours appear to be associated with individual good self-rated health for women but this did not vary with position on the SES gradient. Neighbourly relations did not seem to be associated with health for men, or at the area level. Surprisingly the quality of relationships with work colleagues shows no link with health at neither the individual nor the area levels. The implications of all these findings will be considered in more detail below.

7.1 Self-rated health (SRH)

Our study found that on a 6 point scale (very good, good, fair, average, poor and very poor) 34.1% of the sample rated their health as less than good. It is difficult to compare this finding directly to those from other studies as the number of possible replies and the exact wording of the question vary. For example, the French National Health Survey found that 22.3% replied that they had 'less than good' health on a 5 point scale of very good/good/fair/bad and very bad (Tubeuf et al 2008). A cohort from the Greater Paris area observed that 22% reported less than good health (Chauvin et al 2007). A Swedish survey using a 5 points scale (identical to that used by Tubeuf) found that 29% declared 'less than good health' (Engstrom et al 2008). Clearly, the exact wording of the question and the scaling (5 or 6 possible replies) affect the SRH result, but the results from the EPCV survey for self-reported health are within the general range of that which could be expected for a 6 points scale. Also less than good SRH is not a 'rare' outcome that only occurs in 'extreme' groups as about one third of the sample report less than good health.

Our study found that less than good SRH was more likely to be reported by women (37% for women, 31% men). Similarly, Cambois & Jusot (2010) observed that 33% women and only 28% men perceived less than good SRH. It has been suggested that the gender difference may be due to women having higher expectations of good health (Tubeuf et al 2008).

Older people are far more likely to report poor SRH than younger people (table 4.3). About 15% of the 25 to 44 years report poor health compared to 64% of the over 65 years. The difference between the genders increases with age. There is a 3% gender difference in poor health for the under 44 years but an 8% difference between those over 65 years. A difference in the mean age of the genders in the working-age group

compared to those of retirement age, could be an explanation but it appears to be unlikely as it is less than 1 year. Another potential explanation for the difference in SRH could be that the retired men left in the sample are healthy survivors (Kubzansky et al 1998).

Non-smokers are more likely to report poor health, but this is due to the smokers' younger mean age. Not playing sport is also associated with poor SRH but this too is largely age related. Not consulting a doctor during the last year is relatively rare (about 15% of the sample) and is more frequent amongst working-age men. Unsurprisingly, not going to see doctors is more likely to be associated with reporting good health.

7.2 Socioeconomic status and health

7.2.1 Individual socioeconomic status and self-reported health

As we hypothesised, at the individual level, a social inequality is observed for self-rated health. All markers of SES status (equivalised household income, perceived income, education attainment and occupation) indicate health inequalities with people lower on the social gradient reporting poorer health than those at the top of the gradient. A 3 fold increase for all indictors can be seen with more people reporting 'less than good' health amongst the lowest social groups compared to the highest even after adjusting for age and gender (table 1 of the article, Heritage 2009, in Appendix 1; tables 4.4 & 4.5 in chapter 4). There is an even larger health gap between the small 'inactive' occupational group and the other occupations.

As planned, we investigated the SES indicators to see if one showed a steeper gradient with SRH than the others. However all the indicators appear to suggest approximately the same steepness in the inequality gradient despite the indicators being split into different numbers of categories. Unlike Cambois & Jusot (2010), we found that all measures: income, education and occupation were significantly associated with health indicating health inequalities.

In general, equivalised income appears to be a particularly reliable measure of SES. Jusot (2004) found that income was better than other social class measures at predicting mortality. Also using the income quartiles avoids the problem of comparing small 'extreme' groups. It has been suggested that there may be a "threshold" effect of income inequality on health (Kondo et al 2009). Our findings do not support a threshold effect for

income and self-rated health association in France as all our SES indicators suggest an incremental increase of poor health with decreasing social status.

The data was analysed for men and women separately and both sexes showed the same gradient for all markers of SES (Appendix 2, Table 4.5 & for income in Fig 4.1), however the slope was steeper for women (Table 4.5) after adjusting for age. Jusot et al (2007b) also found a steeper SES-SRH gradient for women. This implies that SES has a greater impact on the perceived health of women than men. The opposite might have been expected as French men have considerably greater health inequalities than women when mortality is used as the outcome measure (Monteil & Robert-Bobée, 2005). The limitation of using self-rated health as the main outcome variable for the individual studies is discussed in section 7.7, later in this chapter.

Table 4.5 confirms the findings of most inequalities studies by showing a steeper gradient of SRH by the SES variables for the 'under 65 years' population than for the older age group. For example, the association with less than good SRH for manual workers gives an odds ratio of 4.2 (95%CI 2.9 to 6.1) for the under 65s, which is stronger that for the over 65 years (OR 2.7; 95%CI 1.7 to 4.3). Reporting being in financial difficulty is particularly associated with poor health amongst the under 65s.

Although most of our analysis has focused on the composite SES variable, it should be noted that working-age, professional inactive women report particularly poor health. Their self-reported health is considerably worst than even women in manual professions. Firstly inactive women are a relatively small group (164 in all) that appears to have the same age structure as manual women. Further analysis reveals that they are very marginally more likely to report having no friends, not be a member of a club and feel lonely. They are not more likely to report chronic illness and/or handicap. It does appear that this small group of professionally inactive women has particularly poor self-rated health which cannot be explained by differences in social ties. It is possible that the difference is due to other factors such as a lack of self-confidence but we did not have the data to explore this possibility.

7.2.2 SES/deprivation and departmental mortality

The cross-sectional ecological study shows that socioeconomic status, as measured by proportion of manual workers in French departments is associated with mortality. The deprivation index formed by correlating a number of indicators with premature mortality is obviously associated, but the "conceptual" index based on indicators from international

deprivation indexes, was not associated with mortality. Surprisingly, the proportion of manual workers appears to be more closely related to departmental mortality and premature mortality than even the “correlated” deprivation index.

7.2.3 Developing a French deprivation index

As the important review by the Haut Conseil de Santé Publique (2009 p56) indicates, a consensus does not currently exist about the most appropriate deprivation index for France, such as those of Carstairs and Townsend. However, there is agreement that one should be developed. In some countries, such indexes have been use to detemine payments for health care practitioners even if the indicators used in the indexes have been criticized (Talbot 1991).

Currently, a number of research teams in France are looking to develop such an index at the IRIS level (areas covering about 2-4000 population). A personal communication from Prof Lang, Toulouse (email11 Jan 2010), confirmed that a definitive selection of deprivation variables has not been established in France. Subsequently, a meeting to exchange information was organised during July 2010. After we had developed the deprivation index described here, Rey et al (2009) published an index, which was developed at the 'commune' (smallest administrative unit in France) level using principal component analysis. It was strongly associated with mortality at 5 geographical levels (from communes/towns to regions). Other research teams (e.g. Havard et al 2008) have suggested a similar type of index.

Choice of variables included in the deprivation index

Our study suggests that indicators that could be combined to form a deprivation index for France are:

- primary school (redoubling) failure rate,
- unemployment rate,
- proportion of benefit recipients (a benefit such as CMU, access to free medical care).

Its creation was limited to data freely available to researchers and available at the departmental level. We tried a conceptual approach by choosing variables that we thought would indicate deprivation at departmental level in France, only to find that it had no association with mortality when combined as an index. The second index was created which we named a ‘correlated’ index based on those variables that correlated with premature mortality (listed above).

Each country's index must reflect its culture and geography. Indicators of deprivation may have different meanings between countries. For example a Brazilian study chose 'not employing a maid' as an indicator of social deprivation (Pattusso et al 2003). There appears to be real differences both in the possible measures of deprivation that are readily available in the UK and France, and how in France they associate with departmental mortality. Some of the expected deprivation indicators e.g. overcrowded households and property ownership are probably being influenced by urban/rural differences. An important difference between France and Britain is the greater number of small farmers in France who typically would be owner occupiers, would not have problems of overcrowded housing and would own a car but would also have very low incomes. Christie (2003) also found that in rural Wales, car ownership was not associated with wealth.

Looking at the detailed correlation of variables shows some other cultural differences. In the UK, having a large proportion of under 5 years olds in the population has been seen as an indicator of poverty (e.g. Jarman Index). No similar associations were seen in France. Having many children in France is often associated with a strong Catholic faith. A high numbers of 'under 5 years' can be observed in areas that have an active religious tradition (e.g. Vendée) and also in better-off families (our data, results not shown). Also measures of deprivation and social status have different meanings in different time periods. For example, many more people pass the baccalaureate (end of secondary school) exam today compared to 40 years ago. Today's wealthy, environmentally-aware, urban dwellers may choose not to own a car.

Vera Castairs developed an index for Scotland after finding a poor correlation between health indicators and the Jarman index (Morris & Carstairs 1991). At the level of the Scottish health board, she found a closer association with mortality for her index than just using social class (Carstairs & Morris 1989). This is the opposite of our findings. It is possible that for France at the departmental level, a general measure of SES (% of manual workers) is a better reflection of the overall social gradient, than trying to identify a 'deprived' proportion of the population. Marmot has written that a greater reduction in overall mortality can be achieved if gradient is reduced rather than concentrating only on the extremely vulnerable groups (Marmot 2004; WHO 2008).

It should be noted that the development of a deprivation index was not the main objective of Study 3. It was principally used as a tool to categorise the departments in order to investigate the association between mortality and social ties. The social relationship variables were available at departmental level. We therefore had to create SES variables

for this geographical level (average population 630,000). Residential segregation between the rich and the poor is obviously greatest at the smallest neighbourhood level. Departments were originally created to be administrative units that would be as similar as possible in structure, each radiating out from a central town. It is probable that not only the indicators of the original 'conceptual deprivation index' may possibly have been inappropriate for France but also that each department is too heterogeneous with both rich and poor areas. Smaller geographical areas should show greater variation in the socioeconomic variables and therefore are more likely to have a greater association with mortality.

7.2.4 Individual socioeconomic variables

Galobardes et al (2007) has suggested that it is preferable to use a range of measures of socioeconomic position where possible. One of the strengths of the EPCV data is the availability of a number of indicators of social position (education, occupation and household income which we converted to equivalised income). The actual number of replies for 5 professional groups and 5 levels of education attainment were used; income was divided in quartiles for Study 1 and tertiles for Study 2. These divisions result in more equal groups for the income variable than those of education or occupation. Due to the lack of small 'extreme' groups amongst the income categories, odds ratios are likely to be more uniform, and 'bumps' in the gradients are likely to be avoided (e.g. the SRH for people with only a secondary education certificate).

Our study had another, more unusual measure of income, that of subjective income. Overall older men are twice as likely (17.7% to 9.0%) to report that their income is comfortable than younger men. This is the opposite of the actual income gradient where younger men are more frequently found in the highest income quartile. It may be that younger men feel more pressure 'to bring home the cash' and are less satisfied with their income. We did not find other epidemiological studies with which we could compare our findings for this variable.

All the SES variables are linked with age, with older people more frequently found in the lower categories. Education shows a particularly steep gradient with age (17 years between the highest and lowest education categories). Moreover, over 2/3rds (941) of the over 65 year olds are in the none/only primary education category which makes education an especially poor marker of socioeconomic status for older people.

Our results show that women have a greater age range across the SES variables than men. For example, the mean age difference from the highest to lowest income categories is 6.7 years for women compared to 0.8 years for men. An exception is the education variable where both men and women show marked but similar age gradients. This implies that in France, women achieve the same level of education attainment as men, however women are less likely to have senior professionals' jobs which also results in gender income differences.

7.3 Social relationships/ties/networks

Chapter 2 reflected on the importance of social relationships. The field of social networks and support is based on a number of disciplines including anthropology, sociology and psychology (Berkman & Kawachi 2000; Bouvier 2005). Michel Forsé was an important advocate for the need to develop research in the field of social networks in France (Degenne & Forsé 1994). Different types of social ties are important at different periods of the life-course and depending on each person's personality however the first social ties occur within the family. As Ogden Nash observed 'a family is a unit composed not only of children but of men, women, an occasional animal and the common cold' (Shapiro et al 2005). Social ties develop at school and later with neighbours, work colleagues, others friends and via participating in clubs and NGOs amongst people who have an interest in the same activities. The range of variables chosen from the EPCV questionnaire tried to reflect these different types of social ties.

7.3.1 Choice of social tie variables

The variables analysed were chosen as they appear to be measuring different aspects of social ties and also because they had few missing answers. Social relationship studies often look at structural (number of contacts) and functional or cognitive features (amount of perceived support). A cognitive question asked whether the respondent 'felt lonely'. Most of the other variables analysed were of a structural nature which asked about different types of social ties: living with other, contacts with friends, neighbours and work colleagues. Although relationships with work colleagues have been examined within the context of the employer-based cohort studies (such as Gazel and Whitehall), few general population health studies have data on these relationships. We used a variety of replies to single questions and also created 4 composite indexes.

Our study found that 24.6% of men and 31.2% of women lived on their own (Table 4.6). This is higher than the 12.6% of the French population found to be living alone in 1998 by (Pan Ke Shon 1999). This is due to the fact Pan Ke Shon counted the whole population (not only adults over the age of 25 years as we did). Children are obviously less likely to be living alone than adults. Older women are only half as likely to be married and living with others as their younger counterparts.

Pan Ke Shon (1999) noted that the number of people classified as socially isolated doubled during adulthood, our study also showed that generally older people have less social ties than those between 25 to 44 years. Comparing those under 44 years to the over 65 years respondents, the composite family and friendship variables drop by half but close contact with neighbours remains the same. Feeling lonely slightly increases with age by 3.5% for men and 8.4% for women. Fuhrer et al (1999) found women have more people that they rank as close but men have larger (looser) social networks. Our questionnaire did not have exactly the same question, but men are slightly more likely to report having social ties. Men are more likely to report being married, and so to live with others and eat with others at lunchtime. They are also more frequently a member of a club and have regular contact with friends and work colleagues. There was no difference in the replies for feeling alone, having at least one friend, and contact with neighbours. Women are more likely to have received a phone call.

