A life course assessment of health management in the MRC National Survey of Health and Development

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I, Rebecca Jane Wilson, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Abstract

As the UK population expands and adverse health increases with the ageing population, health care services are under pressure to meet demands. Thus, it is necessary to understand how individuals manage their health at different stages in adulthood and identify the health and social factors across life associated with different approaches to health management.

Data from the MRC National Survey of Health and Development, a British birth cohort study following 5362 individuals from birth to 68 years, were used to measure health management across adult life. Measures of health professional consultation at age 43, women's management of symptoms and general health in midlife and health check attendance at age 68 were developed from the rich data archive. Associations were tested between health and social factors from childhood and adulthood (socioeconomic position, health, health care utilisation, lifestyle, personality and family support) and health management outcomes using multivariable regression models and structural equation modelling. Associations between measures of health management from earlier, mid and later adulthood were tested to explore patterns of health management across adult life.

Childhood serious illness was associated with higher consultation at age 43 and with lower self-management in midlife and lower health check attendance in later life in women, although these associations largely operated through adult factors. Worse health in adulthood and more health care utilisation were associated with a higher likelihood of proactive health management approaches. Higher social class across life was associated with lower consultation, higher self-management and attending more health checks. Positive health behaviours were associated with higher levels of self-management and higher health check attendance.

The correlates of health management differed between health challenges and life course stage. Proactive management of one health challenge was sometimes associated with the proactive management of another at a later stage in the life course. This suggests that whilst some individuals may have a greater propensity to proactively manage their health throughout adulthood by various means, other individuals may take little or no action when responding to health challenges; this group should be encouraged to better engage with proactive health management.

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Abbreviations

MRC NSHD = Medical Research Council National Survey of Health and Development

NHS = National Health System

CAM = Complementary/alternative medicine

SEP = Socioeconomic position

NCDS = National Child Development Study

HRT = Hormone replacement therapy

HFNS = Hot flushes and night sweats

PMT = Premenstrual tension

EFA = Exploratory factor analysis

CFA = Confirmatory factor analysis

SEM = Structural equation model

OR = Odds ratio

RRR = Relative risk ratio

CI = Confidence interval

1 Introduction

1.1 Introduction to the thesis

This thesis will consider the ways individuals manage their health and explore the factors from childhood and adulthood associated with some of the ways in which adults respond to a number of health challenges in the Medical Research Council (MRC) National Survey of Health and Development (NSHD). The first chapter will introduce some of the behaviours that fit within the idea of health management; specifically, the utilisation of professional health care services - including both services accessed in response to a health event and engagement with preventive care - and health self-management. Whilst these approaches to health management may seem like very different behaviours, with different motivations, goals and outcomes, what underlies them is the proactive intent to care for, or maintain, one's own health and wellbeing.

How adults look after their health is likely to be of increasing interest to health care providers and public health bodies as the number of older adults in the population grows; in 2011, 16% of the total population of England and Wales were 65 or over (ONS, 2011) and this is forecast to grow to 23% by 2035 (ONS, 2012). The ageing population is partly a result of the increasing life expectancy seen in the UK (Oliver, Foot, & Humphries, 2014). The greater proportion of older adults has implications for health (and particularly levels of ill-health) across the population, as old age is generally associated with worse health; 50% of 65+ year olds report being in either fair, bad or very bad health, compared to 12% of under-65s (ONS, 2011). The percentage of adults aged 65 and above reporting chronic health problems or disabilities in 2011 is high, at 52% of adults in this age group (ONS, 2011). Not only are numbers of individuals with chronic conditions high, but many older adults have comorbidities. Analysis of data from the General Practice Research Database revealed that one fifth of registered patients in the UK had two or more chronic conditions, with rates of comorbidities highest in patients aged over 60 compared with younger people (Brilleman et al., 2013).

As the proportion of older adults residing in the UK grows, there are concerns over providing adequate health care to meet the demands of the population. Due to the changing population, the NHS is currently catering to a very different demographic than it was initially designed to when it was first implemented in 1948 (Oliver et al., 2014). Health care services have failed to keep up with this rapid demographic change (Oliver et al., 2014), as health care budgets have not risen accordingly with the growing demand

for resources and the complex nature of modern health care needs (Royal College of General Practitioners, 2013).

Moreover, changes in lifestyle over recent years are likely to impact on the demand for health care services and resources (Wanless, 2002). Examples of this are seen in sedentary behaviour, which increases with age (Health Survey for England, 2008) and is linked to adverse health (Ekelund et al., 2015; Proper, Singh, van Mechelen, & Chinapaw, 2011). Diets lacking in fruit and vegetables, alcohol consumption and cigarette smoking are a burden to health care services (Health Survey for England, 2013; ONS, 2013a, 2013b). The illnesses and adverse health that unhealthy lifestyle choices and behaviours result in cost the NHS in excess of £6 billion each year (Boyce, Robertson, & Dixon, 2008), hence, encouraging the public to improve and maintain their health is believed to benefit health care providers by preserving resources. Given that these poor health behaviours can lead to an increase in the demand for health care services and that, conversely, positive health behaviours are cited as ways adults can proactively self-manage their health (to be discussed further throughout Chapters 1 and 2), health behaviours should be considered when exploring individuals' approaches to, and the factors associated with, health management.

The rising demand for health care services has highlighted the variation in the patterns of access to health care services and frequency of help-seeking across the population. Blame is sometimes attributed to certain groups within the population for over-consumption of health resources, with some groups labelled a burden on health care services (Payne, 2016). However, there is also the argument that health care services exist to provide professional health care to those that need it and therefore should be utilised. Delaying help-seeking or heath care avoidance could be detrimental to health and may also result in the need for more health care resources when help is finally accessed (Weissman, Stern, Fielding, & Epstein, 1991). Thus, it would seem that timely and appropriate access to health care services is what is required to benefit both the individual and allow health care providers to meet the needs of the population.

1.2 A brief overview of health management approaches

There are many ways in which an individual might manage their health; this is likely to depend on how they perceive their own health state and experience or anticipate any symptoms, how much they prioritise their health, the resources available to them and many other factors. This section will briefly discuss some of the common and more

frequently referenced approaches to managing health; it is these particular behaviours that will feature throughout this thesis. One of the ways in which individuals manage their health is health professional consultation, via the utilisation of health care services. This thesis will discuss two types of health care utilisation: consulting a professional in response to or regarding a particular health challenge and engagement in preventive health care, which includes attending screening procedures or routine health checks and engaging with immunisation programs. Another way individuals manage their health is through self-management, which will be defined below in section 1.2.2.

Within the literature, there is debate as to whether health care utilisation and self-management are contradictory or complementary approaches to managing one's health. It has been argued that the level of usage of health care resources is indicative of an individual's ability to self-manage their health, where more frequent access to services denotes less self-management (Ritter et al., 2001). However, this does not take into account the severity of the health needs of the individual and the level of support the individual feels they need from the professional. Furthermore, the reduction of usage of services is often used as a measure of success for self-management interventions, yet it is also said that encouraging patients to make use of available health care resources when needed is key to improving health outcomes (Pincus, Esther, DeWalt, & Callahan, 1998). The following section of this chapter will discuss both health care utilisation and self-management independently and then present the concept of collaborative health care in how both approaches can be used in an integrated model of health care.

1.2.1 Health care utilisation

In the UK, adults can access professional health care services via the NHS, where health care is provided free at the point of access. For many individuals, professional health care will be one of the primary ways in which they manage their health, by accessing services in pursuit of advice, treatment or preventive care. The NHS was first introduced in 1948 (Oliver et al., 2014), so the majority of adults residing in the UK will have grown up with access to free health care and many individuals may feel a right to access services having contributed to its funding via taxation.

Professional health care services are available to individuals for times when medical attention is required in response to a health challenge, for instance, if an individual experiences a particular health symptom they might contact their GP, or those with chronic conditions will often receive ongoing care from a number of health care providers. The NHS also provides preventive health care, which could be considered a means of managing one's health as it involves screening for risk factors or early signs of disease.

An example of this is health checks, where healthy individuals – who may have no current symptoms – are routinely screened for certain cardiovascular diseases and/or cancers (Labeit, Peinemann, & Baker, 2013). Adults in the UK are invited to attend health checks voluntarily, thus, in preventive medicine, access to health care depends on different motivation compared to, for example, visiting one's GP or seeking emergency health care.

However, despite the provision of theoretically unlimited access to services, there is tension between the availability of resources and the demand for care. The current health care system is modelled on treating acute illness (Holman & Lorig, 2004) and the health care needs associated with ageing and chronic illness present a challenge for health care providers as they result in increased primary care visits, hospital admissions and, ultimately, greater care costs (Glynn et al., 2011). It could be argued that the traditional model of health care delivery, whereby patients are passive consumers of health care services and resources, has fostered a culture of dependency, where patients lack both the motivation and the confidence to take responsibility for their health in the long term. In a policy document outlining and forecasting the structure and processes of the NHS for the next 10 years, it was concluded that the current model of health care delivery is in need of reform (PWC, 2013).

Some people seek professional health care 'prematurely', often due to a lack of confidence in understanding their symptoms, the perceived severity of symptoms and, subsequently, the need for reassurance from a health professional (Self Care Forum, 2014). These are all aspects that could potentially be altered by adequate information and support from health care services and professionals, to encourage timely help-seeking in the future. It is conceivable that if individuals were to have a better understanding of how best to navigate the health care system this would facilitate timely and appropriate access to services (Hibbard, Stockard, Mahoney, & Tusler, 2004; Kenning et al., 2015) and achieve what Rogers, Flowers, & Pencheon (1999) defined as 'optimal access': "providing the right service at the right time in the right place."