A survey in Paris found that 14% reported feeling lonely (Chauvin et al 2007), this is less than the 23% who reported feeling alone in our survey. The difference is due to the fact that EPCV question had 3 possible replies: felt alone, did not feel alone and neither one not the other. In our analysis, we dichotomised the variable and combined the replies for felt alone and not one not the other which gave a total of 23%. However, 11% of the sample gave the more extreme reply of ‘feeling alone’, very close to the Paris SIRs finding. The Paris study found that the 14% remained constant for men regardless of age, but it increased with age and lower SES amongst women. We found that slightly more older men (4%) felt lonely compared to men under the age of 45 years, as did 8% more older women. The inverse gradient with SES was the same for both genders.

7.3.2 SES and social relationships

In the popular imagination there is a romantic image of poor people living in close communities where everyone knows each other and the kids all play together. Our findings do not support this image as they indicate a gradient with people from the lowest

SES having the least social ties (Table 4.7 & Figs 4.2), even after adjusting for effect of age. Low SES respondents are less likely to have received a private phone call during the last week, to be a member of a club and to report having at least 1 friend. They also report weaker composite family relationships, friendships and poorer relationships with work colleagues than high SES respondents. Blanpain et al (1999) found that less than 4 social contacts per week was more frequent amongst low income and less educated groups. Social support at work was inversely associated with SES (Stansfeld et al 1997). Baum et al (2000) found no association between household income and participating in some activities such as taking part in a singing or self-help groups, however the expected gradient did appear between income and sports activities. Not having much money may prevent people from joining clubs. Febvre & Muller (2003) showed that the average club membership fee in France was only 30€ (£25) per year. Also it seems unlikely that lack of money would prevent people in the middle SES groups from having friends or receiving phone calls. It may be that people on low incomes lack the social confidence and the self-esteem necessary to join clubs, telephone friends etc (Marmot 2004; Wilkinson 2005).

A German study also found that poor social networks and living alone were more frequent amongst SES disadvantaged people measured by education and income (Weyers et al 2008). Like in our study, Weyers et al also found a particularly strong association between contact by phone and SES; as well as betweeen SES and having a friend. Both studies show a clear gradient between SES and being married/living with a spouse.

The UK Health and Lifestyles Survey found that the influence of social capital on health is much weaker than the influence of socioeconomic factors (Cooper et al 1999). This suggests that it is important to control for SES when looking at the association of social ties and health, and that the results of studies that don't may provide poor estimates.

Our study shows that at the individual level, poor family relationships are more strongly associated with low SES but other studies have not always shown the same link. The Whitehall cohort found that low grade men had more contact with their extended family than high grade men. An area study (based on the Castairs deprivation index) found a weak non-linear relationship between family and deprivation (Stafford et al 2004). At departmental level, we too found that more contact with family members is associated with areas which have a higher proportion of manual workers (a marker of low SES).

7.4 Social relationships and health

We found that living with a spouse, not living alone, not having felt alone yesterday, receiving a phone call, being a member of a club, having a friend and also the more general measures of friendship, neighbourliness and extended family relationships are all associated with better individual self-rated health. Our findings are in line with other studies that show that poor social ties are associated with poor self-rated health and high mortality (Melchior et al 2003, Seeman et al 2004; Holt-Lunstad et al 2010).

7.4.1 Social ties and self-rated health

As mentioned earlier, the immediate family is an important source of social relationships. Our analysis shows that living with a spouse is associated with better health for all SES groups after adjusting for age. Kawachi et al (1999) studying 160,000 Americans, found that 9% more of those living alone reported less than good health compared to those living with others. Our results were similar with a 13% difference. About 30% of married people of both genders and single men report poor health, compared to 45% of single women but this is mainly due to single women being older than the other groups (i.e. average age of single men 50 years, single women 57years).

Self-reported health is systematically lower among those with lower levels of social ties after adjusting for the age and sex of respondents. The composite variables show a gradient with poor health from high through to weak relationships. All but two of the social tie variables show a significant association.

We have shown that if the models are adjusted for SES as well as for age, self-reported health continues to be lower among those with weak social ties. This shows that weak social ties are associated with poor health independent of the effect of SES on health, despite the steep health inequality gradients found in France. The cognitive indicator 'felt alone yesterday' appears to be particularly unaltered by adjustment by SES. Gele and Harslof (2010) found that those who were active members in two or more social organisations reported better health (OR: 1.73, 95% CI: 1.34 - 2.22) but the authors did not adjust for SES or age. We found that although it remains significant, the association between poor SRH and being a member of a club reduces when SES is added to the model (ORs respectively 1.70 and 1.35).

An analysis by age shows that for the under 65s all the social ties variables (except eating alone at midday and colleague relations) were significantly associated with health.

For the over 65s only the variables for friendship, not being a member of a club and feeling alone are associated with poor self-rated health. Unlike a Japanese study, we did not find that living alone was deleterious to health for older people (Turagabeci 2007).

In an Australian cohort, Giles et al (2005) found that having friends is the social tie which is the most closely associated with a decrease in mortality. This association was greater than that for family contacts and mortality. Our study also found that friendship had a strong association with health. Perhaps friendships provide more social confidence or some other kind of positive support as they are chosen, rather than family ties which just exist without the respondent necessarily having a say in them.

The Copenhagen City Heart study found that contacts with parents, children, family members, and friends were associated with better health. Greater contacts with neighbours showed a weak reversed pattern, as it was associated with poorer health. The presence of a spouse or partner was protective for men only (Barefoot et al 2005). These findings are very similar to ours where the absence of a spouse is more associated with poor health for men than women. We found that a lack of almost all social ties is more strongly associated with poor health for men than women. Only feeling lonely and weak neighbourly relations more strongly associate with poor health for women than men. Skrabski et al (2004) found that social capital variables such as trust, reciprocity, membership of associations explained 68% of variance in male mortality but only 29% for women. This appears to confirm our finding that a lack of social ties is more detrimental to men's than to women's health.

7.4.2 Social ties and mortality – the ecological study

Chaix et al (2008) found that mortality was inversely associated with neighbourhood cohesion in Sweden even after adjustment for individual factors such as income and health status. The effect persisted after adjusting for physical environmental factors. This result and others (e.g. Kim et al 2010) which also found contextual effects lead us to undertake the ecological study.

We found that four of the social relationship variables were associated, positively or negatively, with departmental mortality and/or premature mortality. After adjusting for SES and deprivation, areas where more people participate in clubs, receive private phone calls and have frequent contact with friends are associated with lower premature mortality. Conversely, infrequent contact with the extended family appears to be

associated with lower mortality. At the area level, contact with neighbours, work colleagues and feeling lonely do not appear to be associated with mortality.

Stafford et al (2004) found greater contact is not universally good as lower self-rated health was found in areas with high family ties. They also observed that greater contact with family showed an inverse relationship with tolerance and respect. We also found areas with more contact family were more associated with high mortality.

Although neighbourhood and other geographical areas are often used in social capital research, compositional effects appear to explain the majority of the associations for many studies (Lofors et al 2006; Lindstrom et al 2002; Engstrom 2008). De Silva et al (2005) in a meta-review found clear evidence of the inverse gradient of social capital to mental health at the individual level, but the results were less clear in the 7 ecological studies. Poortinga (2006) looked at social trust in 22 European countries. He found a strong association between social trust and SRH at the individual level, but none at national level. Stephens (2008) suggests that social capital is better understood in a broader social context not necessarily located in neighbourhood. To sum up, the literature suggests that, as might be expected, area social tie features are less strong than individual ones. It is still unclear whether contextual features of social cohesion influence health after controlling for an area's composition.

We found no difference of the impact of relationships with work colleagues on health at the individual or area levels. Also neighbourly relations and health were only weakly associated at the individual level. Except possibly amongst older people, neighbour relations do not appear to have an important impact on health, but we were surprised to find that workplace contacts did not have an effect. We were expecting that those who reported poor workplace relationships would experience greater stress and report lower SRH. Perhaps the questions were not sufficiently discriminative as it appears that meeting work colleagues outside work hours etc is not important for health. Unfortunately the questionnaire did not ask specifically about lack of decision making at work nor workplace bullying.

7.5 A double whammy – does a lack of social relationships exacerbate social health inequalities

We specifically investigated whether the impact of weak social ties on health was different for those at bottom of the social gradient compared to those at the top. The

individual sample was stratified using the composite SES index and also by income alone. The models stratified by income (table 5.6) show effects in the direction of our initial hypothesis for the majority of the social tie variables – the impact of social ties on health is greatest for the most economically vulnerable i.e. those on a low income. The effects are particularly noticeable for the social ties such as not received a phone call, does not have a friend and for the composite friendship variable. However, the interactions with income are not statistically significant for all variables. The associations are slightly more pronounced but are essentially the same for the under 65 year olds. Surprisingly, the middle income groups show the greatest association between poor SRH and not living with a spouse,

When the models were analysed by sex (tables 5.7& 8), a lack of social ties appears to have a particularly strong association with poor health for low income men. Receiving a phone call and having friends continue to show the expected gradients. Being a member of club appears to be particularly positive for low SES men's health. We also found that for high income women only, not being married is significantly associated with better SRH.

When stratified by SES (combined income, education and occupation) the gradient was less evident as the only variable that clearly showed a differential impact with living with a spouse. The cognitive variable of 'feeling alone' also appears to have a greater negative impact on the health of those with low SES. For the under 65 years old only, not having a friend also has a greater negative impact on the health of those with low SES.

The stratification by income shows the hypothesized gradients of the impact of weak social ties on health where as the composite SES does not show clear differences. Despite the importance of the effect of SES over life-course, our results suggest that current income may be a more precise indicator of current social status. The income gradient is less related to age than education or occupation, so when the statistical models are adjusted for age, income is less affected.

The ecological study shows that when the 91 departments were stratified by low, medium and high deprivation or SES, some social relationships (club membership, contact with extended family and receiving telephone calls) appear to be more closely associated with mortality in high deprivation areas than in more privileged departments. However, the interaction between SES and social relations for mortality is only found to be significant for the social relation variables of club membership and contact with friends. The deprivation index and two social relation variables also show significant

interactions. These findings support our hypothesis that the impact of social ties on mortality is greatest in the most economically vulnerable areas, however the results are not completely conclusive as the interactions were not always significant.

Out findings are similar to those of Antonucci et al (2003) where vulnerability was measured by low educational attainment. Among people over age 40, they found that less education was generally associated with smaller social networks in Detroit, USA. Further sub-group analyses showed that men with less education but who had large social networks and high perceived support, reported health as good as well educated men. This suggests social relationships may protect the health of men with low SES.

Fone et al (2007) saw social cohesion and income as potentially important joint determinants of mental health. High social cohesion significantly modified the association between income deprivation and mental health. The difference in the predicted mean area mental health scores at the 10^{th} and 90^{th} centiles of the income distribution was 3.7 in the low cohesion group and only 0.9 in the high cohesion group.

7.6 Strengths of the data and study design

A strength of the data presented in this thesis is that the individual analysis was based on a representative sample of the French adult population (25 years and over). As data was collected by investigators visiting the selected households, the response rates were favourable compared to other cross-sectional studies. For example Gele et al (2010) only achieved a 40 % response rate using a postal survey method.

At the individual level, the 1997 EPCV survey was a rich source of information about a number of SES measures (income, education, perceived income and occupation) as well many different aspects of social ties from household composition, friendship, club participation and contact with neighbours and work colleagues. Another strength was that information about both genders was available, which is important as French mortality inequalities studies have shown strong gender differences.

It was possible to find similar social ties information from other questionnaires from the same period which were combined to improve the reliability of the departmental averages. The mortality standardisation and much of the SES data came from the census in 1999, which was close to the date of the EPCV surveys ensuring comparability.

We were interested to investigate the inequality gradient across the whole population. We chose not to compare samples for the extremes of the gradient (e.g. comparing the top and bottom deciles) but to use information from the whole of the sample.

A key variable was income. The questionnaire provided net household income and the number of household members. Although some authors do not do so (e.g. Baum et al 2000), we felt it was important to convert household to equivalised income in order to take account of the number of people in the household. Although a number of different methods exist, we used a widely recognised method developed by the Luxemburg study and used by others (e.g. Blakely et al 2001; D'Souza et al 2008).

We have been particularly interested in differences in the interaction between social ties and health at various points on the social gradients. Although the reasons a person selects a particular self-rated health reply are not fully understood, Tubeuf et al (2008) have shown that SRH may underestimate SES differences (see below). What is important for the individual study is that SRH has not been shown to exaggerate SES differences, and so our results may be conservative estimates.

We analysed the data at departmental level to examine for an area effect which might be different to that at an individual level. A problem with some ecological research is that the ecological indicators are just a summation of individuals' indicators from the study (Popay 2000). This not the case for our ecological study as the SES, social ties and mortality data came from difference sources. Using department data had the added advantage that we could use mortality as the health outcome indicator.