1.2.2 Health self-management

For the purpose of this project, heath self-management will be defined as: the health behaviours and everyday activities an individual undertakes to monitor and care for their own health by controlling or reducing the impact of an illness or of any adverse symptoms they may experience or anticipate (Arcury et al., 2012; Aujoulat, Marcolongo, Bonadiman, & Deccache, 2008; Clark & Dodge, 1999). Self-management in practice varies from person to person, depending on the health needs of the individual, their

characteristics and the environment from which they are able to draw resources; however the crucial element is the necessity for individuals to be active in managing their health and take responsibility (at least in part) for their care (Arcury et al., 2012). Conceptually, self-management of health differs from the traditional professional to patient model of health care delivery in its ability to be tailored to suit the needs of the individual (Lorig & Holman, 2003), as it is directed by the individual rather than a health professional. Self-management has previously been described in the literature as a spectrum of reactions to a health event or condition, ranging from denial and inaction to a proactive, focused and motivated response, however, this project will consider proactive measures taken intended to maintain wellbeing and improve health outcomes as self-management. As self-management ultimately refers to an individual's response to a diagnosis or health status (either past, current or potential), there is an inevitability of self-management (Lorig & Holman, 2003). The autonomous aspect of self-management infers that individuals are able to decide to take action or not in response to a health problem (Arcury et al., 2012). This idea suggests that there are varying degrees of self-management, ranging both in intention and effectiveness.

In practice, there are several approaches to self-management described in the literature. Complementary therapies, also referred to as complementary and alternative medicine (CAM), may be recommended by a professional or be entirely self-initiated, either way the individual is required to engage with in an intervention for the benefit of their health outside of the traditional model of health care delivery. Self-care practices include behaviours employed in response to a symptom, such as the use of non-prescribed medication (Arcury et al., 2012). Self-care practices may also refer to the management of chronic conditions, including adhering to a prescribed medication regime (Rockwell & Riegel, 2001) and also generally attending to one's wellbeing to maintain a good standard of health through the adoption of health promoting activities (Lorig & Holman, 2003). Individuals' approaches to self-managing their health is likely to depend on their health needs and available resources.

Self-management has been promoted by the NHS in accordance with their vision of patient-focused care and is a key feature within its strategic priorities (Department of Health, 2005). In a report outlining the proposed top ten priorities for health care commissioners, actively supporting health self-management was identified as the number one priority for commissioners, drawing the conclusion that self-management reduces the burden on health care services, makes cost savings, improves patient experience and, fundamentally, improves health outcomes (Naylor et al., 2013).

Similarly, the Department of Health (2007) called upon commissioners to encourage a culture where patients strive to independently maintain good health and wellbeing.

The large body of literature on self-management of chronic conditions highlights the importance of day-to-day care and the lifetime responsibility for patients managing a chronic condition (Lorig & Holman, 2003). Self-management of chronic conditions is often dependent on the diagnosis as the specific symptom profile and illness trajectory tends to dictate a required set of behaviours, thus, self-management priorities are generally determined by an individuals' diagnosis (Taylor et al., 2014). For example, patients with diabetes are often required to follow a demanding self-management routine, involving glucose monitoring and dietary management specific to diabetes (Bodenheimer, Lorig, Holman, & Grumbach, 2002). However, there is often a considerable overlap in the self-management requirements for a number of chronic conditions. For instance, heart failure patients are required to fully adhere to a prescribed medication regime, adhere to a recommended diet, maintain a level of physical activity, closely monitor and respond appropriately to their symptoms (Rockwell & Riegel, 2001), yet each of these behaviours is necessary for many other health conditions. Moreover, self-management practices are different for those who have chronic comorbidities compared to those who are managing one chronic condition, as different challenges arise from having simultaneously demanding health needs (Bayliss, Steiner, Fernald, Crane, & Main, 2003). This highlights the difficulties faced by the ageing population, many of whom are managing multiple conditions. Rockwell & Riegel (2001) proposed that chronic illness self-management is a learnt behaviour, as it includes strategies taught by health care professionals or may be a repertoire of techniques the individual has developed through years of experience of managing their condition. However, as the effectiveness of self-management can also vary within the individual, it is likely that there are additional influences explaining the variance in these behaviours over time.

The term self-management is sometimes used interchangeably with 'self-care', particularly in policy documents (Department of Health, 2009). However, some authors differentiate between self-management and self-care and definitions vary. Self-management may be used as a wider term to describe the measures taken by individuals with a health condition or illness to reduce the impact of the illness, including the use of professional health care services and self-directed care, whereas self-care is often used to refer to any preventative strategies or health behaviours demonstrated by individuals without illness to maintain well-being (Barlow, Wright, Sheasby, Turner & Hainsworth, 2002) and sometimes to refer to the self-initiated practices in response to health symptoms (Arcury et al., 2012). The variation in terms and definitions used in the existing

literature highlights an important consideration for future work in this area, in that terms used should be clearly defined and used consistently for the benefit of the reader and to maintain the focus of the research. This thesis will use the term 'self-management' to describe the self-initiated behaviours adopted by individuals to manage their health and this will encompass self-care practices.

Social and cultural differences in the particular approaches to self-management have been found, highlighting the contextual and environmental impact on the use of self-management behaviours. Despite the focus on individual responsibility for the management of one's health, the social setting is important for achieving effective self-management. Many individuals cite the importance of support from others, both in practical help with self-management practices and the wellbeing gained from social interaction (Berman & Iris, 1998). It has been noted that the effectiveness of self-management is often dependent on the context within which it is practiced, including both social and community networks and engagement with health care services (Gallant, 2003). Cultural differences have been observed in the use of non-conventional treatments to manage health concerns (Arcury et al., 2012), medication use (Martin, Badrick, Mathur, & Hull, 2012) and access to health care services (Adamson, Ben-Shlomo, Chaturvedi, & Donovan, 2003). Additionally, health beliefs and attitudes towards the self-management of health are formed over time within the context of social environment, previous experience with health care services and cultural beliefs (Berman & Iris, 1998).

Whilst most literature refers to the health self-management practiced by patients with chronic conditions (Lorig & Holman, 2003), self-management is increasingly a necessary approach to care for general health (Berman & Iris, 1998). There is a discrepancy in the literature on self-management and the reality of self-management, as whilst the majority of papers focus on chronic conditions, in practice, the majority of self-management involves general health care, most commonly for fatigue, feeling 'run down', headaches and joint pain (Self Care Forum, 2014).

1.2.2.1 Models of health self-management

There are a number of models intending to conceptualise health self-management. Some of the models of self-management take into consideration the structural and organisational elements of the health care system and their role in cultivating, facilitating and supporting self-management. Although most of the models of self-management are inspired by the models of health behaviour from the field of health psychology, the

models discussed in this thesis assess self-management in the context of chronic illness, whereas the models from health psychology are more generic.

The 'Self-Care Continuum' (Self Care Forum, 2014) portrays self-management as a linear scale, ranging from minor, more frequent health-related decisions (for example, dietary behaviours, the use of non-prescribed pain relief in response to an acute symptom) to more major events (such as receiving care for a major trauma), at which point the individual is unable to manage their health independently and will require input from health care professionals. The current framework for public health care services aims to support individuals/patients at every stage of this continuum (Self Care Forum, 2014). The Self-Care Continuum raises the issue that individuals need to acknowledge when is the appropriate time to seek professional help for an event nearer the major end of the spectrum. However, this model has no capacity to measure self-management and consequently has not been used in research, thus it is limited in its usefulness but is interesting to consider as a representation of the continuous and indeterminate nature of self-management.

The model of self-care in chronic illness (in which self-care is defined as behaviours used for health promotion, illness prevention and to manage symptoms) (Connelly, 1993) is based on the Health Beliefs Model (Rosenstock, 1974), a social cognition model that aims to predict health behaviours based on a number of cognitive variables (Norman & Conner, 1993). The model includes three components: predisposing variables (self-awareness, health motivations and perceptions of severity, susceptibility and efficacy), enabling variables (characteristics, psychological wellbeing, cues to action, social support) and self-care behaviours. Each of these components over-lap, demonstrating the mutual relationships and potential interactions between the various factors. The model's ability to identify the predictors of health self-management was tested by Rockwell & Riegel (2001), using an adapted model with a clinical population of heart failure patients. Whilst they concluded that only two predictor variables from the model significantly predicted self-management behaviours (education and symptom severity) this study did only test seven predictors (comorbidities, social support, social class, age and sex were found to be non-significant), which did not represent the full range of potential variables included in the original conceptual model. Although this model has had limited success in identifying some predictors of self-care behaviours, it lacks a temporal element and does not evaluate the effectiveness of self-care behaviour or consider health outcomes.

The Chronic Care Model (CCM) (Wagner et al., 2001) depicts the elements required at different levels to support individuals with chronic conditions. This model differs from the models from health psychology in that it represents health self-management as a component within a much larger system of health care and as an end-product of successful interactions between other networks and health care services. The model includes health care systems in place at an institutional level, with reference to the organisation of systems and delivery of health care, and the role of community support in facilitating self-management. Fundamentally, the CCM includes the key role of 'productive interactions' between the patient and health care provider in improving health outcomes. Although this model benefits from a wider approach to health care, by framing health self-management in a wider social context, including the provision of external resources and support from a societal and community level, it fails to consider the individual differences, at a personal level, in how and why someone might manage their health needs.