7.7 Limitations of the studies

One of the limitations of the individual level analysis study is that although self-rated health (SRH) has been shown to be both a robust health indicator strongly linked to mortality (Idler & Benyami 1997, Heistaro et al 2001, Kelly 2003), little is known about how individuals actually arrive at their SRH replies (Idler et al 2004). Over or under reporting of poor health status could occur by some social groups. For example, Tubeuf et al (2008) and Delpierre et al (2009) have show that poorly educated people in France tend to under-declare poor SRH. Despite the under reporting, Tuberf et al (2008) compared a number of health indicators and concluded that self assessed health does "seem to be a good health measurement tool" p16. Using data from the Gazel cohort, Goldberg et al (2001) confirmed that SRH can be justified as a proxy for serious self-

reported diseases such as cancer and depression. They also found some association for less apparent diseases such as hypertension. Our questionnaire asked about the number of visits to a doctor during the last 12 months and we found it was closely associated with self-reported health as was having a chronic disease or handicap (0.52). The wish to undertake an ecological study to examine the impact of social relationships on departmental mortality came from the desire to analyse the interactions on an 'objective' health outcome indicator.

Questionnaires about social capital or social ties also have the weakness that someone feeling depressed may rated their number of friends etc, as well as their health, as lower than they really are. This could lead to a potential reporting bias which only longitudinal studies with measures of mental health can address. However, looking at 148 studies, Holt-Lunstad et al (2010) found a likelihood of increase survival for participants with stronger social relationships regardless of initial health status.

Another limitation of the cross-sectional study design is that results can only show associations, which may not be causal. Similarly it is not possible to draw conclusions about possible reverse causality, which might occur if people in very poor health became unable to maintain social ties as for example, they are not able to leave their home. This seems unlikely, as further analysis of our self-rated health variable shows those with 'good' health report less social contact than those reporting 'very good' health. Also, cohort studies, which by their nature can avoid the problems of reverse causality, have found similar results to ours (Berkman & Syme 1979; Melchior et al 2003). Also Baum et al (2000) found that initial of physical or mental health did not appear to impact on participation. Reverse causality may also account for sick people loosing their job and moving down the income scale (Jusot et al 2008). However, in France, strong job protection legislation and social insurance helps to prevent ill health reducing income. Our study showed the same associations between self-rated health and education and occupation, as well as income. In this respect, education may be a better measure of socioeconomic status as, once in employment, education attainment is not affected by poor health.

Kondo (2010) has suggested that SES status may be a marker of a range of broader societal characteristics such as political ideology or race relations which can not be altered by reducing income differences or improving educational qualifications. Although other drivers may contribute, it seems unlikely they are the main forces as the SES

health gradient has been identified in all countries regardless of political regimes or level racial tension (WHO 2008).

Health behaviours may have an impact on self-reported health. Total alcohol consumption is high in France compared to other Western European countries (DREES 2007) and is a potential explanation for part of the premature male mortality inequalities (Salem et al 2001). A weakness of our study is that the 1997 questionnaire did not ask about alcohol. Equally there were no questions about body weight or nutrition, although details about tobacco smoking and playing sport were collected. When the regression analyses are run adjusting for smoking and sport as well as age and sex, there is a marginal reduction in the odds ratios for SES and social ties with SRH (Appendix 2). The odd ratios that were previously statistically significant remain so. The adjustment for playing sport did affect the club participation and health association due to the fact that many people in France play sport within the context of a sports/gym club. It may be that health behaviours are mediators rather than confounders (eg it could be that those people who are socially isolated drink or smoke more and that these effects are stronger in low income groups).

Social relationship studies often look for both structural and cognitive features of social cohesion. The questionnaire contained many 'structural' social network questions and some cognitive e.g. felt alone yesterday. It also asked about receiving support from friends and family (small loans, help with child care). In general we could not analyse these variables as there was a greater number of missing replies and the way that the questionnaire had been originally coded made it unclear as to reason for the lack of data. It could have been that the person had never been confronted by the problem or the person had not received the support or the respondent had simply skipped the question. Receiving private phone call was closely associated with health however there were no questions about emailing or using internet social network as this was still relatively rare in 1997. A general limitation of our study is the relevance of the data that was collected more than 10 years ago.

Ecological study limitations

A strength of the ecological study was that an 'objective' health indicator was used i.e. mortality. A study weakness was that data was only available at the departmental level however Jusot (2004) did find that French regional SES was predictive of mortality.

The attempt to create a conceptual deprivation index similar to that of Jarman or Townsend at departmental level was not a success. However it was not the main aim of the study which was to investigate departmental social ties and mortality. We have tried to be as transparent as possible in the methodology, in order to support other researchers interested in this field. We hope that the work done here to identify variables for a deprivation index will contribute to the development of a deprivation index for France. Other research teams have recently published deprivation indexes identified using other methods (Havard et al 2008; Rey et al 2009).

As has been mentioned earlier, the development of a deprivation index will probably need to occur at a small geographical level (for example the IRIS, municipal or zones of employment). The closest relationships with SES variables are usually found in the smallest areas, where people are more segregated by SES. At the departmental level, populations with many different SES characteristics will be mixed, so giving weaker associations. We did not search for SES data at smaller than departmental level, as this was the geographical level of the social relationship data.

7.8 Possible underlying pathways

The studies presented in this thesis are cross-sectional and therefore it is not possible to elucidate underlying processes directly from the results. However, experiments in other fields can be drawn upon to provide possible explanations for the findings.

Social inequality could damage health through two pathways. Firstly, a highly unequal society implies that a substantial segment of the population is impoverished, and poverty is bad for health, known as the material hypothesis (Lynch et al 2004). Secondly, income inequality is thought to affect the health of not just the poor, but also the better off in society. The so called ‘spill-over’ effects of inequality have in turn been attributed to the psychosocial stress resulting from invidious social comparisons (Naidoo 2010). Many health and other social problems have been measured as greater in more unequal societies not just poorer countries. More unequal countries have been associated with more mental illness (Pickett et al 2006) more obesity (Pickett et al 2005) and poorer child wellbeing (Pickett & Wilkinson 2007). More egalitarian countries not only have lower mortality rates but also appear to be more socially cohesive (Kawachi & Kennedy 2002 p186; Wilkinson 2005; Kim et al 2008). When less energy is wasted in worrying about the social ladder, more can be invested in making social bonds.

It seems unlikely that the material explanation is the only explanation for our results. France has an extensive welfare system (i.e. initial unemployment benefits equal 90% of the previous salary) and has improved access to the health care system (with the universal medical coverage scheme). Our study deliberately looked for and found a social gradient amongst the middle to upper classes as well as at the bottom end of the scale. It is unlikely that the middle section of society in France suffers from material deprivation. Although our study did not show larger gender differences between the SES and SRH associations, international comparisons have shown that France high mortality inequalities for working-age men despite having a fairly low GINI income score. If income differences are not the cause of these inequalities, further investigation is required to find them. Differences in alcohol consumption may provide part of the answer, but unfortunately alcohol data was not available from the EPCV survey. Marmot & Syme (1976) noted that cultural norms could protect or aggravate social stress, there may be other cultural differences specific to France (Tubeuf et al 2008). France traditionally has relatively low occupational mobility. Staff are not graded by current merit but by job entrance examinations (concours) that may have been passed several decades previously. In the workplace the use of first names or surnames is carefully coded, as is the use of the 'tu' pronoun or the more formal 'vous' and the recipients of social kissing. It is possible that some of these culturally specific behaviours accentuate the social gradient in France.

A number of other possible, non-financial, pathways could explain our findings. The French sociologist, Bourdieu, has written extensively about social and cultural norms. He describes how each social class has norms which he called 'habitus' relating to leisure activities and how to receive friends (Bourdieu 1979). It may be that the social norms for people of low SES mean that they value social contacts less. Alternatively, a psychological explanation would focus on a lack of social confidence, and feelings of not being in control, which have been associated with lower SES (Wilkinson 2005; Siegrist & Marmot 2006). A lack of social confidence due to educational or material disadvantage may explain why low SES people don't feel comfortable telephoning others, attending clubs etc (Marmot 2003). Berkman & Glass (2000) have hypothesised how social ties increase self esteem and also overall health. Intervention studies to promote social confidence also known as empowerment have been effective in promoting health (Wallerstein, 1992; Bambra et al 2007). Empowerment not only reduces stress and increases confidence it may also have an impact on material conditions. Increased empowerment may lead to increased lobbying to improve local facilities or to obtain welfare grants.

Numerous biological pathways have been identified that, when they malfunction due to excessive amounts of stress, increase mortality (McEwen & Gianaros 2010). Chronic stress is clearly bad for health (Fries et al 2005; Sloan et al 2005; Cohen et al 2006). Animal studies have shown how stress whether caused by subordination or social isolation affects neurons and sensitive areas of the brain, in particular, the hippocampus (Sapolsky 2004). Amongst humans, Kim et al (2010) found that neighbourhood deprivation and low social cohesion were associated with increased coronary artery calcification.

Stress, whether is occurs from lack of status or poor social relationships, can have the same deleterious effect on the body. One biological explanation could be linked to the hormone oxytocin which appears to have an important role in the development of all types of social bonding (as described in chapter 3). Dysfunction in this system may lead to autism (Wu et al 2005). In experiments, oxytocin has been shown to increase pro-social behaviour such as trusting others (Kosfeld et al 2005). Social support is thought to influence the existence of cardiovascular disease via sympathetic-adrenomedullary influences on blood pressure mediated by the release of oxytocin (Knox & Uvnas-Moberg 1998). Elevated fibrinogen concentrations predict coronary health disease. Loucks et al (2005) found that lower fibrinogen levels were associated with higher levels of social integration in men, but this association was not present for women. Although we only reported self-rated health, it is interesting to note that we too found that social integration had a bigger impact on men's health than on women's.

7. 9 Policy implications

With the unquestionable evidence of the existence of social health inequalities, lately greater attention has been given to their causes and possible policies to reduce them (WHO 2008). In France, there has been recent increase in the number of publications about social health inequalities (Leclerc et al 2008; Basset 2009; Haut Conseil de Santé Publique 2009). The HCSP report states that health inequalities are not due to the health care system but to the socioeconomic determinants: education, income, access to employment, conditions during childhood, working and living conditions and social integration. After a conference in January 2010 in Paris about the findings of the WHO Commission (2008) on the social determinants of health; the Health Minister commissioned a report about social health determinants and how reducing health inequalities could be best integrated into the new public health law planned for 2012.

Health inequalities are high on the agenda of the new Regional Health Agencies (Basset 2009). This national approach is supported by an EU decision on the 20th October 2009 to support member states to define effective strategies to reduce health inequalities in an approach titled 'Together for health'. As mentioned in chapter 1, a Norwegian review suggests that a clear political mandate, relevant research, and an intersectorial understanding of health determinants are necessary for the successful introduction of national health inequality policies (Strand et al 2009).

Marmot (2001) showed that the lowest social class (V) only accounts for about 5% of the UK population. Despite their lower mortality rates, higher social classes contribute more to the number of deaths attributable to social inequalities, due to their larger sizes. ('Attributable deaths' is the concept of the number of deaths greater than that of the highest social class). Our study has confirmed the social inequality health gradient. Public policies should not only focus on the very vulnerable but on reducing the overall social gradient. Kawachi & Kennedy (2006, p91) provide a colourful example that teams in the US baseball league that have relatively equal pay do better than those teams with large pay differentials. In baseball, income inequality appears to create disincentives for cooperation and teamwork, both vital attributes for successful business.

This study confirms that a lack of social ties is associated with poor health. In France, issues of social cohesion came to national prominence during two crises. A heat wave hit France during early August 2003. Old people suffered most. An epidemiological analysis showed that people living alone (i.e. never married, divorced or widowed) were more likely to have died during the heat wave than married people (OR adjusted for age, sex, nationality 1.65, 95%CI 1.23-2.15) (Cadot et al 2005). Stratification by sex showed that single men appeared to be particularly at risk. This lead to an increased awareness of the need to help elderly neighbours at times of extreme weather and to the creation of registers of vulnerable old people by local authorities. The second incidence was the urban riots lead by disenfranchised young people in 2005. Both crises reinforce the public authorities wish to encourage solidarity, social cohesion and mobility.

Public health and health promotion organisations have also increased emphasis on a social approach. During most of the latter 20th century, the focus was on individual lifestyle choices such as reducing smoking and drinking, appropriate diet and more exercise (INPES 2008). From the mid 1990s onwards, in UK, the emphasis moved to a more community approach with the development of Health Action Zones, Healthy Living Centres etc. In France, although health promotion still mainly comprises one-off health awareness events, there is increasing interest in the social roots of health problems and

a community approach, (Leclerc, Fassin et al 2000). Community based projects have received considerable funding such as the Ateliers Santé-Ville (city health workshops) initiatives and also the urban social cohesion contracts.

For Aristotle, the ancient Greek 'polis' or city is the natural setting for 'developed' humans societies (Shapiro et al 2005).The WHO healthy cities movement aims to promote health in urban areas by changing the social and physical environment rather than stigmatise individuals. It is a vehicle to act on the wider social health determinants as city councils/ agglomerations have a broad remit of responsibilities from housing, urban design, managing waste and green spaces as well as promoting citizen's economic, cultural and social wellbeing (RFVS 2010). Healthy cities have a focus on the reduction of inequalities. For example a city council can decide to promote areas which mix different types of housing together to attract house owners, private renting and people in social housing to the same community (Barton et al 2009), which should help to reduce the formation of urban 'ghettos' and the resulting social tension. There can be a focus on inequalities by improving public transport, school meals, elderly residential homes in the most deprived suburbs and ensuring cultural events are financially accessible to all. Quality play areas can be developed in high density housing areas rather than only in the central park.

City councils can also promote the development of social ties by ensuring that new estates are built with local shops and other amenities such as spaces that voluntary organisation can hire in order to develop local activities. The promotion of clubs and voluntary organisations appears to be particularly important as our findings suggest that club membership is associated with good self-rated health and mortality, especially amongst low income people and people living in deprived areas.