Another model of self-management described by Sallis, Owen, & Fisher (2008), depicting the relationships between organisational factors and support for self-management of diabetes (though equally relevant to other chronic conditions), begins by setting the individual within a context of family and peer support, cultural influences and ultimately a national or regional health framework. Within this context, the individual may then be supported by these external resources and services, which, in order to achieve effective self-management, need to be consistently maintained (Sallis et al., 2008). This model has the advantage of considering the social and cultural influences on self-management, but lacks a life course perspective, failing to consider the individual's prior experiences or exposures. Furthermore, it does not include the potential mediating factors that may be influenced by the social environment and have an impact on self-management, such as health beliefs and self-efficacy.

A more comprehensive model was developed by Moser & Watkins (2008) to demonstrate the factors affecting self-management in heart failure patients. This model includes the role of psychological and social factors (including psychological health, socioeconomic factors and perceived control), ageing-related factors (including cognition, physical functioning and comorbidities), current symptoms, health literacy and prior experiences (related to both health care services and symptoms) in influencing individuals' decision making and subsequent heart failure self-management. This model benefits from a life course perspective as it includes both health and socioeconomic factors from earlier adulthood, however it does not explore the inter-relatedness of these factors, potentially missing some of the pathways by which health and social experiences

and exposures throughout the life course interact to influence health and health management in later life.

The lack of multidimensional models, including life course perspectives and pathways, further demonstrates the limitations in the existing literature on self-management of health.

1.2.2.2 Self-management interventions

A number of self-management interventions have been developed over the last 40 years; many utilising concepts and targeting the explanatory variables from models of health behaviour prediction, such as self-efficacy, health beliefs and symptom perceptions. Self-management interventions are most often targeted at clinical populations with chronic conditions, either specific to a condition (such as such as arthritis (Long, Laurin, & Holman, 1984), asthma (Gibson et al., 2009; Pinnock et al., 2015) heart failure (Jovicic, Holroyd-Leduc, & Straus, 2006), chronic pain (Carnes et al., 2012) and chronic obstructive pulmonary disease (COPD) (Bourbeau, Nault, & Dang-Tan, 2004; Taylor et al., 2005)) or more generic programs for a range of diagnoses. Condition-specific interventions have been shown to be more effective than interventions developed for multiple conditions in meta-analyses (Taylor et al., 2014). More recently, however, self-management interventions and programs have been developed to be used by generic chronic clinical populations, including the Chronic Disease Self-Management Program (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001) and 'Self-Management for Life' and the 'Expert Patients Programme' (www.selfmanagementuk.org).

There are also several recent health campaigns to promote the self-management of general health, aiming to encourage the public to be attentive to their health and respond accordingly, by assessing whether symptoms may be managed independently before automatically referring to a health care professional. The 'Treat Yourself Better' campaign (www.treatyourselfbetter.co.uk) aims to deter people from consulting their GP for minor ailments, specifically to obtain antibiotics for cold and flu symptoms. The campaign aims to raise awareness of the nature and duration of cold and flu symptoms and provide advice for treating symptoms at home. Similarly, the Self-Care Forum (www.selfcareforum.org) advocates treatment for minor ailments, such as coughs and colds, at home, by ensuring a well-stocked supply of (non-prescribed) medicines and accessing local pharmacy services. NHS Choices (www.nhs.uk) is a website where individuals can access a 'health encyclopaedia', where they can search for information on a wide range of health symptoms, conditions and treatments, a symptom checker, that aims to assess whether symptoms need further medical attention or not, and a

catalogue of medication information. Healthtalk.org is a website offering a wide range of information regarding many different health concerns, with a focus on peer support, providing insight from individuals with relevant experience. The aim of all of these resources is to empower individuals with information regarding symptoms and health conditions, provide reassurance if needed and to deter individuals from using health care services prematurely or for minor illnesses.

Self-management interventions often operate by targeting modifiable predictors or influences of self-management. Self-management programs for chronic conditions often target patients' adaptation to their diagnosis/diagnoses by focusing on health beliefs and how an individual perceives their health and their illness (Sobel, 1995). Interventions all vary, however patient education and psychological support are two of the most frequently included components (Taylor et al., 2014). Interventions also teach patients to independently monitor their symptoms, about correct usage of prescribed medication and to judge when it is appropriate to seek professional help.

Patient education has been highlighted as a necessity for the care of chronic conditions in order to cultivate informed and engaged patient-status. Self-management education seeks to empower individuals by encouraging them to identify and address their health problems or potential problems using decision-making and problem-solving skills (Bodenheimer et al., 2002). Patient education is often used to promote health literacy, which describes the ability to access, understand and make use of health-related information (World Health Organisation, 1998). Health literacy is a focus of many self-management interventions (Kennedy et al., 2013; Long et al., 1984; Pal et al., 2013) and is often evaluated using patient knowledge and understanding as outcome measures. For patient knowledge to be used as a tool to empower patients, patients are required to employ self-efficacy. As such, patient self-efficacy is often also addressed in self-management education programs (Clark & Dodge, 1999; Kennedy et al., 2013; Lorig et al., 2008) as it is fundamental for achieving one's objectives (Bodenheimer et al., 2002).

Many interventions have reported benefits for patients, such as improved patient knowledge (Long et al., 1984), technical self-management skills (Bodenheimer et al., 2002), self-efficacy and health behaviours (Lorig et al., 2001) and reduced symptoms (Bodenheimer et al., 2002), pain (Lorig et al., 2001) and disability (Long et al., 1984). A systematic review of self-management interventions for chronic conditions concluded that interventions improved patients' knowledge, use of self-management behaviours and self-efficacy when compared to no intervention (Barlow et al., 2002). However, this review concluded that it was not possible to compare the methodologies of the studies,

due to inadequate descriptions, thus preventing the active elements in the interventions resulting in the change in behaviour from being identified. Further methodological issues were reported, including small sample sizes, failure to use intention-to-treat analyses and some studies with short follow up periods (eg, four months), which seems counter-intuitive to the long-term management of a chronic illness over an extended period of time. Methodological limitations were found in most of the COPD self-management interventions reviewed by Taylor et al. (2005) and a more recent review concluded that although there were associations with modest improvements in health outcomes for patients with diabetes, respiratory conditions, cardiovascular disease and mental health illnesses, poorer quality studies were more likely to report more positive results (Panagioti et al., 2014).

The reduction in the usage of health care resources has been cited as one of the fundamental targets of self-management for commissioners and health care providers (Naylor et al., 2013) and this is reflected in many of the interventions designed to improve self-management. Previous research has reported that self-management reduces visits to GPs, out-patient services (Long et al., 1984; Lorig et al., 2008), emergency care (Lorig et al., 2001) and hospital readmissions (Jovicic et al., 2006). Self-management interventions also generally aim to reduce passive reliance on health care professionals, hence many of the authors of these interventions represent effective self-management as the antithesis of health care utilisation, as such, a reduction in the use of services is often an outcome measure used in these intervention studies. For instance, a systematic review of self-management interventions for heart failure patients found that intensive, educational programs reduced readmission to hospital for both heart-related and all other complaints (Jovicic et al., 2006). Similarly, a systematic review of 15 studies assessing the benefits of self-management education for asthma patients reported that just over half of interventions demonstrated cost-savings as a result of a reduction in utilisation of health care resources (Bodenheimer et al., 2002). However, a systematic review assessing interventions across a range of chronic conditions concluded that reductions in health care utilisation were generally small and were strongest for cardiovascular and respiratory illness (Panagioti et al., 2014).

It could be argued that cost savings for health care providers should not be the main motivation for encouraging patients to engage in self-management, but the focus should be on health outcomes and improved patient experience and health-related quality of life. This aspect of the existing research continues to highlight the discrepancy between self-management and health care utilisation as means of managing one's health. Whilst it seems intrinsic to managing a chronic condition, health care utilisation is consistently

represented in the self-management literature as troublesome and as something to be discouraged.

1.3 Illness behaviour

Illness behaviours are defined as "*the varying ways individuals respond to bodily indications, how they monitor internal states, define and interpret symptoms, make attributions, take remedial actions and utilise various sources of informal and formal care*" (Mechanic, 1995) and "*the way in which symptoms are perceived, evaluated and acted upon by a person who recognises some pain, discomfort or other signs of organic malfunction*" (Mechanic & Volkart, 1961). These definitions overlap with the definition of self-management described in section 1.2.2 and include health care utilisation as another potential way in which individuals might respond to a health event or challenge. The concept of illness behaviour also includes responding to symptoms by doing nothing (Mechanic, 1962). It also addresses the ways in which those individuals who have comparable symptoms respond differently to symptoms, in how they perceive their health and utilise professional health care services (Mechanic, 1995). However, where the literature around illness behaviour differs to the idea of health management (the focus of this thesis), is that illness behaviour requires an adverse health event (eg, symptoms or illness), whereas self-management can apply to asymptomatic individuals, in that they can manage their general health in order to maintain good health.

The study of illness behaviour identifies many of the different ways in which individuals respond to symptoms, including use of professional services, use of lay and social networks and doing nothing. The illness behaviour literature addresses factors other than the presence or absence of symptoms that influence health care utilisation, such as social and psychological factors (Campbell & Roland, 1996). Most individuals only consult a professional regarding symptoms after having discussed their symptoms with friends and/or family first (Blane, Power, & Bartley, 1996), suggesting that the influence of the social network can affect illness behaviour and the ways in which people manage their health.

Whilst self-management interventions often seek to reduce contact with health care professionals, the 'illness iceberg' phenomenon refers to the fact that the majority of poor health does not reach medical attention (Hannay, 1980). Using data from clinical populations to estimate the prevalence of a number of health conditions in the average community, it has been hypothesised that GPs are aware of only the 'tip of the iceberg of disease' (Last & Adelaide, 2013). This literature argues that the majority of individuals

do not seek professional help for the symptoms they experience; they in fact do nothing, at least for a period of time. It is generally assumed that patients go from being asymptomatic to experiencing symptoms and then consult a professional, however research shows that patients are rarely asymptomatic (Zola, 1973), but at any given time many people have a number of symptoms that they tolerate. Thus, it has been suggested that patients 'accommodate' their symptoms for a length of time before seeking professional help. Based on the assumption that most individuals have symptoms, yet some choose to seek professional help whereas others do not, it is conceivable that there are many factors that influence the likelihood of health care utilisation. The existing research exploring this will be discussed in Chapter 2.

Campbell & Roland (1996) presented a conceptual framework demonstrating the steps between the onset of symptoms and seeking professional help. These steps include individuals' perception of susceptibility and severity and the costs and benefits of seeking help, how the illness progresses and responds to self-care, social support and the use of lay advice, patient's knowledge and experience of the illness and any actual or perceived barriers to receiving care. This model of illness behaviour attempts to highlight the processes individuals experience in predicting the likelihood of health care utilisation. However, as a model, it is relevant only to people with and responding to symptoms, reflecting the illness behaviour literature.

Illness behaviours are influenced by sex (Mechanic, 1976). There are several potential reasons for this, including the possibilities that women may perceive more symptoms than men or may be more likely to report symptoms than men, or that some health care services are often sex focused and are more targeted at women (eg, family planning). Conversely, Hannay (1980) reported that women were more likely to be part of the symptom iceberg, meaning that they experience serious symptoms and do not consult a professional. This highlights the difference between men and women's health experiences and this may ultimately influence how they manage their health.

The literature also refers to the many cultural elements of illness behaviour. The cultural and social groups to which an individual belongs influence how symptoms are perceived and presented to health care professionals (Blane et al., 1996). Cultural influences on how symptoms are appraised include how common the symptom is within a certain culture and whether it is considered unusual or not and also how symptoms fit "within a society's major values" (Zola, 1966). Again, the cultural element of illness perceptions and behaviours is relevant to the sex differences in health experience and management.

Particularly with regard to women's reproductive health, there are many cultural differences in how women's health is perceived.

1.4 An integrated approach to health management

As the usage of primary health care services increases, particularly emergency care (The King's Fund, 2015) and general practice (Health & Social Care Information Centre, 2007), patient self-management has been proposed as a solution to address the gap between the ever-growing health care needs of the public and the over-burdened health care system's capacity to meet these needs (Barlow et al., 2002). It is argued that it is no longer feasible to wholly rely on health care providers to address every aspect of one's health needs and that patients should expect to become their own principle care givers (Holman & Lorig, 2004). This requires a movement away from the traditional practice of doctor-led health care delivery where patients are expected to be inactive, compliant and lacking in autonomy. Oliver et al. (2014) proposed the need for 'integrated care', where the individual is supported by health care professionals to take more responsibility for their own health and wellbeing and the focus is as much on maintaining wellbeing as it is on reactively treating and managing illness. Literature and policy documents began to focus on self-management as a part of integrated care in the 1980s, attempting to move away from the consumerist perception of health care utilisation (Gallant, 2003), however, given that access to primary health care services is continuing at a rate that the NHS is not able to accommodate comfortably (Smith, McKeon, Blunt, & Edwards, 2014) self-management is clearly not being adopted universally and practised to its full potential and this notion of collaborative care is not yet the norm.

The prominence of the biomedical model in defining a model of healthcare delivery has meant that in recent years 'health care' has mainly referred to access to and engagement with professional services and resources (Pincus et al., 1998), with other methods of attending to one's health being labelled as 'complementary' or 'alternative'. This has led to a complex and confusing portrayal of the relationship between health care utilisation and self-management. Collaborative care between the patient and health care professional has previously been championed as the most effective model of health care delivery, reaping the benefits of the individual's knowledge of their own care preferences and experiences with different treatments and the professional's medical expertise (Bodenheimer et al., 2002). Individual differences also play a role in moderating the relationships between health care utilisation, self-management and health outcomes, as some patients benefit greatly from minimal medical input whilst others are more reliant on professional services (Pincus et al., 1998). Whilst many campaigns and interventions,

as discussed earlier in section 1.2.2, encourage people either to self-manage their health or, in some cases, to go to the doctor (for instance, in response to a symptom/set of symptoms, rather than delay help-seeking), most health professionals would agree that optimal health outcomes result from both the input of professionals and the proactivity of the individual.

With growing concern over the over-use of health care services, many resources have been made available to the public in an attempt to provide individuals with health-related knowledge, empower individuals to monitor and manage their health and, ultimately, to buffer immediate and unnecessary access to primary care services. The term 'expert patient' has been coined to describe patients who are equipped with the knowledge, skills and awareness and who have the confidence to manage their health in partnership with health care professionals (Shaw & Baker, 2004).

However, not only does collaborative health care depend on the proactivity of the patient, health care providers need to be on board too. In order to realise a 'shared responsibility' model of health care delivery, professionals are being urged to improve communication with patients and supply adequate information in order to empower patients to become involved in the decisions surrounding their care (Heisler, Bouknight, Hayward, Smith, & Kerr, 2002). Collaborative health care results from shared decision-making, which needs to be promoted and facilitated at an organisational level if effective health self-management is to be supported and achieved (Taylor et al., 2014).

Health care providers are encouraged to motivate patients to take ownership of their health and make reasonable judgements on accessing services, utilising resources and delivering self-care. This involves a shift from dealing with passive, compliant patients to co-operating with informed, motivated and assertive patients, and subsequently some health care professionals have expressed concern about empowering patients to take an active role in their treatment (Shaw & Baker, 2004). It could be a concern that empowering patients may undermine the expertise of the professionals. The Department of Health (2005) has identified several potential risks for self-management, including patient safety regarding the appropriateness of self-care and the equality of access to resources, due to the availability of local services, lack of both social and professional support and barriers including poverty and poor housing. This highlights the necessity of a collaborative relationship between the patient and health care provider whereby a balance between professional support and self-care can be aimed for. Holman & Lorig (2000) summarised this balance by describing the ideal partnership between patient and

professional benefitting from both the expertise of the professional and personal experience of the patient.

The complementary nature of self-management and health care utilisation is promoted in the care of chronic conditions, where the patient is the primary manager of the day-to-day care of symptoms and health needs and the health care professional's role is to provide medical expertise and support (Bodenheimer et al., 2002). Hence, self-management and effective clinical care are dependent on each other. It is this interaction between appropriate health care usage and effective self-management that has been highlighted as the key to optimal health outcomes for patients with chronic conditions, which depends on a cohesion of supportive and dynamic health care professionals and an engaged, informed patient (Bodenheimer et al., 2002).

Whilst much of the literature focuses on the impact of self-management, particularly self-management interventions, on reducing health care utilisation, there is a less academic literature on the complementary usage of health care resources and self-management. This gap in the literature needs to be addressed, as much of the recent policy documentation focuses on the need for collaborative partnerships between patients and professionals. Health care providers have been presented with the challenge of developing effective tools to facilitate self-management (Leyden Academy, 2013) which requires an understanding of how patient self-management can be introduced, facilitated, supported and maintained. Therefore, further exploratory research is required to gain a better understanding of self-management and the mechanisms behind approaches to managing health.

1.5 Life course approach to self-management

The study of life course epidemiology focuses on the long-term impact of exposures and experiences in childhood, adolescence and adulthood on later health and wellbeing (Kuh, Ben-Shlomo, Lynch, Hallqvist, & Power, 2003). There is growing evidence from birth cohort and other longitudinal studies that biomedical, behavioural and social factors across life affect adult health (Ben-Shlomo, Cooper, & Kuh, 2016; Kuh & Ben-Shlomo, 2004). However, there have been far fewer studies that take a life course or even longitudinal approach to health management, and the scarcity of evidence is reflected in policies and reports. A life course approach may be particularly relevant to the study of health management, given that many health beliefs and lifestyle factors, all fundamental to the management of health, may be influenced by childhood factors, various exposures from within an environmental context, socioeconomic demographics and events from

across adulthood (Case, Fertig, & Paxson, 2005; Richards, Stephen, & Mishra, 2010; Wadsworth & Kuh, 1997). Furthermore, as pointed out by Rockwell & Riegel (2001) self-management in a learnt behaviour, the product of years of experience of management an illness. The various pathways by which childhood and earlier adulthood social and health factors might influence how an individual manages their health are to be discussed further in Chapter 2.

The argument for a life course approach is even stronger when exploring the management of women's health, which is a key part of this thesis. The management of women's health merits further research as women generally have different heath care needs and experiences to men and therefore management approaches utilised are often specific to women. The study of women's health benefits from a life course approach as women experience certain health challenges (eg, menarche, childbearing, menopause) at multiple life stages (puberty, reproductive years, the menopausal transition) (Royal College of Obstetricians and Gynaecologists, 2011).