The geographical clustering of people at high risk makes area based initiatives look cost effective but an exclusive approach on targeting the poor neighbourhoods needs to be considered with care. Joshi et al (2000) found that if only the poorest 20% of UK electoral wards are targeted, then 71% of the low income group would be missed. The city of Brest has a long tradition of socially mixed communities. Despite the city having high mortality overall, it is difficult for the city to benefit from some government help as it no longer has distinct 'deprived' communities (Julie Le Goic, city councillor for health, Brest, personnel communication 30/06/10).

Policies should not only focus on implementing material changes but also on promoting social confidence. The prevalence of mental disorders increases stepwise with lower

social status (Dalgard 2008; Ferrer & Palmer 2004; Stansfeld et al 1998). Both individual characteristics like low self-efficacy, and material factors like economic problems, contribute to the social gradient in mental health. Dalgard & Tambs (2008) propose that both aspects should be addressed. Baum has identified links between the SES gradient, social life and feelings of social confidence and empowerment. She argues that if "empowerment is beneficial for health, then a campaign, supported by the health services, to increase involvement in civic activities that gives people a sense of gaining more power over their lives could have worth while health promoting outcomes"(p421 Baum et al 2000). The healthy city movement supports the same approach (Heritage & Dooris 2009). Social mobility and social confidence can be enhanced by educational mobility. As mentioned in chapter 1, only 6% of the places at the elite engineering schools are filled by the children of manual workers despite them being 32% at compulsory secondary school pupils (Observatoire national de la pauvreté et de l'exclusion, 2006).

As weak social ties have been associated with increased morbidity, studies from the US (Lett et al 2009) and France (Delpierre et al 2009) recommend that the health service should be gathered to identify people at risk. The suggested indicators are: perceived emotional support from intimate relationships; perceived tangible support from peripheral contacts; and the number of children, relatives, and friends in a patient's support network.

Any policy modifications should favour early years development. The wealth of information from life course studies indicates the necessity to invest in this vital period of a person's life and is seen as having one of the greatest potentials to reduce health inequalities (Davey Smith & Hart 2002, Lang et al 2009, Singh-Manoux et al 2004). Experiences in childhood (in particular up to the age of 8 years) and in education, lay the critical foundations of health later in life. Brain development is highly sensitive at this period. National and local governments are in a strong position to support parents and also to ensure that children are given the best possible start in life. Furnee et al (2008) show the cost-benefit of investing in education to improve health.

Finally, referring to Putman's suggestion of the need to promote bowling leagues, Scott (1996) suggests that "it is not enough that we all start bowling again. There have to be bowling leagues in which people of different races are connecting with one another." Promoting 'bridging' social capital which increases the links between communities would appear to be desirable. A possible future international indicator of social mixing could be the professions of a person's 5 closest friends. A further development of the studies

presented here would be to focus on ‘linking’ and ‘bridging’ social capital variables in France (links between communities such as having friends from a different social class) as these appear to be particularly important for health, and also for social mobility (Gele & Harslof 2010).

7.10 Conclusion

In the introduction to this report, a triangle of possible health determinants was presented to illustrate the potential impact on health of social ties and socioeconomic status, as well as the possible link between social ties and SES. Our cross-sectional study cannot prove the direction of the associations but other cohort studies have shown that SES primarily determines health rather than vice versa. Our results show that both age and SES are associated with social ties as younger, higher status individuals report more social ties of all types. Our study confirms the expected health inequality gradient at the individual level for equivalised income, occupation, education attainment and for an indicator of subjective income. At the ecological level, the proportion of manual workers was associated with departmental mortality. These results are important for a country like France where an interest in health inequalities is growing rapidly both amongst researchers and policy makers.

The third side of the triangle is the impact of social ties on health. Independent of the effect of SES, good health is more likely to be reported if the respondant has close social ties such as being married, receiving private telephone calls, being a member of a club and having at least one friend. The composite indexes of friendships, extended family relations and to a lesser extent neighbourliness show the same associations with health. Considering the amount of time spent in the workplace, it was surprising that good relationships with work colleagues do not appear to be important for health in this sample. The cognitive variable of feeling lonely is associated with poor SRH. Only wealthy, unmarried women report better health than those who are married. Generally, greater association is observed between social ties and self-rated health for men than women, also the under 65 years respondants’ health appears to be more sensitive to social contacts than their older counterparts.

Although we have examined more general features of social ties, SES and health, we specifically hypothesised that a lack of social relationships will be more detrimental to health of economically vulnerable people compared to those with high social status. Despite the combined SES variable not showing the hypothesised differences, when

income is used as an indicator of SES, differences in the impact of social ties are marked. In the lowest income stratum, the impact of social ties has a greater association with health than for those in the wealthiest group. At the ecological level, participating in clubs and other non-formal groups appears to have a particularly beneficial effect on health in the economically vulnerable areas. However, frequent contact with the extended family is more associated with higher mortality in the most deprived departments. At the individual level, it is not clear why the differences were systematically observed for income and not the other SES markers. The income groups all have approximately the same mean age whereas occupation and educational attainment have larger age differences. It is also possible that level of income is more associated with social confidence (therefore less stress and better health) in France than education or occupational category.

We wanted to investigate which of the SES variables would be most associated with health. At the individual level, income, education and occupation show significant and similar health gradients. This finding is unlike that of Jusot et al (2007a), who found that income was more closely associated with SRH than other socioeconomic variables such as education. We found that women make up a larger proportion of the lower income and occupational groups. It appears that women achieve the same level of education qualifications as men but are less likely to have senior professional, better paid jobs. This is despite France having family friendly policies (Melchior & Berkman 2006). We had more difficulty in creating a deprivation index to investigate area health inequalities but we suggest that unemployment rate, the proportion of the population receiving medical insurance benefits (CMU) and the proportion of children who have failed a year at primary school could be possible deprivation indicators at departmental level. The data for these indicators are readily available but further research is required to confirm if these variables are appropriate for a French area deprivation index.

For a country with a strong welfare state and relatively low income inequalities as illustrated by its Gini coefficient, France has large mortality inequalities amongst men of working age (Kunst et al 1997). When the international studies placed France in an unfavourable position compared to other countries' level of health inequalities, Mackenbach and Kunst's results were doubted. However, both the method to classify manual and non-manual workers has been investigated (Cavelaars et al 1998, Erikson et al 1997), as has been the existence of absolute as well as relative health inequality differences (Dahl et al 2006;Kunst et al 1998b). Avoidable premature mortality amongst male manual workers in France is high and leads to a large gender difference in life expectancy. Although lifestyle behaviours contribute on the inequality gradient, it is

possible that there are other psychosocial factors which influence the gradient. Perhaps more rigid cultural norms reinforce the social hierarchy in France compared to other countries. Future research should examine country-specific characteristics, such as differences in cultural values or norms, which may influence the relationships between social capital, income inequality, and health (Mansyur et al 2008).

Humans are social animals that have a genuine sympathy for other and a desire to establish a variety of social relationships (De Waal 1996). These attributes can be fully reconciled with the idea that genetic self-promotion drives the evolutionary process (Ridley 2004). A lack of social relationships may have as large negative impact on health as smoking, alcohol consumption and lack of physical activity (Holt-Lumstad et al 2010). A lack of social ties, as well as a lack of social status, results in chronic biological stress which is damaging to the brain and other organs (Kim et al 2010, Sapolsky 2004, McEwen & Gianaros 2010). Friendships and other social ties may reduce the negative impact on health of being at the bottom of the social hierarchy.

Overall, our findings support those of the published literature that social ties are important for health especially for those people who are towards the bottom of the social gradient. Policies to support the creation of social ties in the general population e.g. urban design to create spaces for people to meet, family friendly policies etc should benefit health generally and may reduce health inequalities. Social ties were found to be particularly associated with men's health and that of the working-age population. The importance of reducing the health inequality gradient and the positive impact of close social ties on health should feature prominently in the new national public health law due to be published in 2011/2012.

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Appendices

Appendix 1
Publications/presentations

1. Heritage Z 2009 Inequalities, social ties and health in France **Public Health** 123 e29 - 34

2. Heritage Z, Wilkinson RG ;Grimaud O, Pickett K 2008 Impact of social ties on self-reported health in France: Is everyone affected equally ? **BMC Public Health** 8 243

3. Heritage Z, Grimaud O, Jourdain A, Wilkinson RG Association entre réseau social et santé perçue : un impact qui varie en fonction du niveau de revenu ? Workshop presentation Marseille 16 October 2008 Congrès national des Observatoires régionaux de la santé (Abstract published)

Also

1. Poster :La cohesion social semble etre fortement associée à la santé perçue chez les personnes à fable revenu comparées aux personnes à revenu plus élévé Toulouse 2006
2. Presentation : Les inegalités sociaux et la cohesion social en France, Jan 2007, Seminaire Villes-Santé francophone
3. Teaching Formation des étudients americans à l'EHESP Oct 2008 et 2009 Health inequalities and their possible causes
4. Public Health Association conference April 2008 Workshop presentation

Other related publication about either health inequalities or social ties

1. Santé des Gens du Voyage / Travelling people's health ; RFVS 2009. Co-ordination of the production of the book which aims to highlight the health needs of this population. The books findings and recommendations have been presented at a number of conferences.
2. Author of two articles about healthy cities (which has health determinants and reducing inequalities at its heart) Health Promotion international Dec 2009
3. Author of a short article about the latest research on social health inequalities for Horizon Bretagne July 2010
4. Co-ordinator of a book 'Villes-Santé en Action' and author of the introduction which describes health inequalities RFVS/EHESP March 2010

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e-Supplement

Inequalities, social ties and health in France

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SUMMARY

Objectives: To discuss the evidence of social health inequalities in France and, in this context, to examine the association of social ties and socio-economic status (SES) with self-reported health (SRH).

Study design: A literature search and a nationally representative cross-sectional study of 5046 French adults with data about SRH, socio-economic status and relationships with family and friends etc.

Methods: SRH was analysed by three measures of SES: income, education and socioprofessional group. The frequency of five single and four composite measures of social ties by SES was calculated. Logistic regression models estimated the association between SRH and the social ties variables.

Results: Compared with other countries in Western Europe, France has large social class health inequalities, particularly in relation to premature male mortality. This study found that 'less than good' SRH was significantly more likely to be reported by people in lower education, lower socioprofessional and lower income groups. Social isolation and weak social relationships were associated with low SES. For eight of the nine variables, weak social ties were associated with 'less than good' SRH even after adjusting for SES.

Conclusion: Weak social ties are associated with poor health. In the context of a country with large health inequalities, the effect of social isolation on health is independent of SES.

Introduction

Social health inequalities have been found in all countries where they have been measured.[1] A health gradient has been demonstrated consistently across all socio-economic statuses (SES), regardless of whether occupation, income or education are used as indicators of SES.[2,3] The existence of a gradient suggests that health inequalities are not simply due to material causes, such as a lack of money, but are also linked to other reasons, such as lack of confidence or social networks.[1,4] However, this has not been accepted by all authors.[5]

Inequalities in France

A comparison of Gini coefficients suggests that income equality in France is not as good as in the Scandinavian countries but is better than in Belgium, Italy or the UK.[6] In 2004, life expectancy at birth in France was 76.7 years for men and 83.8 years for women. Life expectancy for men is close to the European Union (EU) average, but that for women is the highest in the EU after Luxemburg. The large difference between the male and female rates is striking. Fig. 1 shows life expectancy by occupational class.[3] There is a life expectancy slope for men from 74 years for male manual workers to 81 years for senior professionals, but the slope is less steep for women. Looking at the causes of premature mortality (under 55 years of age) for men, it is seen that manual workers are 10 times more likely to die from upper digestive tract cancers and alcoholism (measured as liver cirrhosis) than senior professionals. For these same populations, there is a three-fold difference in lung cancer, cerebrovascular disease and suicide.[7]

An early paper comparing French mortality rates with those of other countries found that inequality rates were greater in France than elsewhere,[8] which is surprising given its low Gini coefficient. Using occupational class data from large national cohort studies, male mortality was compared. According to this measure, inequalities were of the same order in England and Finland, but greater in France. Differences between the three countries concerning the principal causes of death leading to inequalities were: cardiovascular diseases in England, accidents and cardiovascular diseases in Finland, and cancer and cirrhosis in France. Mackenbach et al.[9] showed that for premature mortality by occupational class in men, France had the greatest inequality [relative risk 1.71, 95% confidence interval (CI) 1.66–1.77] compared with eight other countries. The figures were based on a comparison of manual workers with non-manual workers. In 1998, this team stated that

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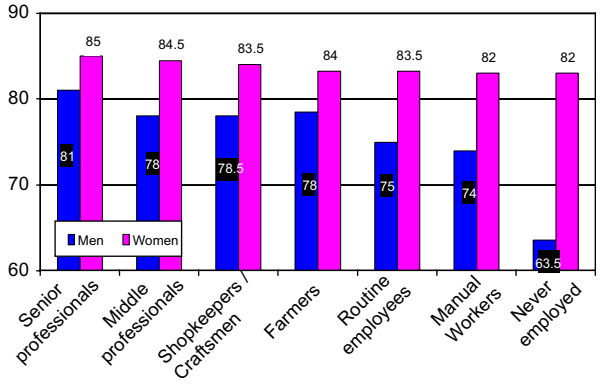

Figure 1. Life expectancy for people aged 35 years in 1999 by occupation. Source: Monteil C, Robert-Bobée I. *INSEE Premiere* 2005;**1025**:1–4.[3]

'France leads the international league table' for health inequalities (of the 11 countries under consideration).[10] These poor findings for France compared with other Western European countries were confirmed in another study in 2008.[11]

Health inequalities can be partly explained by class differences in health behaviours such as drinking alcohol and smoking,[7] but cohort studies have estimated that less than half of the mortality difference by social class can be accounted for by differences in health behaviours.[12–14] Other explanations are required.