There is a clear rationale for further research into health management using a life course perspective, including both how individuals manage their health across the life course and the exploration of how health and social factors from across the life course might influence health management in later life. The life course approach may be useful in explaining the variation in health management, both within and between individuals, as it proposes that health in later life is influenced by the interaction between, and the cumulative effect of, certain biological and social factors (Wadsworth & Kuh, 1997). This may explain social and cultural differences in health management and certain health behaviours, including the individual differences in perceiving and managing symptoms or health conditions and the variation in the use of health management approaches at different life stages. Mechanic (1995) argued that illness behaviour is a "*longitudinal process*" that is influenced by personal and social factors and that epidemiological research methods are necessary to identify the "*multifactorial determinants*" of varying responses to symptoms and illnesses.

Context is a key concept from the life course approach which is particularly relevant to the study of health management as it highlights the role of social and environmental influences at a given point in time. Contextual factors impact both the likelihood of various exposures and the individual's behavioural response to particular exposures (Kuh et al., 2003) and these are likely to vary across the life course.

Chronological ageing is also likely to have a significant influence on health management throughout the life course, for several potential reasons. Comorbid chronic conditions

are more prevalent in older adults, with 25% of adults aged over 60 reporting at least two chronic conditions (General Lifestyle Survey 2009, cited in Department of Health (2012)). Those of more advanced age may carry a greater burden of health care needs and managing multiple conditions presents many barriers to effective self-management (Bayliss et al., 2003). Various age-related social constraints may hinder older adults' ability or motivation to access services or to self-manage their health, particularly the external resources used to support self-management, such as social support and ease of access to health care resources and supplies, which are said to decline in older age (Steverink, Lindenberg, & Slaets, 2005).

The cumulative burden of certain life events, life stressors and worsening health status may hinder one's capacity to adopt or maintain effective self-management behaviours. Those with more risk accumulation (Kuh et al., 2003) may have greater need to engage with professional services and long-term self-management for a given symptom or condition. In later life many adults experience minor health ailments, but cumulatively these minor health care needs can present a significant hindrance to quality of life (Oliver et al., 2014), demonstrating the need for long-term care of interacting, accumulative health needs. This presents the potential for a divergence between the increasing need for effective self-management and the diminishing capacity for ongoing self-management, which is likely to become more pronounced with age.

Although there is minimal literature specifically on management of health in context of the life course, there is a body of evidence demonstrating the range and role of health behaviours over the life course. The life course perspective has been used for understanding and portraying the trajectory for certain health behaviours. Epidemiological models of the pathways between childhood factors and adulthood health behaviours (Mishra, Ben-Shlomo, & Kuh, 2010; Schooling & Kuh, 2002) portray the potential mechanisms by which this association might operate. This research will be discussed in more detail in Chapter 2. Moreover, the influence of the social environment on health behaviours persists throughout the life course. An individual's profile of health behaviours typically includes those that appear at specific life stages, such as smoking and alcohol consumption, which are typically established in adolescence or early adulthood, and those that are formed in childhood, such as diet and exercise. These behaviours may be normalised within a social context at each relevant stage in the life course (Umberson, Crosnoe, & Reczek, 2010). This may include positive health behaviours, such as maintaining a healthy weight or attending screening programmes, and health risk-behaviours, such as excessive alcohol consumption or smoking.

Adult health behaviours are also influenced by the transitions in adulthood, including marriage, childbirth and parenthood and employment stages (eg, education, training, retirement) (Mishra et al., 2010). One example of this is seen in old age, when loneliness and isolation are more prevalent (possibly due to retirement or spousal bereavement), positive health behaviours decrease, particularly in men (Dean, 1989).

'Behavioural capital' appears in the life course framework of health behaviours (Schooling & Kuh, 2002), which refers to the repertoire of skills and competencies acquired throughout the life course that may be used to navigate through the many health events and challenges an individual faces. The accumulation of attributes such as coping, problem-solving and decision-making may influence an individual's likelihood of choosing and adopting positive health behaviours (Schooling & Kuh, 2002).

The majority of the existing literature does not consider early-life factors associated with individuals' approaches to managing health, thereby neglecting the pathways that operate throughout the life course that might increase an individual's aptitude or motivation to effectively manage their health. Without a proper understanding of both why and how individuals respond to the various health challenges they are faced with over the life course, health care providers may struggle to support self-management in the most efficient and effective way, thus preventing collaborative health care. This disjointed body of research would benefit from a broader approach to assessing how individuals manage their health and how this is influenced by various exposures, experiences and influencers from across the life course.

1.6 Summary

The existing literature on health management is not wholly conclusive for several reasons. The literature that aims to identify the predictors of health self-management describes health care utilisation as an alternative outcome, discounting the idea that self-management and health care utilisation can be complementary, as in the model of health care recommended by recent policy documents. Furthermore, a contrast is often drawn in the literature between the self-management of general health and of chronic illnesses. It has been suggested that there is not such a rigid dichotomy between the two behaviours (Self Care Forum, 2014) and this would intuitively seem to be the more helpful model for health care providers with which to encourage self-management, thereby supporting self-management in all populations, not simply those with chronic conditions. This approach is more likely to embed the concept and practice of self-management in the health care framework, by making it relevant to all.

Further research is needed to assess a holistic approach to health management, incorporating at least more than one of the options individuals have as means of managing their health. A life course approach is necessary to fully explore the health and social predictors of different health management approaches, including both childhood and adulthood. There is also a gap in the research that needs to be addressed in investigating how individuals manage their health throughout the life course and whether or not people are consistent in their approach to managing their health at different life stages, or if this is something that varies or fluctuates as we age.

These are ideas that will be discussed throughout this thesis, where forms of health management will be assessed using a life course perspective to also identify the factors associated with health management at different stages throughout adulthood. This thesis will consider health professional consultation for various symptoms and health conditions, thus measuring 'reactive' health management through the use of health care utilisation, self-management of symptoms and general health and engagement with routine health checks in later life, an indicator of preventive health management. These areas of health management were selected to be investigated further in this thesis as they represent different approaches to health management, as discussed throughout this chapter, utilised as means of improving or maintaining health and wellbeing. To undertake this research, data were used from the rich archive of the MRC National Survey of Health and Development (NSHD), the oldest of the British birth cohort studies (Kuh et al., 2011, 2016; Wadsworth, Kuh, Richards, & Hardy, 2006). The NSHD, described in Chapter 3, serves as a valuable dataset for this area of research as it provides both these measures of health management, with which health management for different health challenges and at different stages of adult life can be compared, and measures of many of the factors that are likely to be associated with health management, including health and social factors from childhood and adulthood.

The next chapter will present a conceptual framework of the health and social factors potentially associated with health management and the pathways by which they might operate. It will also discuss some of the literature supporting these factors and their possible association with health management, with the aim of informing the hypotheses to be tested in this thesis. Chapter 3 will present the PhD aim, objectives and hypotheses as well as describing the data and measures used in this thesis. The results will be presented in Chapters 4 (health professional consultation at age 43), 5 (women's management of health in midlife), 6 (health check attendance in later life) and 7 (health management across the life course). Finally, Chapter 8 will include an overall discussion of the thesis.

2 Literature Review

2.1 Introduction

Health management was operationalised in this thesis as the response to a health challenge and will be studied in the oldest British birth cohort study, the MRC National Survey of Health and Development (NSHD; described in Chapter 3). The health challenges to be studied include health symptoms experienced by men and women in early adult life and by women in midlife; the responses to these challenges will distinguish between consultations with a health care professional, self- management, both or neither of these responses. In addition, how participants try to maintain their health as they age and their uptake of health checks in later life will also be investigated.

As described in Chapter 1, a life course approach suggests that adult health management, and factors that influence adult health management (such as health beliefs, health behaviours and other lifestyle factors), may be influenced by exposures from earlier in the life course. This chapter reviews the literature that describes some of the associations between exposures from childhood and adulthood and the approach individuals take to managing their health in mid to late adulthood. The exposures discussed in this chapter are not the only factors likely to be associated with health management in adulthood but were selected as the most salient health and social factors mentioned in the literature and measurable in NSHD data. Childhood exposures considered are childhood serious illness resulting in hospital admission, social class and adolescent self-organisation. Adult experiences or exposures considered are socioeconomic position (SEP) (measured by educational attainment and adult social class), health in adulthood, health care utilisation, health behaviours, personality, health beliefs/attitudes and family circumstances. This literature review will inform the development of a life course model of health management which will form the basis of this thesis.

2.1.1 Methods

The literature review for this thesis aimed to identify and explore the factors associated with health management. Health management was operationalised as health professional consultation, health self-management and engagement with preventive care health (including screening attendance). These are health management approaches (a) frequently referred to in policy related documents and grey literature and (b) measurable in NSHD; these behaviours will be collectively referred to as health management throughout this literature review from hereon in. As it was anticipated that

this literature review would identify many possible associations and pathways between the various explanatory variables and the different approaches to managing health, a systematic review for each of these associations and pathways was not feasible.

The literature review not only aimed to assess the existing literature describing direct associations between health and social factors from childhood and adulthood and health management but also included some of the literature that demonstrated some of the potential pathways by which these factors may be associated with health management. Many of these pathways were inferred from previous life course models of health and health behaviour (Kuh, Power, Blane, & Bartley, 2004; Mishra et al., 2010; Schooling & Kuh, 2002). An example of this is the potential pathway between childhood social class, adulthood social class and health management, although there are many more pathways that could be inferred from previous life course models. Although there is a gap in the literature base, as previous life course models did not demonstrate pathways between health and social factors and health management, they illustrated associations between various determinants health related outcomes. When there was to evidence to suggest that health outcomes identified in these models might be associated with health management (eg, adult health (see section 2.3.2) and health behaviours (see section 2.3.4)), the determinants of these factors where considered as potential contributory factors and possible pathways were explored further in the literature.

Initially, as the literature search set out to identify the health and social factors associated with health management reported in the literature, the search was broad and the terms "health care utilisation", "primary care", "GP consultation", "health self-management", "health check attendance" and "screening attendance" were used to explore the literature relating to these fields. Search terms were entered into PubMed and OvidSP, as a database interface to search MedLine, Embase, PsycArticles and PsycInfo.

Although a wide range of factors are likely to be associated with health management, health and social factors (a) measurable in NSHD and (b) conceivably associated with health management as a health outcome, informed by previous life course models, were selected as exposures of interest for the literature review.

As identified in Dahlgren & Whitehead's (1991) model of the main determinants of health, there are both general, 'higher level' (ie, at the general socioeconomic, cultural and environmental level) factors associated with health and individual determinants related to lifestyle. However, as many of the factors identified at the general, socioeconomic/cultural level, including living and working conditions at a national level, were generally not available in NSHD, the review did not focus on these factors and

focused instead on factors that were measured at an individual level, including socioeconomic circumstances, health related experiences and lifestyle behaviours.

Factors that were hypothesised to be associated with health management were included in the search terms using Boolean operators ("AND", "OR"), for example, "education" "AND" "health care utilisation". As emergent themes became apparent through the literature (for instance, if recurring correlates of particular health management approaches were noted), the search terms became narrower, for example, "education" "AND" "menopause" "AND" "GP consultation". Many references included in the literature review were sourced from papers within which they were cited, thus employing a 'snowballing' approach to searching for literature.

Where possible, systematic reviews were sourced as existing peer-reviewed appraisals of relevant literature describing associations between health and social factors from childhood and adulthood and either other factors on potential pathways between exposures and health management or directly with health management outcomes. Such papers were identified either from the reference lists of previously identified papers or by including "systematic review" in the search terms (eg, "social class" "AND" "health behaviours" "AND" "systematic review").

All studies were critically appraised as they were read, and where methodological flaws or limitations were identified, these were considered in the literature review. Studies and systematic reviews judged to be of reasonable quality (ie, adequate sample sizes, thorough description of methods and analytical processes, robust interpretation of findings) were included in the review if they demonstrated support for or against direct or indirect associations between a health and social exposure from childhood or adulthood and a particular health management approach.

Results of included studies were collated by the exposure described in relation to health management and discussed collectively in terms of support for and against an association with health management or a pathway through which an association might operate. Health and social factors for which there was support for an association with health management, either directly or on a pathway, were included in a conceptual model.

Both the associations and pathways highlighted in the literature review and consideration of the measures available in NSHD were used to develop a conceptual framework for the factors associated with health management using a life course approach. Factors that were salient in the literature as correlates of one or more health management approach were confirmed as available in NSHD data and included in the model. This

framework was used to inform the analytical approach taken in this thesis, that is, the hypotheses that were formed (described in Chapter 3) and the associations and pathways that were tested in Chapters 4, 5 and 6.

2.1.2A life course model of health management

The literature identifies several health and social factors from childhood and adulthood which are likely to influence individuals' management of health when faced with certain health challenges. Some of the most commonly cited exposures (those discussed throughout this chapter in the literature review) were included in a life course model of health management, which aims to demonstrate the pathways by which childhood and adult health and social factors may be associated with health management in adulthood (Figure 2.1).
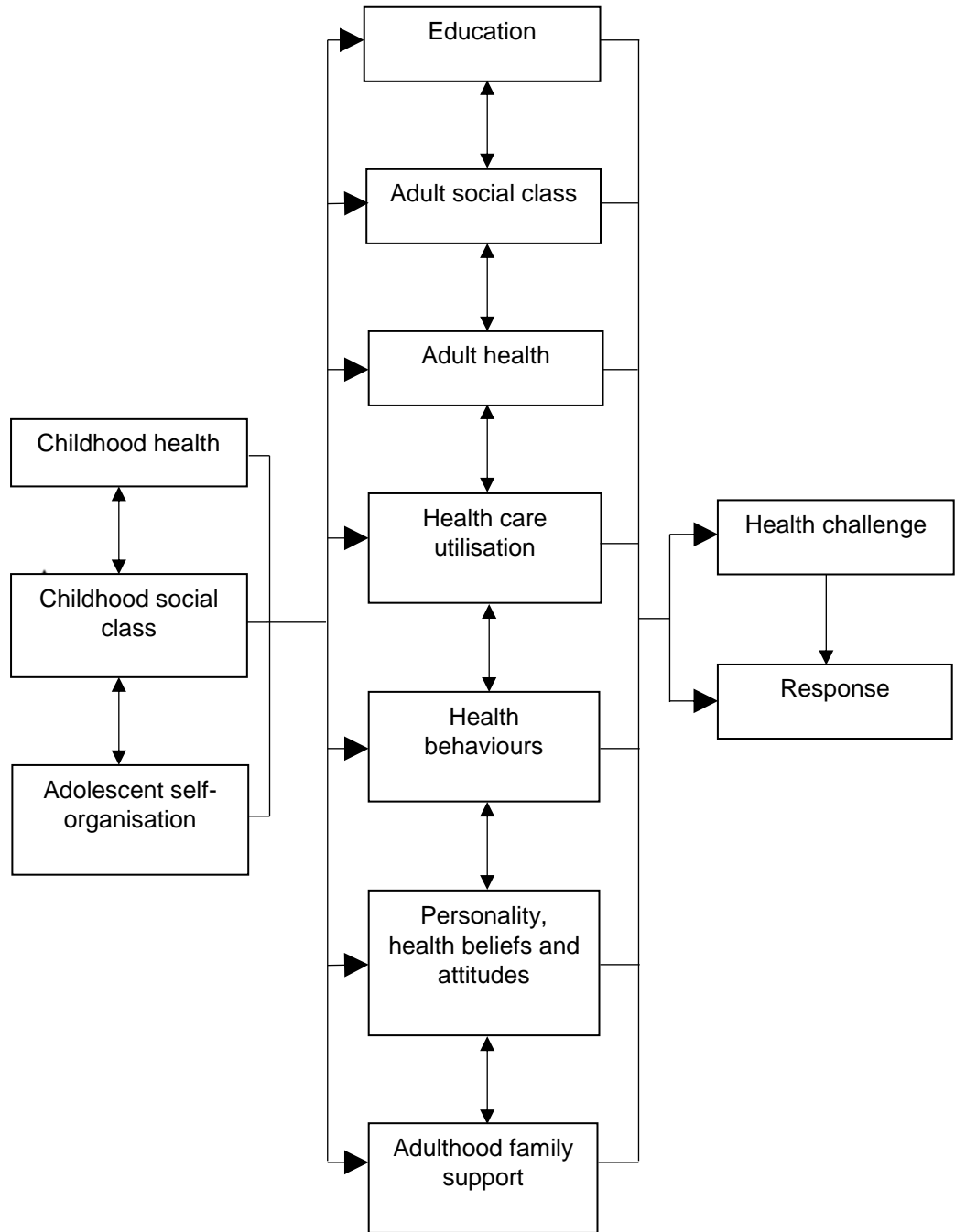
Figure 2.1 A life course model of the health and social factors associated with health management

The sections that follow first discuss the evidence for associations between the selected exposure and adult health management and/or health care utilisation and then consider some of the mechanisms by which any associations may operate.

2.2 The role of childhood factors and adult health management

2.2.1 Childhood health and adult health management

There is a lack of literature exploring the associations between childhood health and adult health management, although previous research has shown that poor childhood health is associated with more frequent utilisation of child health care services. In a cross-sectional study of N=6648 children in England, those who had either short-term or chronic illnesses were more likely to have recently accessed GP services or hospital services, either as an inpatient or an outpatient, compared to children without reported illness (Saxena, Eliahoo, & Majeed, 2002). Although this result is unsurprising, as children with poor health are likely to be presented to professional services by the adults with responsibility for their care, it is possible that early, more frequent exposure to health care services may influence help-seeking behaviour in adulthood. Research using longitudinal data would be able to assess whether or not this pattern is maintained into adulthood, addressing a gap in the current literature.

2.2.1.1 Pathways between childhood health and adult health management

2.2.1.1.1 Health related pathways

If childhood health is associated with adult health management, this could operate via a number of pathways. For example, the associations between childhood and adulthood health are likely to form part of a pathway between childhood health and health management in adulthood. In NSHD there are many examples: poor childhood health and low birthweight and short height (indicators of poor health (Hardy, Wadsworth, Langenberg, & Kuh, 2004a; Kuh & Ben-Shlomo, 1997)) have been associated with increased blood pressure (Hardy et al., 2004), worse grip strength (a predictor of disability and morbidity (Rantanen et al., 1999, 2003)) (Kuh et al., 2006), respiratory problems (Mann, Wadsworth, & Colley, 1992) and an overall measure of poor adult health (Kuh & Wadsworth, 1993).