Social relationships

The degree of social cohesion (i.e. the frequency and quality of social relationships) appears to be positively associated with health.[15–18] The French Gazel study has indicated a negative influence of poor social integration on male mortality.[19] Melchior et al.,[20] using data from the same cohort, found that a lack of social support and a dissatisfaction with social relationships, rather than the size of social network per se, decreased health. This suggests that functional or cognitive aspects of social relationships may be more important than the frequency of social interactions.

Higher grade London civil servants had more friends and received more emotional support than their lower grade colleagues. They were also less likely to be depressed.[21] Although social relationships have been generally associated with good health, as Stansfeld[22] pointed out, 'relatively little work has attempted to relate macro-social variables such as social class to social support' (p. 162).

This study aimed to explore the relationship between self-rated health (SRH) and three indicators of SES. It also investigated whether the different measures of social ties are linked to SES, and if there is an association between health and social ties after adjusting for SES.

Methods

The data used in this study were gathered by the National Institute of Statistics, Paris (INSEE) during May 1997. Details of data collection can be found in an earlier publication.[23] In summary, INSEE selected 8000 households from mainland France at random, of which 5691 (71%) were successfully contacted by interviewers. Sociodemographic data and information about SRH, income, education, occupation and social relationships were analysed.

All survey respondents who were aged 25 years or more were included in the study. Those under 25 years of age were excluded for two reasons. Firstly, they were under-represented by the survey compared with the Census data 2 years later, and secondly, much socio-economic data was missing for this population of young adults. Their exclusion left an analytic sample of 5046 individuals.

Self-rated health

The main outcome measure was SRH, which was measured on a six-point scale. The replies were dichotomized into very good and good (66% of the sample), and average, fair, poor and very poor (34%); the latter group was classified as 'less than good' health.

Social ties

Five measures of social ties were chosen from single questions in the questionnaire. Where necessary, replies were transformed into dichotomous variables.[23] Four composite measures describing relationships with family, friends, neighbours and work colleagues were created by combining the answers to three or four questions (see Box 1). The composite measures were then divided into strong, middle and weak categories. Colleague relationships were based on the replies of the 2408 people who were in employment.

Subjects were grouped into five categories based on educational attainment. Information was also gathered about the respondent's profession. Retired people were classified by their previous job. The survey asked for the total net annual income per household. To adjust for household size, the conversion used by the Luxemburg Income Study[24] was followed, and an income for each individual was calculated. This was done by dividing household income by the square root of the number of people living in the household.

A composite socio-economic scale was created by combining the information about income, education and profession. Each variable was graded into five levels and given a score from one to five which were added together. If one of the socio-economic variables was missing, the remaining two were averaged. The new variable was collapsed into three categories.

SRH was analysed by income, education and socioprofessional group. Odds ratios were estimated using logistic regression models for the risk of 'less than good' SRH by each variable, and by the combined SES variable. Systematic adjustments were made for age and gender. The five single measures and four composite measures of social ties were also described and logistic regression models of

Box 1. Variables reflecting social ties.

Single questions

Subject reported that he or she:

- Is married and/or living with a partner
- Felt lonely yesterday
- Received a personal telephone call during the previous 7 days
- Has at least one friend
- Is a member of a sports, cultural or musical club, parent–teacher association, religious group or trade union

Composite measures

- Family relationships (marital status; frequently see parent/child living outside the household; frequently see siblings; frequently see other family members)
- Friendships (number of friends; frequently see friends; practical support, e.g. child care, from friends)
- Neighbour relationships (quality of relationships with neighbours – like them, conflict etc; practical support, e.g. lend garden tool to neighbours)
- Colleague relationships (see colleagues outside work; can speak freely during work time; play sport with them; use the familiar pronoun 'tu' most of the time)

Table 1
Association of self-rated health (SRH) with indicators of socio-economic status (SES)

	Number in category	% of men	Mean age (years)	Regression with 'less than good' SRH	
				OR[b]	95% CI
Income					
Upper	1251	48.8	49.5	1	
Upper-middle	1387	47.7	49.7	1.74	(1.44–2.12)
Lower-middle	1068	44.8	51.7	2.56	(2.09–3.12)
Lower	1181	38.3	53.7	3.98	(3.11–4.62)
Missing = 159					
Professional group[a]					
Senior professional	516	60.7	48.4	1	
Intermediate professional	889	48.5	49.3	1.42	(1.05–1.92)
Farmers/shopkeepers	646	50.3	61.0	2.61	(1.94–3.54)
Routine employees	1442	22.1	47.9	2.79	(2.10–3.71)
Manual workers	1347	63.1	52.3	3.54	(2.68–4.66)
Inactive	189	10.6	53.3	5.05	(3.33–7.64)
Missing = 17					
Education					
University/tertiary education	990	45.7	45.0	1	
Baccalaureate/18 years old	578	46.9	43.1	1.38	(1.04–1.83)
Short professional qualification	1297	53.1	44.1	2.11	(1.69–2.63)
Secondary school	282	35.5	51.1	1.36	(0.98–1.91)
None/primary school	1868	39.5	62.0	3.46	(2.81–4.25)
Missing = 31					
Composite SES					
Highest	1643	49.4	47.9	1	
Middle	2135	42.9	50.2	1.95	(1.66–2.30)
Lowest	1251	42.3	57.4	3.77	(3.16–4.51)
Missing = 17					

OR, odds ratio; CI, confidence interval.
[a] Retired people classified by previous profession.
[b] Adjusted for age and gender.

SRH were estimated. Frequency of social ties by SES was also calculated. The exact number of missing records was small and can be found in the tables. The analyses were conducted using Stata version 10.

Results

Of the 5046 respondents aged 25 years or more, 44.8% were men and 55.2% were women. The men had a mean age of 50.6 years (95% CI 49.9–51.2) and the women had a mean age of 51.8 years (95% CI 51.2–52.5). Table 1 shows that there were more men than women (over 44.8%) in the upper income and senior professionals categories. This trend is less clear in the education variable. More men had short professional qualifications, which often lead to skilled manual professions. Generally, the better paid, better qualified individuals were slightly younger than their lower paid/lower qualified colleagues. The farmers/shopkeepers/artisans were an exception, as this group was, on average, older than the other professional groups.

In Table 1, logistic regression estimates that 'less than good' SRH is associated with lower income, lower professional status and lower education, even after adjusting for gender and age. For example, the lowest income quartile had an odds ratio of 3.98 (95% CI 3.11–4.62) compared with the highest income quartile.

Fig. 2 shows the percentage of people reporting social ties by SES. Both the single markers of isolation (e.g. not member of a club) and composite indices (e.g. family relationships) show that isolation/weak relationships are more commonly reported by people of low SES.

The indicators of social ties are described in Table 2. Men were more likely to be married/living with a partner than women. In addition, men were more likely not to have received a personal telephone call in the past 7 days, but they reported better relationships with their work colleagues. Older people were more likely to report not having a friend, weak friendships in general, and weaker family relationships. Contact with neighbours did not appear to diminish with age.

After adjusting for age and sex (Model 1), odds ratios show that 'less than good' SRH is associated with social isolation such as

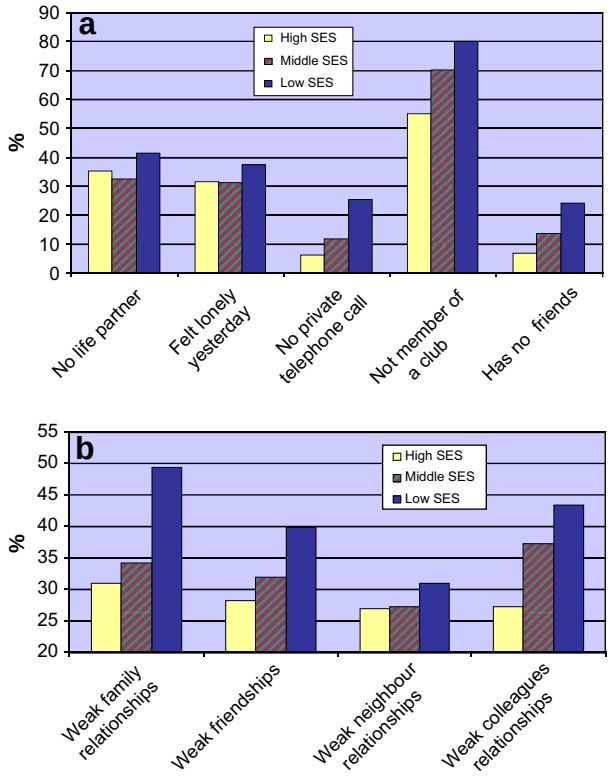

Figure 2. (a) Social isolation variables by socio-economic status (SES). (b) Social relationship indices by SES.

feeling lonely, not having friends etc. A slight gradient can be observed in the composite variables, with weak family relationships being associated more closely with poor health than middle family relationships, which in turn are more closely associated with poor SRH than strong family relationships. When the social ties/health association is adjusted for SES (Model 2), the associations are reduced but remain significant for virtually all of the variables tested. The variable of 'feeling lonely yesterday' appears to be particularly robust. When SES is included in the model, the previously weak link disappears between the quality of colleague relationships and health.

Discussion

A search of the literature showed that health is associated with the SES gradient in France, as is the case in other developed countries. However, the gradient for male mortality appears to be particularly steep for France compared with other European countries. This study also found an association between SRH and three markers of social status, namely income, education and professional group. There is a more than three-fold increase in people reporting 'less than good' health in the lowest social groups compared with the highest social groups. There is an even larger gap between the inactive occupational group and the other occupations. 'Inactive' refers to people who have never worked, predominantly women. However, care must be taken when interpreting this ratio as the small number of people in this group means that the finding is not statistically significant. The same is true for those with secondary education qualifications. As the composite SES variable was created by combining income, profession and education, it is unsurprising that it follows the same trends.

All three markers of SES show a clear gradient with poor SRH. The data were analysed separately for men and women (calculations not shown here), and both genders showed the same gradient for all three markers. However, men did not show a steeper gradient as might have been expected.[3]

Other authors[15–21,25,26] have found that social relationships are closely associated with health. The present study supports this association despite the steep socio-economic health inequality gradients found in France. Table 2 shows that SRH is systematically lower among those with lower levels of social contact, despite adjusting for age and gender of respondents. The composite variables show a gradient with poor health from strong through to weak relationships. If the model is adjusted for SES, the association remains for all but one of the variables. This model shows that weak social ties are associated with poor health, independent of the

Table 2
Association between 'less than good' self-rated health (SRH) and social ties

	Number in category	% of men	Mean age (years)	Model 1 'Less than good' SRH (adjusted for age and gender)		Model 2 'Less than good' SRH (adjusted for age, gender and SES)	
				OR	95% CI	OR	95% CI
Married/partner							
Yes	3249	50.1	49.4	1		1	
No	1795	35.2	56.7	1.22	1.06–1.40	1.23	1.06–1.41
Missing = 2							
Felt lonely							
Not lonely	3315	44.1	50.3	1		1	
Yes, felt lonely	1616	45.2	53.0	1.49	1.30–1.71	1.44	1.25–1.66
Missing = 115							
Received personal telephone call							
Yes	4280	42.3	50.7	1		1	
No	606	58.0	54.6	1.83	1.52–2.20	1.36	1.12–1.65
Missing = 106							
Participates in a club							
Yes	1586	49.8	50.8	1		1	
No	3319	41.9	51.4	1.70	1.47–1.96	1.35	1.16–1.57
Missing = 141							
Has friend(s)							
Yes	4242	44.2	49.7	1		1	
No	694	44.8	60.6	1.68	1.41–2.02	1.36	1.13–1.64
Missing = 110							
Composite variables							
Family relationships							
Strong	1692	46.6	45.8	1		1	
Middle	1494	51.6	49.0	1.31	1.11–1.55	1.30	1.09–1.55
Weak	1860	37.7	58.0	1.44	1.23–1.69	1.33	1.12–1.56
Missing = 0							
Friendships							
Strong	1713	47.7	46.3	1		1	
Middle	1875	41.7	51.4	1.27	1.09–1.49	1.16	0.99–1.37
Weak	1458	45.3	57.1	1.49	1.26–1.76	1.32	1.11–1.56
Missing = 0							
Neighbour relationships							
Strong	2280	44.6	51.6	1		1	
Middle	1338	43.9	51.8	1.27	1.09–1.49	1.16	0.99–1.37
Weak	1411	46.0	50.3	1.36	1.16–1.57	1.26	1.07–1.47
Missing = 0							
Colleague relationships							
Strong	907	56.1	30.1	1		1	
Middle	689	48.0	40.7	1.07	0.82–1.41	0.99	0.75–1.30
Weak	810	45.6	42.3	1.13	0.87–1.46	0.94	0.72–1.23
Missing = 2638							

SES, socio-economic status; CI, confidence interval; OR, odds ratio.

effect of SES on health. The cognitive indicator 'felt lonely yesterday' appears to be particularly unaffected by adjustments in SES.

Weak social ties appear to be more common in low SES groups than among those higher up the social scale. A recent German study also found that poor social networks were more common among SES disadvantaged people measured by education and income.[27] As this study has shown, the German study found a particularly strong association between contact by telephone and SES.

Not having much money may prevent people from joining clubs. However, a recent study showed that the average club membership fee in France was only 30€ (£22) per year.[28] Also, it seems unlikely that lack of money would prevent people in the middle income groups from having friends or receiving telephone calls.