In a younger British birth cohort study, the National Child Development Study (NCDS), benefitting from a large sample size and longitudinal data on health, childhood health -

particularly chronic conditions reported at age 16 - was found to be associated with self-reported health at age 42 (Case et al., 2005). Chronic conditions that persisted throughout childhood were associated with worse self-rated health in adulthood. Although it may be expected that chronic conditions in childhood, that are inherently long-term, could have a lasting impact on an individual's health in adulthood, the relationship between childhood and adulthood health is worth considering as a potential component of the pathway between health across the life course and health management in adulthood. Haas (2008) wrote of the "long arm of childhood health", referring to associations between poor childhood health and adverse health trajectories in adulthood. Using data from the Health and Retirement Study (HRS), Haas (2008) reported that individuals who had 'excellent' childhood health had fewer functional limitations in later life than those with 'poor' health in childhood, after controlling for childhood social class.

2.2.1.1.2 Socioeconomic pathways

The association between childhood health and health management in adulthood may also be partly explained by socioeconomic circumstances throughout the life course. Findings from NSHD have shown that childhood health is strongly correlated with childhood SEP (Wadsworth & Kuh, 1997); such evidence could support the hypothesis that an association between childhood health and adult health management may be explained by socioeconomic and behavioural factors (links between childhood SEP and health management will be discussed in section 2.2.2). Moreover, there is consistent literature reporting associations between worse childhood health and lower SEP in adulthood (the association between adult SEP and health management will be discussed in section 2.3.1). An association was reported between poorer health both at age 7 and age 16 and lower social class at age 42 in men in the NCDS (Case et al., 2005). The authors also reported that poorer health at age 7 was more strongly associated with worse educational attainment than poorer health at age 16 was, demonstrating the cumulative detrimental effect poor health in childhood has upon socioeconomic factors in adulthood. In the same cohort, poor health in early adulthood predicted downward social mobility (Power, Matthews, & Manor, 1996). These studies justify further exploration of the pathways between childhood health and adult health management using a life course approach.

2.2.2 Childhood socioeconomic position and adult health management

2.2.2.1 Childhood SEP and health care utilisation

In this thesis, childhood social class will be used as a measure of childhood socioeconomic position (SEP). A limited amount of research has investigated the associations between childhood SEP and adult health management or health care utilisation.

There are a small number of studies assessing the association between SEP and health care utilisation in childhood (which might influence health care utilisation in later life); however, results are mixed. A cross-sectional study using data from the 1999 Health Survey for England (Saxena et al., 2002) found no association between social class and the use of health care services (including GP services and access to hospital services either as an inpatient or outpatient) in a sample of children and young adults (up to the age of 20). Although this study lacks a longitudinal approach, it reflects the lack of relationship between childhood social class and health care utilisation which may or may not transfer into adulthood.

One study reported an association between childhood SEP and hospital admissions. The longitudinal study, which followed children for the first 10 years of life, using linked routine data, reported that children from a lower social class were more likely to be admitted to hospital and remain an inpatient for more days than children from the highest social class, after adjusting for factors relating to childbirth and maternal health (Petrou & Kupek, 2005). This study suggests that a link between social class and health care utilisation is apparent in childhood, hence it is possible that this association could persist into adulthood but early exposure to professional health care services may also influence later health management approaches. Furthermore, evidence was found for the effect of SEP in childhood on children's attendance to preventive health care services and health professional consultation. In a study of N=68,366 children, low SEP was associated with a lower likelihood of consulting a professional in families where children were not attending preventive health care services, which included general health check-ups and immunisations (Martensson et al., 2012).

Childhood SEP has also been associated with health care utilisation in adulthood, although the evidence is limited. In a retrospective study of participants who grew up in a deprived area of the UK, those who lived in rented accommodation as a child (this was used as a marker of social disadvantage), visited their GP more often in adulthood (Lindsay, 2009); this study suggested that this association might operate through lower

health locus of control, in that those from a lower SEP felt as they had lower personal control over their health. However, this study did not consider social mobility throughout the life course and only included childhood SEP as a predictor of health management, without considering the possible pathways.

2.2.2.2 Pathways between childhood SEP and adult health management

Childhood SEP could be associated with adult health management through many of the other adult health and social factors shown in Figure 2.1. As the literature is vast, a selection of recent studies and systematic reviews will be discussed below to illustrate these associations.

2.2.2.2.1 Socioeconomic pathways

There is strong evidence for associations between childhood and adulthood SEP (as represented by education and adult social class in Figure 2.1). For example, findings from the NCDS showed that coming from a family with a higher household income as a child was associated with socioeconomic advantage in adulthood, as indicated by higher educational attainment, even after adjusting for parental education (Case et al., 2005), demonstrating the role of childhood environment in predicting socioeconomic outcomes in adulthood. These results have been supported by other research, including research from NSHD (Kuh, Power, Blane, & Bartley, 2004) and from another longitudinal study (the Midspan family study) that reported that individuals whose father was from a manual working class had lower levels of education themselves (Hart, Mcconnachie, Upton, & Watt, 2008).

2.2.2.2.2 Health related pathways

Childhood SEP is often described in the literature as a predictor of health in adulthood which in turn could influence health management. There are a number of health-related pathways that might contribute to an association between childhood SEP and health management in adulthood. (It is worth noting that research from the 20th century predominantly uses father's occupational grade to capture childhood SEP.) As presented in a model of the pathways between childhood and adulthood health in Kuh et al. (2004), childhood social class influences adulthood social class (both directly and indirectly via educational attainment) (discussed further in section 2.3.1) and the socioeconomic environment in adulthood affects health outcomes through adult health behaviours and underlying biological mechanisms; in addition, childhood SEP may affect adult health through its influence on childhood growth, development and the initiation of health behaviours.

The literature consistently reports associations between childhood SEP and adult health, in terms of adult cardiometabolic and cardiovascular disease (Brunner, Shipley, Blane, Davey Smith, & Marmot, 1999; Clark, DesMeules, Luo, Duncan, & Wielgosz, 2009; Howe et al., 2010; Jones et al., 2015), obesity (Hart et al., 2008; Power et al., 2005a), lung function and respiratory disease (Galobardes, Lynch, & Davey Smith, 2004; Mann et al., 1992; Ramsay, Whincup, Lennon, Morris, & Wannamethee, 2011) and certain cancers (Davey Smith, Hart, Blane, & Hole, 1998; Galobardes et al., 2004). Childhood SEP has also been associated with adult self-rated health. Case et al. (2005) also reported that a more disadvantaged childhood social class was associated with a higher likelihood of being in poor or fair health at age 42 and that accounting for father's social class and educational attainment explained nearly 20% of the variance in a multiply adjusted model of life course predictors of adult health in the NCDS.

The association between childhood SEP and adult health is likely to be explained by a number of alternative pathways. Results from NSHD also illustrated the need to consider different mechanisms contributing to the associations between childhood social class and adult health outcomes; Mishra, Black, Stafford, Cooper & Kuh (2014) reported that associations found between father's social class and physical health (as measured by the physical functioning scale of the SF36,) at age 60-64 were explained by other adult health and social factors, including adult SEP, health and health behaviours.

There is a large body of literature describing the association between childhood socioeconomic circumstances and adult health behaviours (also shown in the chain of risk life course model (Kuh et al., 2004)), which may contribute to the pathway between childhood SEP and adult health management. There is consistent support for an association between manual childhood SEP and smoking in adulthood, particularly in women, in the Whitehall II British longitudinal study (Brunner et al., 1999), the Midspan family study (Hart et al., 2008) and in a cross-cohort study including both the NSHD and the NCDS (Power et al., 2005). Systematic reviews and large, national cohort studies have also presented evidence for associations between lower childhood SEP and lower levels of physical activity (Elhakeem, Cooper, Bann, & Hardy, 2015; Juneau, Benmarhnia, Poulin, Côté, & Potvin, 2015) and alcohol misuse (Gauffin, Hemmingsson, & Hjern, 2013).

2.2.2.2.3 Summary

Whilst the literature gives a fairly comprehensive overview of the associations between childhood SEP and adult health, many of which can be used to infer the possible pathways between childhood SEP and health management in adulthood, there is a lack of literature considering the role of childhood socioeconomic circumstances in adults'

approach to managing their health, particularly self-management and engagement with preventive health care. These gaps in the literature will be addressed by this thesis.

2.2.2.3 Childhood SEP and women's health management

As one of the health challenges discussed in a later chapter (Chapter 5) is women's response to symptoms in midlife, this section considers associations between childhood SEP and women's experience and management of symptoms in midlife.

2.2.2.3.1 Childhood SEP and women's management of symptoms in midlife

Childhood social class has been shown by one study to be associated with women's management of the menopause. Lawlor, Davey Smith, & Ebrahim (2004) found that in a sample of N=4286 British women, selected from a variety of GP lists, those who reported a manual childhood social class were more likely to be currently taking or to have ever taken HRT, compared to women from higher social classes in childhood. These results were significant after adjusting for age, adult social class and other measures of women's health in adulthood. However, this study did not account for symptomatology in midlife (the role of symptoms will be discussed further throughout this chapter), so it is unclear whether HRT use in this group was a result of more frequent or more bothersome symptoms or if it reflects a more medicalised approach to managing symptoms. Whilst the research on childhood exposures and management of women's symptoms experienced in midlife and throughout the menopausal transition is minimal, there is currently an absence of research that considers the role of symptoms in mediating the associations between childhood exposures and management of symptoms in midlife.