A number of possible, non-financial pathways could explain the study findings. The French sociologist, Bourdieu,[29] has written extensively about social and cultural norms. He has described how each social class has norms, which he called 'habitus', the habitus relate to leisure activities and how to receive friends. It may be that the social norms for people of low SES mean that they place less value on social contact. Alternatively, a psychological explanation would focus on a lack of social confidence due to educational or material disadvantage to explain why people with low SES do not feel comfortable telephoning others, attending clubs etc.[13,30]

A biological explanation could be linked to the hormone oxytocin which appears to play an important role in the development of all types of social bonding. Dysfunction in this system may lead to autism.[31] In experiments, oxytocin has been shown to increase pro-social behaviour such as trusting others.[32] Social support is thought to influence the existence of cardiovascular disease via sympathetic-adrenomedullary influences on blood pressure mediated by the release of oxytocin.[33] Animal studies have shown how stress, whether caused by subordination or social isolation, affects neurons and sensitive areas of the brain, particularly the hippocampus.[34]

One of the limitations of this study is that SRH was used as the outcome measure. Although SRH has been shown to be a robust health and mortality indicator,[35–37] it is not fully understood what SRH is actually measuring.[38] Another limitation is the cross-sectional study design, which means that the results can only show associations that may not be causal. Similarly, it is not possible to draw conclusions about possible reverse causality, which may occur if people in very poor health become unable to maintain social ties. This seems unlikely, however, as further analysis of the SRH variable (not shown here) showed that those with 'good' or 'average' health reported less social contact than those reporting 'very good' health.

Conclusion

This paper described the high levels of health inequality in France; a country with social inequalities but a relatively low Gini coefficient. In this context, this study showed a three- to four-fold difference in SRH when associated with three markers of SES: income, education and professional group. Low SES is also associated with weaker social contacts. Eight of the nine measures of social ties were associated with poor health, even after adjusting for SES.

These findings need to be confirmed, ideally by the funding of a trial to improve social cohesion which would have a more sophisticated measure of health. If its results were positive, national and local authorities should consider re-inforcing social cohesion, especially in poor communities, as part of measures to improve the population's health.

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Competing interests

None declared.

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Research article

Impact of social ties on self reported health in France: Is everyone affected equally?

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Abstract

Aim: To examine the association of social ties and income with self reported health, in order to investigate if social ties have a greater impact on the health of people on low incomes compared to those financially better off.

Methods: A nationally representative cross-sectional study of 5205 French adults using data from questionnaires which asked about health, income and relationships with family and friends etc.

Results: Less than good self-rated health (SRH) is twice as frequently reported by people in the lowest income group than those in the highest income group. People with low incomes are also more likely to have felt alone on the previous day, received no phone call during the last week, have no friends, not be a member of a club, and to live alone. Socially isolated people report lower SRH. Likelihood ratio tests for interaction vs. main effect models were statistically significant for 2 of the measures of social ties, borderline for 2 others and non-significant for one. For 4 of the 5 indicators of social ties, larger odd ratios show that social isolation is more strongly associated with less than good SRH among people on low incomes compared to those with a higher income.

Conclusion: Social isolation is associated with 'less than good' self-rated health. This effect appears to be more important for people on a low income.

Background

Low socioeconomic status (SES) and less income are associated with poor health in France as in other developed countries [1-3]. There is still a debate as to how much this is due to the direct effects of material circumstances [4] to psychosocial factors [5], or to the psychosocially mediated effects of either. Those favouring psychosocial explanations point to the importance of social relations, sense of control etc as health determinants. They also emphasise that middle income people, not affected by material poverty, suffer from poorer health than the richer groups in a society [6,7]. The same has been found to be true in France [8,9].

In 1979, Berkman and Syme [10] showed that mortality increased with a lack of social relationships. The results were still significant after controlling for social class and behaviours such as smoking. Other studies have also

shown that the frequency and quality of social relationships are positively associated with health [11-13]. The French 'Gazel' cohort has indicated the negative influence of poor social integration on male mortality [14]. Melchior et al [15] using data from the same cohort, found that a lack of social support and a dissatisfaction with social relations, rather than the size of social network, decreased health. Antonucci and Fuhrer [16,17] found that French older adults with few social network connections had an increased risk of mortality: the age-adjusted rate ratio was 2.69 for men and 1.56 for women.

The exact mechanism linking friendship and social support to health has yet to be established conclusively. Several pathways through which social affiliations could influence health have been identified. Behavioural pathways include smoking, diet etc. Psychological pathways include the effects of social connectedness on feelings of self-esteem and coping. Physiological pathways are the biological processes through which our bodies are affected by social relationships [18]. Oxytocin was originally known as a neuropeptide key for birthing but it now appears to have an important role in the development of all types of social bonding. Dysfunction in this system may lead to autism [19]. Knox & Uvnas-Moberg [20] outline how social support can influence the existence of cardiovascular disease via neuroendocrine pathways such as sympathetic-adrenomedullary influences on blood pressure mediated by the release of oxytocin.

Although social relationships have been associated with good health, as Stansfeld [21] pointed out, "relatively little work has attempted to relate macro-social variables such as social class to social support" page 162 [21]. In the Whitehall II study, higher grade civil servants were in better health and had more friends and received more emotional support than their lower grade colleagues [22].

There is indisputable evidence of the link between SES and health. Most studies looking at social ties do show a positive association with health, but there are ongoing discussions about the exact mechanisms (structural or functional) [23,24]. However, not all of the social ties studies have controlled for SES. The apparent health effects of friendship and other social ties may have a different effect at low and high SES.

The aim of this study is to examine the association of social ties and self reported health across levels of income in France. Our hypothesis is that the impact of social isolation on health will be greatest among the most economically vulnerable i.e. for those people on low incomes.

Method

The data used in this study were gathered during May 1997 by the National Institute of Statistics, Paris (INSEE, Institut National de la Statistique et des Etudes Economiques) as part of the Permanent Survey of Household Living Conditions (PSHLC). Ethics committee approval was obtained by INSEE for the original survey. The questionnaires covered many different domains. For this study, we used socio-demographic data, plus information about self-rated health (SRH), household income and social relationships.

The PSHLC randomly selected a total of 8,000 households from mainland France and 5,691 (71%) were interviewed. Up to 3 adults per household were asked to respond to questionnaires. We randomly selected one adult per household. Key data (income or SRH) were missing for 5% of individuals. The sample was compared to the census population collected 2 years later. It was found to be representative of the French population by age, gender and region, except for those less than 20 years old who were under represented. We excluded them, giving an analytic sample of 5, 205 respondents aged 20 years and over.

Individuals were classified according to income. The survey asked for the total net annual income for the household in 13 categories. In France, net household income refers to income after all social security/national insurance charges have been deducted but before income tax and local taxes have been paid. To adjust for household size, we followed the conversion used by the Luxembourg Income Study [25] and calculated an equivalised income for each individual by dividing the mean of each income category by the square root of the number of people in the household. This variable was collapsed into 4 categories with approximately equal numbers of individuals in each.

Five measures of social ties were chosen from the questionnaire. Where necessary, replies were transformed into dichotomous variables. The first variable related to a subjective feeling of loneliness. Respondents were asked "Thinking about yesterday, did you have the feeling of being: alone/supported by others/not one or the other". We coded 'feeling alone yesterday' as 1 and the other replies as 0. The following four variables were related to more structural aspects of a social network. The questions were "During the last 8 days, have you had at least one personal telephone conversation with someone who is not a member of your household? Yes/No"; and "Have you friends, men or women, outside your immediate family? Yes/No". A variable for club membership was created from two questions. The first asked "Are you part of an association or similar structure (sports, cultural, scientific, musical or regional traditions club etc)? and the second

referred to membership of a school parents association, humanitarian NGO, religious group, political party or trade union. If the respondent said they participated regularly or irregularly to either question, they were classed as a member of a club. We also recorded whether or not the respondent lived alone.

Self-reported health was measured on a 6-point scale. The replies were dichotomised into very good and good (68% of the sample), and average, fair, poor and very poor (32%) which we classified as 'less than good' health.

Self-rated health and social ties were described by income categories and differences in proportions were tested using Pearson chi-square tests. We also estimated logistic regression models for the risk of 'less than good' SRH by each measure of social ties, adjusting for age and sex. Each one of the 5 measures of social ties was examined separately. The number of records available for the logistic regression varied according to the social tie covariate examined. The exact number of missing records was small and can be found in the results table below. We also looked to see if there was an interaction between age or gender and each social tie.

To investigate whether or not social ties had a different effect on SRH by income category, we compared models containing main effects of social ties and income to interaction models which additionally included interactions between the social tie variable and income, using likelihood ratio tests. This process was repeated for each of the 5 social tie variables. In 2 income strata, logistic regression explored the association between 'less than good' SRH and each social tie by high or low income. For simplification, these models were estimated using a dichotomous income variable, with two approximately equal sized categories. The high and medium-high income categories were combined as 'high' income, and medium-low and low were combined into a 'low' income category. The analyses were adjusted for age and sex, and were conducted using Stata v10.

Results

Table 1 shows the main characteristics for each of the income groups. The proportion of women is significantly greater in the lower income categories. Average age, however, does not differ by income group. There is a clear income gradient in health with the proportion of people reporting less than good health increasing significantly as income decreases. This gradient is robust to adjustment for age and gender. With the high income category as the reference group, the medium-high category has an odds ratio for less than good health of 1.72 (95% confidence limits 1.42 to 2.09), the medium-low income group of 2.48 (95% CI 2.03 – 3.03), and the low income group of 3.72 (95% CI 3.07 – 4.51).

All 5 measures of social ties are associated with income (see Figure 1 & Table 1). People on lower incomes are more likely to 'feel alone', 'not receive personal telephone calls', 'not have a friend' nor be 'an active member of a club or an association' and 'to live alone'. All these associations are significant ($p < 0.001$). There is a 2 to 3 fold difference between the highest and lowest income groups for the variables 'felt alone yesterday', 'not receiving a telephone call' and 'not having a friend'.

Table 2 shows that for each of the measures of social ties, those people with strong social ties report better health. In other words, a higher percentage of people who are socially isolated (felt alone, received no telephone call etc) reported 'less than good' health than those with strong social ties. After adjustment for age and gender, odds ratios for less than good health are highly statistically significant ($p < 0.001$) for 4 of the 5 measures of social ties: felt alone, received no phone call, has no friends and not member of a club.

Table 1: Characteristics of individuals in each income category

	Income				
	High	Medium-High	Medium-Low	Low	
Number of individuals	1284 (24.7)	1445 (27.8)	1131 (21.7)	1345 (25.8)	
Average age (years)	48.1	47.5	48.6	48.6	ns
Woman (%)	663 (51.6)	758 (52.4)	624 (55.2)	827 (61.4)	$p < 0.001$
Number (%) reporting less than good health	248 (19.3)	410 (28.7)	410 (28.4)	605 (44.9)	$p < 0.001$
Number (%) without various social ties:					
Felt alone yesterday	99 (8)	120 (8)	128 (11)	237 (18)	$p < 0.001$
Did not receive a phone call	88 (7)	152 (11)	155 (14)	268 (20)	$p < 0.001$
Have no friends	93 (7)	166 (11)	162 (14)	244 (18)	$p < 0.001$
Not a member of a club	665 (52)	941 (65)	784 (69)	1021 (76)	$p < 0.001$
Lives alone	281 (22)	358 (25)	282 (25)	556 (41)	$p < 0.001$

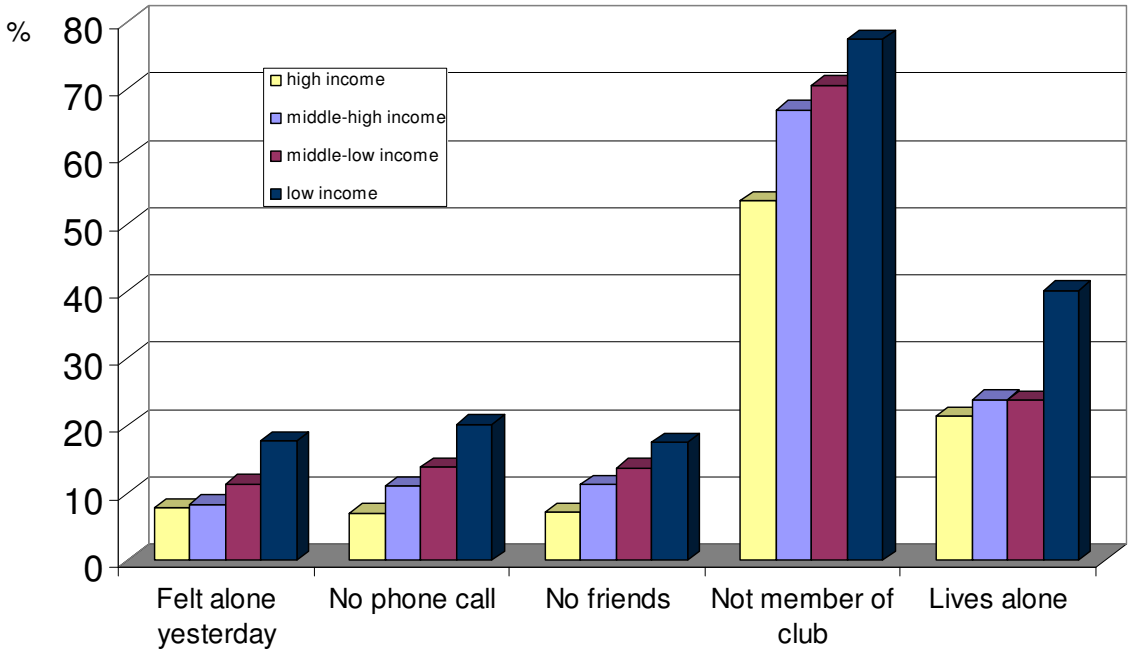

Figure 1
Percentage of people without various social connections by income group.

As the associations between the 5 measures of social ties and SRH were found in a preliminary analysis not to be materially different for men and women (p for interaction from 0.31 to 0.91), all analyses use the combined sample.

The association between 'living alone' and less than good SRH is only seen for the unadjusted analysis (OR 1.67 $p < 0.001$, 95% confidence intervals 1.47–1.90). Table 2 shows that it is not significant after adjustment for age and sex. People over age 45 were more likely to report poor health if they lived alone (OR = 1.76, CI = 1.50 – 2.07) but the opposite was true for those under 45 years old (OR = 0.82, CI = 0.61 – 1.08). This difference by age between the socially connected and socially isolated who report poor health is not observed among the other 4 measures of social ties.

Table 3 shows the association between social ties and 'less than good' SRH at 2 income levels, high and low. The likelihood ratio test for goodness of fit of the interaction models compared to main effect models, showed that interactions between social ties and income in relation to 'less than good' self reported health were significant for 'no friends' and for 'living alone'; of borderline significance for 'felt alone' and 'no telephone call'; and not significant for 'no club membership'. After adjusting for age and gender, table 3 shows that having a lack of social ties is consistently more strongly associated with poor health at low income than high income. Amongst those with above average income, only the odds ratios of 'less than good' SRH with 2 social tie variables, 'felt alone' and 'not a club member', are significant and then only at the 0.01 level. In the low income stratum, highly significant associations ($p < 0.001$) are observed between 'less than good' SRH and 4 of the social ties variables: felt alone, received no phone call, has no friends and not a member of a club.

Discussion

Our results confirm that in France, like other developed countries, a health-income gradient exists with poor self reported health being more than twice as frequent among people in the lowest income quartile compared to those in the highest income quartile.

People on a low income are also more likely to have 'felt alone yesterday', 'received no phone call in the last week', 'have no friends', 'not be a member of a club', and to 'live alone'. Febre and Muller [26] found a similar association between income and membership of a club or voluntary organisation in France. They found that only 32% of peo-

Table 2: Self rated health according to various social ties

	Number (%) reporting very good & good health	Number (%) reporting less than good health	Odds ratio for less than good health [1]	95% conf. limits
Felt alone yesterday				
Did not feel alone	3 162 (70.4)	1 331 (29.6)	ref	
Felt alone	272 (46.6)	312 (53.4)	2.42	1.98 – 2.95
missing *123*				
Phone call				
Received call(s)	3 090 (69.8)	1 338 (30.2)	ref	
No calls	354 (53.4)	309 (46.6)	1.92	1.60 – 2.32
missing *114*				
Friends				
Has friend(s)	3 138 (70.9)	1 285 (29.1)	ref	
No friend	308 (46.5)	355 (53.5)	1.75	1.46 – 2.11
missing *119*				
Club membership				
Member of club(s)	1 226 (74.8)	412 (25.2)	ref	
Not member	2 201 (64.5)	1 210 (35.5)	1.72	1.49 – 1.99
missing *156*				
Other household members				
Lives with others	2 646 (71.0)	1 082 (29.0)	ref	
Lives alone	877 (59.4)	600 (40.6)	1.09	0.94 – 1.26
missing *0*				

(1) adjusted for age & gender

ple in the lowest income quartile were members of a club compared to 57% of those in the highest income quartile.

Our study supports the findings of other authors [10-13,16,17,19,20] that social relationships are closely associated with health. We found that self-reported health is systematically lower among those with lower levels of social contact and integration. The models stratified by income show effects in the direction of our initial hypothesis: the impact of social ties on health is greatest for the most economically vulnerable – i.e. those on a low income. However, the interactions with income are statistically significant only for 2 variables, 'having no friends' and 'living alone' and of boarder-line significance for another 2.

These findings are similar to those of Antonucci et al [27] where vulnerability was measured by low educational attainment. Among people over age 40, they found that less education was generally associated with smaller social networks in Detroit, USA. Further sub-group analyses showed that men with less education, but large social networks and high perceived support, reported health as good as well educated men. This suggests social relationships may protect the health of men with low SES.

Table 3: Association of lack of social ties & less than good self rated health by level of income

	High income		**Low income**		**lr test for interaction (1)**
	Odds ratio (1)	95% C I	Odds ratio (1)	95% C I	
Felt lonely yesterday	**1.80**	1.30 – 2.49	**2.46**	1.90 – 3.20	**0.06**
Received no phone call	**1.31**	0.95 – 1.89	**1.94**	1.52 – 2.47	**0.07**
Has no friends	**1.17**	0.87 – 1.59	**1.95**	1.52 – 2.49	**0.02**
No club membership	**1.42**	1.16 – 1.74	**1.72**	1.38 – 2.14	**0.80**
Lives alone	**0.84**	0.67 – 1.05	**1.14**	0.94 – 1.39	**0.02**

(1) adjusted for age & gender

Our measure of living alone appears to have a different relationship with health than the other measures of social ties. It is much more affected by an adjustment for age than the other 4 measures of social ties. Further investigation showed that people over age 45 were more likely to report poor health if they lived alone than their younger counterparts. Young people who live alone may do so by choice and therefore would not suffer negative effects on their health.

The psychological measure 'felt alone yesterday' had a stronger association with health (OR = 2.42) than variables measuring the size of social networks (not having friends OR = 1.75 or not being a member of a club OR = 1.72). This confirms other findings that the level of satisfaction with social relationships may be more important for health than indicators relating to the structure of a network [17,18].

Our study indicates that people on low incomes have fewer social ties. Not having much money may prevent people from joining clubs. However a recent study [26] showed the average club/voluntary organisation membership fee in France was only 30€ (£22) per year. Also it seems unlikely that lack of money would prevent people in the middle income groups from having friends or receiving phone calls.

Being on a low income and having few social contacts appears to be particularly associated with poor health. People on low incomes may lack the social confidence and the self-esteem necessary to join clubs, telephone friends etc [6,7]. This population could be biologically stressed due to their low social status, and lack of neuropeptides linked to social bonding, may add to this stress [19,20].

One of the limitations of this study is that although SRH has been shown to be both a robust health indicator and related to mortality [28-30], little is known about how individuals arrive at their SRH replies [31]. Questionnaires about social capital or social ties also have the weakness that someone feeling depressed may rate their number of friends and other social relationships as lower than they really are. This could lead to a reporting bias that only longitudinal studies, with measures of mental health, can address.

Another limitation is the cross-sectional study design, which means that results can only show associations, which may not be causal. Similarly it is not possible to draw conclusions about possible reverse causality, which might occur if people in very poor health became unable to maintain social ties. This seems unlikely, as further analysis of our self reported health variable shows those with 'good' or 'average' health report less social contact than those reporting 'very good' health. Also, cohort studies which by their nature can avoid the problems of reverse causality, have found similar results to ours [10,14,15].

Reverse causality may also occur when sick people lose their job and move down the income scale. In France, however, strong job protection legislation and social insurance helps to prevent ill health reducing income. Education is an important measure of social economic status as, once in employment, education attainment is not affected by poor health. The original questionnaire did contain information about education but the large number of potential reply categories meant it was difficult to interpret the results. Education was also found to be highly related to age with the mean age of primary school/no qualifications group being 62 years compared to 45 years for those with higher secondary or better qualifications. It could be that by using income as a measure of social economic status, we may have primarily looked at the interaction between material deprivation and social ties on health. We have tried to avoid this by using data from the whole sample not just comparing the extremes (middle income people are probably not materially deprived). Also, it should be noted that our findings are very similar to those reported by Antonicci et al [27] who used education attainment as a measure of SES.

It may be that health behaviours are mediators of any relationship between social ties and health, for example, people who are socially isolated may drink or smoke more, and it is possible that these effects are stronger in low income groups. No data were collected in this study on alcohol consumption or diet, but questions were asked about current smoking. Unsurprisingly, smoking prevalence was higher among the low income group. However, when we included smoking in models examining the effect of social ties on SRH, the effects were only slightly attenuated and there were no changes in the statistical significance of the associations.

Conclusion

This study shows that people on low incomes report less social contact and also poorer health. The effect of lack of social ties on health appears to be of greater magnitude among people on low incomes, compared to those who are better off. If further research confirms this finding, it would reinforce calls to promote public health initiatives that aim to strengthen social ties and social cohesion in economically poor neighbourhoods.

Consent

No ethical consent was required for this study. The authors only analysed anonymous information.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

ZH & RGW conceived the study. OG & KEP advised on statistical methods. ZH performed the statistical analysis and wrote the first draft. All authors contributed to its revision and approved the final manuscript.

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F1 - Association entre réseau social et santé perçue : un impact qui varie en fonction du niveau de revenu ?

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Introduction. Les variations du niveau de santé en fonction du statut socioéconomique sont désormais bien établies. Parallèlement, une association a été démontrée entre la santé et le réseau social (ex : les relations familiales et amicales). Par contre, peu d'études ont examiné la variation de l'impact du réseau social sur la santé en fonction du gradient socioéconomique. L'existence d'une telle variation est l'hypothèse de notre étude dans laquelle le revenu est utilisé comme marqueur socioéconomique.
Matériels et méthode. Les données utilisées proviennent de l'enquête permanente sur les conditions de vie, une enquête transversale conduite en 1997 en France auprès d'un échantillon représentatif de 5 046 adultes. Les informations recueillies concernaient, entre autres, la santé perçue et le niveau de revenu. Les variables explorant le réseau social des répondants étaient : « avoir eu une conversation téléphonique personnelle au cours des huit jours précédents », « avoir des amis », « se sentir seul hier », «être membre d'une association » et « avoir un conjoint». Des modèles de régression logistique ont permis de calculer les odds ratios (OR) estimant l'association entre ces cinq variables et la santé perçue (dichotomisée) en ajustant sur l'âge et le sexe. Nous avons ensuite examiné cette association au sein de trois strates de niveau de revenu à effectifs comparables.
Résultats. Le niveau de santé perçue et l'isolement social diminuent significativement avec le niveau de revenu. A l'exception de la présence d'un conjoint, toutes les variables de lien social sont très significativement associées au niveau de santé perçue. Par exemple, « ne pas avoir eu une conversation téléphonique» augmente la probabilité de déclarer un mauvais état de santé (OR= 1,92 ; IC95%= [1,60-2,32]). L'analyse stratifiée montre la croissance des odds ratios à mesure que le niveau de revenu diminue. Par exemple, il n'y a pas d'association entre « ne pas avoir d'amis » et une mauvaise santé déclarée dans la tranche des individus à revenus élevés (OR=0,97, ns), alors qu'elle est décelable dans la tranche des revenus moyens (OR=1,38 ; IC95%=[1,00-1,92]) et plus marquée dans celle des revenus faibles (OR=2,17 ; IC95%=[1,61-2,94]). Des gradients similaires sont observés pour les quatre autres variables.
Discussion et conclusion. Nos résultats confirment que le niveau de santé perçue est moins élevé chez les individus à faibles revenus, ainsi que chez ceux déclarant peu de liens sociaux. Avec les limites propres à une enquête transversale, notre étude suggère que les liens sociaux sont des déterminants de la santé perçue plus importants pour les personnes à faibles revenus que pour celles disposant de revenus moyens ou élevés.

Mots-clés : Inégalités Sociales, Réseau Social, Liens Sociaux, Relations Sociales, Santé Perçue
Keywords: Health Inequalities, Social Network, Social ties, Relationships, Self-Rated Heath

Appendix 2
Extra results tables

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MEN Variable	Total in category	Mean age (yrs)	% reporting less than good SRH	% non smokers	% play sport regularly	% have chronic illness /handicap
SES						
Highest	811	48.6	19.4	71.4	40.8	24.7
Middle	916	49.1	30.3	65.4	31.2	26.9
Lowest	529	56.1	48.6	66.0	16.6	38.0
Missing	*4*	*60.2*	*25.0*	*75.0*	*0.0*	*25.0*
			**	-	**	**
Income						
Upper	605	50.5	19.7	69.6	40.0	24.5
Upper-middle	662	48.7	27.5	70.8	33.4	25.4
Lower-middle	478	51.6	35.8	67.8	27.8	31.6
Lowest	452	51.3	42.9	59.7	21.2	36.3
Missing	*63*	*57.2*	*42.9*	*73.0*	*20.6*	*27.0*
			**	*	**	**
Professional gp (1)						
Senior prof	313	50.2	18.2	72.8	40.3	23.0
Interm prof	431	50.0	20.9	70.3	40.8	27.8
Farmers/Shopkeepers	325	57.7	40.3	76.6	21.2	35.1
Routine employees	318	47.3	32.4	65.1	33.3	26.1
Manual workers	850	49.8	36.1	62.0	25.9	29.9
Inactive	20	34.3	20.0	75.0	40.0	20.0
Missing	*3*	*50.0*	*33.3*	*33.3*	*0.0*	*33.3*
			**	**	**	*
Education						
University/Tertiary Ed	452	45.4	16.8	69.0	43.4	20.8
Baccalaureate	267	44.9	16.8	67.8	42.7	21.7
Short prof qual	688	44.2	25.4	59.4	32.7	21.8
Secondary	100	50.5	20.0	70.0	26.0	26.0
None/primary	738	61.8	50.5	74.4	18.8	42.9
Missing	*15*	*50.1*	*26.7*	*60.0*	*33.3*	*20.0*
			**	**	**	**

Table : Appendix 2.1

Self-rated health by various socio-economic indicators for MEN

Note: probability of significant difference using Person's chi.^{2} *= p> 0.05, **= p>0.001
(1) Retired people classified by previous profession

WOMEN Variable	Total in category	Mean age (yrs)	% reporting less than good SRH	% non smokers	% play sport regularly	% have chronic illness /handicap
SES						
Highest	832	47.3	19.8	75.8	34.4	21.1
Middle	1 219	51.0	35.1	76.5	23.2	29.3
Lowest	722	58.4	59.3	81.2	16.9	42.9
Missing	*13*	*59.1*	*53.8*	*76.9*	*7.7*	*15.4*
			**	-	**	**
Income						
Upper	646	48.5	19.5	78.0	34.0	21.0
Upper-middle	725	50.6	31.0	77.5	25.2	27.7
Lower-middle	590	51.8	41.7	78.6	24.2	34.9
Lowest	729	55.2	53.5	75.4	17.0	37.7
Missing	*96*	*57.6*	*42.7*	*82.3*	*22.9*	*29.2*
			**	-	**	**
Professional gp (1)						
Senior prof	203	45.8	14.3	76.8	37.4	17.2
Interm prof	458	48.6	23.4	74.4	32.3	23.3
Farmers/Shopkeepers	321	64.3	52.3	89.4	17.8	38.9
Routine employees	1 124	48.0	33.2	72.8	26.2	28.0
Manual workers	497	56.6	50.9	81.7	17.9	40.0
Inactive	169	55.5	56.2	83.4	15.4	35.5
Missing	*14*	*57.6*	*21.4*	*71.4*	*14.3*	*35.7*
			**	**	**	**
Education						
University/Tertiary Ed	538	44.8	16.0	77.9	34.4	18.0
Baccalaureate	311	41.7	20.6	66.9	32.5	16.7
Short prof qual	609	44.0	26.3	67.5	27.6	24.1
Secondary	182	51.5	28.0	75.8	29.7	25.3
None/primary	1 130	62.2	58.2	86.0	15.8	44.1
Missing	*16*	*55.1*	*56.2*	*68.7*	*31.2*	*37.5*
			**	**	**	**

Table : Appendix 2.2

Self-rated health by various socio-economic indicators for WOMEN

Note: probability of significant difference using Person's chi.^{2} *= p> 0.05, **= p>0.001
(1) Retired people classified by previous profession

	Highest SES	Middle SES	Lowest SES	
Total number: Men	811	916	529	
Women	832	1 219	722	
Mean age: Men	48.6 yrs	49.1 yrs	56.1 yrs	
Women	47.3 yrs	51.0 yrs	58.3 yrs	
Married or living with partner				-
Men	71.0	72.7	73.0	
Women	58.8	63.5	48.2	**
Lives with other people				-
Men	73.1	76.7	77.1	
Women	66.1	74.2	62.6	**
Did not feel lonely yesterday				
Men	68.8	67.6	62.2	*
Women	68.3	69.8	63.0	**
Received private telephone call during last 7 days Men	91.7	82.4	68.4	**
Women	96.0	92.3	79.0	**
Usually eats lunch with others on weekdays Men	76.0	73.2	73.5	-
Women	70.2	68.2	60.0	**
Participates in a club, group or association Men	49.9	32.6	20.7	**
Women	40.0	27.7	19.3	**
Has at least 1 friend Men	93.2	85.0	75.8	**
Women	93.5	87.3	75.7	**
Composite relationship variables				
Family relationships (Lowest cat) Men	24.7	26.3	38.9	
Women	30.6	34.3	53.2	
Friendships (Lowest cat)				
Men	30.3	34.4	40.8	*
Women	26.2	30.2	39.2	**
Neighbour relationships (Lowest cat) Men	26.6	29.1	31.4	*
Women	27.2	25.9	30.5	**
Colleagues relationships (Lowest cat) Men	26.3	32.8	36.6	*
Women	28.0	41.7	51.4	**

Table : Appendix 2.3

Percentage of social ties by SES **and by gender**

Table Appendix 2.4 : Odd ratios associations between social ties and less than good self-rated health after adjusting for age, sex, smoking, sport and SES
*= p> 0.05, **= p>0.001

	Model 1		Model 2		Model 3 (fully adjusted)	
	Less than good self-rated health (adjusted **age & sex**)		Less than good self-rated health (adjusted age, sex, **smoking, sport**)		Less than good self-rated health (adjusted age, sex, **smoking, sport & SES**)	
	OR	CI	OR	CI	OR	CI
Not married nor living with partner	1.22*	1.06-1.40	1.21*	1.05-1.39	1.19*	1.03-1.37
Live alone	1.12	0.97-1.30	1.13	0.97-1.31	1.17*	1.01-1.36
Lonely yesterday	1.49**	1.30-1.71	1.44**	1.25-1.65	1.40**	1.22-1.62
Not received phone call	1.83**	1.52-2.20	1.69**	1.40-2.03	1.34*	1.10-1.62
Has lunch alone	1.15*	1.00-1.32	1.17	0.97-1.30	1.11	0.96-1.28
Does not participate club	1.70**	1.47-1.96	1.41**	1.21-1.64	1.20*	1.02-1.41
Has no friends	1.68**	1.41-2.02	1.55**	1.29-1.86	1.32*	1.09-1.59
Family relations						
High	1		1		1	
Middle	1.31**	1.11-1.55	1.29*	1.09-1.53	1.28*	1.08-1.52
Low	1.44**	1.23-1.69	1.36**	1.16-1.60	1.26*	1.07-1.49
Friendships						
High	1		1		1	
Middle	1.27*	1.09-1.49	1.24*	1.06-1.46	1.15	0.97-1.35
Low	1.49**	1.26-1.76	1.39**	1.17-1.64	1.25*	1.05-1.49
Neighbour relationships						
High	1		1		1	
Middle	1.27*	1.09-1.49	1.22*	1.04-1.43	1.13	0.96-1.33
Low	1.36**	1.16-1.57	1.29**	1.10-1.51	1.21*	1.03-1.42
Colleague relationships						
High	1		1		1	
Middle	1.07	0.82-1.41	1.06	0.81-1.39	0.98	0.74-1.30
Low	1.13	0.87-1.46	1.07	1.83-1.40	0.92	0.70-1.20

Appendix 3

Appendix 4

Appendix 5

Appendix 3: Profile of socio-professional categories in France

Main socio-professional group title in French	Detailed level	Translation of main class title	Socio-professional group titles (as used in this document)
1. Agriculteurs exploitants		Farmers	Farmers
2. Artisans, commerçants	Artisans, commerçants, Chefs d'entreprise	Craft workers, shop owners, and business owners	Shop owners & craft workers
3. Cadres & professions intellectuelles supérieurs	Prof libérales (médecins), professeurs, cadres, ingénieurs	Senior managers, doctors, lawyers, teachers above primary level	Senior professionals
4. Professions intermédiaires	Instituteurs, travailleurs sociaux, clergé	Intermediate professions	Middle or intermediate professionals
5. Employées	Employés de la fonction publique et administratifs, policiers, militaires	Non manual employees/ clerks	Employees / Clerks/ Routine Employees
6. Ouvriers	Ouvriers qualifiés, non qualifiés et agricoles	Manual workers (qualified & unskilled)	Manual workers
7. Retraites		Retired	Retired
8. Inactifs		Never worked, students, housewives	Inactive

Table App3.1 : INSEE occupational classification with professions translated into English

Age

The table App3.2 gives the percentage of people in each socio-professional category amongst people in employment, by age. Farmers and shopkeepers are more likely to be over 50 years old in contrast to there being more manual workers amongst the younger age groups.

	Occupational category					
Age	Farmers	Shopkeepers, Craftsmen	Senior profs.	Middle profs.	Clerks/ Employees	Manual workers
15 to 29 years	0.9	2.4	6.8	21.1	35.8	33.0
30 to 49 years	2.4	6.3	12.6	22.8	29.3	26.6
> 50 years	4.2	10.5	16.2	21.1	25.6	22.3
Total	**2.5**	**6.4**	**12.1**	**22.1**	**29.9**	**27.1**

Table App3.2: The percentage of people currently in employment by socio-professional category from 1999 census data (INSEE online database).

Title in Erikson-Goldthorpe classification	Name of INSEE French categories as defined by Erikson –Goldthorpe	Threefold E.G. classification
I Higher grade professionals	Professions libérales, professeurs, ingénieurs, gros commerçants	
II Lower- grade professionnels	Instituteurs, services médicaux & sociaux, clergé, police	
III Routine non-manual employees	Employées de bureau, de commerce	Non manual I + II + III + IVa+b
IVa Small proprietors, artisans with employees	Petits commerçants, artisans avec employées	
IVb Small proprietors, artisans without employees	Petits commerçants, artisans sans employées	
IVc Farmers	Agriculteurs exploitants, patrons pêcheurs	Farm IVc+VIIb
V/VI Skilled manual workers	Contremaîtres, ouvriers qualifies, mineurs, marins	Manual V/VI + VIIa
VIIa Semi skilled and unskilled manual workers	Autres ouvriers et manoeuvres	
VIIb Agricultural workers	Salariés agricoles	

Table App 3.3 The Erikson-Goldthorpe classification used for the international comparisons, notably by Kunst and Mackenbach(Erikson et al 1979)

Appendix 4 : Main sources of French data about social health inequalities

- **Centres for Health Examinations**

The centres exist in 98 major towns and offer preventative health examinations to the general public. A national body coordinates the data collection. Since 1992, the centres have prioritized access to those who could most benefit from screening. Approximately a third of the examinations are of people who are considered 'vulnerable' (Moulin 2005). Vulnerable people are those classified as unemployed, homeless, receiving the minimum income benefit or who are under 25 years old and not in education or employment.

- Decennial health survey (Enquête Décennal Santé)

In 1970, 1980, 1991 and 2002-3 interviews about health, health service use, behaviour and social status were conducted in 17,000 households in mainland France. For each round, Interviewers visited the households on 3 occasions, at 1 month intervals. As well as the interviews, all adults were asked to complete a health questionnaire; a total of 35,000 people out of 40,000 completed all 3 rounds of questions. The decennial health survey is cross-sectional, and is managed by INSEE. In 2002-3, more SES data was collected specifically to enable more inequality analysis. Survey can have the difficulty that the non-respondents are substantially different to the respondents, which puts in doubt its representative nature. A brief follow up survey of the 23% non-respondents was able to confirm that they did not have substantially more health problems than the respondents (Lanoë 2007)

- Gazel

Another important source data is France's equivalent of the London Whitehall studies, the GAZEL cohort. It begin in 1989 with the aim of investigating the health of 20,600 employees of the national gas and electricity company (EDF-GDF). It is a particularly interesting work-based cohort as the employees cover all of France and come from a wide range of socio-economic range. The workforce is very stable (Goldberg et al 2007). As well as mortality data and annual questionnaires, almost half the participants have has blood pressure, BMI and blood samples taken. The cohort does have the disadvantage that ¾ of the subjects are male and most are now retired.

- Health and Social protection survey (Enquête Santé Protection Social)

The longitudinal survey started in 1988, and follows a panel of households every 4 years. The 2004 version included more SES data. It is managed by the Institution for Research and Documentation for Health Economics, (IRDES) and most asks about health service use.

- Permanent Demographic Sample (Echantillon Démographique Permanent)

The sample was started in 1968 by INSEE at approximately the same time as the British Longitudinal Study. The database contains all the civil-registration records and census information for people born on one of the 4 references days, therefore approximately 1% of the population. It now contains nearly 900 000 records of which 2/3rds where still identified at the 1999 census (Couet 2007). The association of census data with death records, and its representative nature, means this cohort is valuable for health determinant research. This was the source of the Deplanques 1985 data used in many international comparisons by Kunst and Mackenbach.

- Permanent Surveys on Living conditions (EPCV, Enquête Permanent sur les Conditions de Vie)

INSEE also undertakes regular cross sectional quarterly population surveys on a wide range of social attitudes. These surveys usually concern about 6-8,000 households. They are a mixture of interviews and self-complete questionnaires filled in by the all adults living in the household.

- SIRS cohort

The SIRS (Santé, Inégalités, Rupture Social) cohort is managed by the INSEE Unit 707 and its first round of questionnaires occurred in 2005. It is situated around Paris and its suburbs with the aim specifically to look at the impact of social health inequalities on health. It has a representative sample of just over 3,000 households.

- Barometre Santé (Health Barometer)

The Health Barometer is a regular telephone survey managed by the National Institue of Prvention and Health Education that has existed for more than 15 years. Up to 30 000 people are questioned about their health behavious and attitudes.

Appendix 5 : Abreviations

ACSE Agency for social cohesion and equal opportunities

ASV Atelier Sante Ville/ City health workshops

CI Confidence interval

CNLE National Council for Policies to Combat Poverty and Exclusion

CMU Universal complimentary health insurance

CUCS Urban social cohesion contracts

EHESP Ecole de Hautes Etudes en Santé Publique, French School of Public Health

EPCV Enquête permanent sur les conditions de vie des ménages; Permanent Survey of Household Living Conditions

HCSP Haut Conseil de Santé Publique

INSEE Institut National de la Statistique et des Etudes Economiques; National Institute of Statistics

IRIS Ilots regroupés pour l'investigation statistique / Small areas for statistical investigation

OR Odds Ratio

PASS Permances d'accès aux soins de santé/ permanent access to health care

PRAPS Prevention and access to health care for at risk populations

RAWP Resource allocation working party

RMI Revenu minimum d'insertion / minium income benefit

SES socioeconomic status

SIRS Santé, Inégalités, Rupture Social

SMR standardised mortality rate