2.2.2.3.2 Pathways between childhood SEP and women's management symptoms in midlife

Women's experience of symptoms in midlife could explain or contribute towards the pathway between childhood SEP and how women manage their health throughout the menopausal transition. Previous research has reported an association between father's social class and women's symptomatology in midlife. Women whose father had lower social class reported more severe symptoms (Mishra & Kuh, 2012), which may influence how women respond to their symptoms. Moreover, timing of the menopause has been associated with childhood socioeconomic circumstances. Women from a manual social class in childhood and those who reported indicators of childhood deprivation, such as having no bathroom, sharing a bedroom and having no access to a car, experienced a significantly earlier menopause than women from other social classes (Lawlor, Ebrahim, & Davey Smith, 2003), although the difference was small (0.68 years). Further analysis reported that the association between childhood SEP and timing of the menopause was,

in part, attenuated by adulthood health behaviours and BMI, indicating some of the pathways between childhood social class and women's health outcomes in midlife. In the NSHD, women whose father had a manual social class were also more likely to have an earlier menopause (Hardy & Kuh, 2005), which is likely to be associated with women's experience and management of the menopause. Furthermore, a range of indicators of childhood socioeconomic disadvantage were associated with the experience of more psychological symptoms in midlife in women (Kuh, Hardy, Rodgers, & Wadsworth, 2002) (these symptoms will be included in the analysis for this thesis). The experience of more symptoms is likely to be associated with subsequent management of symptoms, thus demonstrating a possible pathway between childhood social class and health management, particularly relevant to women.

2.2.3 Adolescent self-organisation

Self-organisation has been defined as the "effortful regulation of the self by the self" (Duckworth, 2011). It has been included in this review because this definition overlaps with the concept of health management as presented in this thesis; it ties in with the idea that individuals may decide to consult health care professionals or not and also that individuals may or may not take individual responsibility in self-managing their health. There is currently no literature addressing the role of self-organisation in health management or health care utilisation, however there is a limited amount of research describing the relationship between self-organisation in childhood and health and behaviours in adulthood.

2.2.3.1 Pathways between self-organisation and health management

There is existing literature describing the association between self-organisation in adolescence and adult health behaviours, hence, this could be one of the pathways by which self-organisation might be associated with adults' management of health.

In the NSHD, an indicator of self-organisation was derived from teacher ratings when study members were age 15, reflecting students' attitudes to work, concentration and neatness. Lower self-organisation in adolescence was associated with an increased likelihood of being a light, moderate or heavy smoker up to the age of 60-64, after adjusting for sex, emotional and conduct problems in adolescence, social class, childhood cognition and educational attainment (Nishida et al., 2016).

Similarly, in a longitudinal birth cohort study (the Dunedin Multidisciplinary Health and Development Study) following N=1000 individuals born in the 1970s to the age of 32, Moffitt et al. (2011) found that self-control (defined by Moffitt et al. (2011) as an 'umbrella

concept' encompassing conscientiousness and self-regulation, amongst other 'executive functions'; arguably similar to self-organisation) between the ages of 3 and 11 was significantly associated with worse physical health and with addiction to tobacco, alcohol and prescription and illegal drugs, after adjusting for social class and cognition.

These results suggest a link between self-organisation/self-control in childhood and risky health behaviours throughout adulthood. Taking a life course approach to explaining health behaviours and subsequently inferring health management patterns, this association could contribute to explaining other pathways between childhood and adult health and social factors and health management.

2.3 The role of adult factors and health management

This section reviews the literature investigating associations between adult health and social factors, namely socioeconomic circumstances (represented by adult class and educational attainment), health status, health care utilisation, health behaviours, personality, beliefs and attitudes about health and family support in relation to health care utilisation and health management in adulthood, and specifically in the management of the menopause transition.

2.3.1 Adult socioeconomic position and health management

2.3.1.1 Adult SEP and health care utilisation

There are several studies that have investigated associations between adult SEP and health care utilisation, including the use of primary care services and preventive health care. Results are mixed; however this is possibly due to differences in methodologies used and the types of health care services included in the studies. It has been suggested that the relationship between health care utilisation and SEP differs by the type of health care service concerned. A distinction has been drawn by one study that used data from the Health Survey for England (N=50,977); it reported that lower SEP is associated with higher use of primary care services and lower use of secondary care service (Morris, Sutton, & Gravelle, 2005).

Research exploring the association between SEP and access to primary care generally supports the idea that lower SEP is associated with increased help-seeking. In a study of UK residents with the provision of free-at-point-of-access health care from the NHS, individuals from lower SEP were 60% more likely to consult a professional for immediate medical help than those from higher SEP (Adamson et al., 2003). Similarly, in a

longitudinal study exploring access to primary health care services in Spain, adults from a lower SEP were more likely to access GP services and emergency care than those from a higher SEP (Palència et al., 2013).

SEP is associated with individuals' judgements on whether particular symptoms require medical attention or not. Individuals from a lower SEP are more likely to perceive symptoms as requiring medical attention and are more likely to seek professional help for minor ailments, even within a paid-for health care system, as in the USA (Cockerham, Lueschen, Kunz, & Spaeth, 1986). The authors concluded that individuals from lower SEP place greater responsibility in health care professionals whereas individuals with a higher SEP are more selective in discriminating between symptoms that require medical attention and those that do not.

Although there is consistent literature demonstrating an association between lower SEP and access to primary care, this association is not seen with all types of help-seeking, demonstrating differences between utilisation of different health care services. One study reported the demographic profile of those who accessed NHS Direct, a telecare tool designed to support health self-management and buffer referrals to primary care services (now defunct). Individuals from lower SEP were less likely to use this service (Knowles, Munro, O'Cathain, & Nicholl, 2006), despite this group being identified as those who would most benefit from the service. The explanation for this inequality was not stated, but this could reflect a lack of awareness of available resources in lower socioeconomic groups, costs of a telephone call or, as reported in other studies, a greater readiness to utilise face-to-face services.

Several studies have also reported associations (or the absence of) between SEP and engagement with preventive health care services. In a cross-sectional UK study of the correlates of cardiovascular health check attendance, Dalton, Bottle, Okoro, Majeed, & Millett (2011) found no evidence to support the hypothesis that local level deprivation was associated with health check non-attendance. Another cross sectional study (Labeit, Peinemann, & Baker, 2013) reported that higher educational attainment was associated with an increased likelihood of attending dental checks but not breast or cervical cancer screening, blood pressure or cholesterol checks or eye-tests. A study with the aim of identifying differences between N=216 attenders and N=259 non-attenders to a general health check in Wales found that attenders were more likely to have a higher social class, more years of formal education and be in paid employment, compared to non-attenders (Pill, French, Harding, & Stott, 1988). Specific to women, higher educational attainment was found to be associated with regular cervical screening attendance in a UK study, where the procedure is free and all women within a certain age bracket, registered with

a GP are invited (Waller, Bartoszek, Marlow, & Wardle, 2009). Similarly, a Belgian study reported associations between higher educational attainment and (slightly less strongly) higher income and mammogram attendance in N=1348 women (Missinne, Neels, & Bracke, 2014). These mixed findings suggest that there may be different pathways by which SEP is associated with engagement in preventive health care, hence these associations are not apparent in certain populations or are not reported in different study designs where explanatory variables and/or confounders may differ.

2.3.1.2 Adult SEP and health self-management

There is also research to support the association between adult socioeconomic advantage and self-management of health. Higher educational attainment has been shown to predict better self-care practice in chronic conditions, such as heart failure (Rockwell & Riegel, 2001), HIV and diabetes (Goldman & Smith, 2002). Theories for the positive influence educational attainment has on effective self-management include individuals' critical thinking skills that inform their prioritisation of health and care needs (Rockwell & Riegel, 2001) and the impact education has on SEP in adulthood.

2.3.1.3 Pathways between adult SEP and health management

To fully understand the relationship between adult SEP and health management requires information on possible mediating factors, such as adult health (see section 2.3.2) and health behaviours (see section 2.3.4). There is strong evidence that adult SEP (as measured by social class and educational attainment) influences both objective and perceived health in adulthood and health behaviours. A UK population-based study which made use of a large stratified sample (N=2728) investigated the relationship between SEP and individuals' perception of their health. Wardle & Steptoe (2003) found that individuals with lower SEP were more likely to report poor self-rated health and expected a lower life-expectancy. How an individual perceives their health is crucial to interpreting a health challenge and is likely to explain, at least in part, why those from lower adult SEP utilise health care or manage their health challenges differently from those of higher SEP.

In terms of adult lifestyle, findings from several cohort studies (including NSHD, NCDS and Whitehall II) have shown that lower adult SEP and educational attainment are associated with poorer diet (Braddon, Wadsworth, Davies, & Cripps, 1988), excessive alcohol consumption (in men only) (Braddon et al., 1988; Lynch, Kaplan, & Salonen, 1997), smoking (Richards et al., 2010), physical inactivity and obesity (Brunner et al.,

1999; Lynch et al., 1997; Power et al., 2005), all of which may influence health care utilisation and health management.

2.3.1.4 Adult SEP and women's management of symptoms in midlife

The literature also explores the relationships between socioeconomic factors in adulthood and certain aspects of women's health and health management, particularly the experience of the menopause. As women's management of symptoms and health in midlife will feature in Chapter 5, this literature will be discussed below.

2.3.1.4.1 Adult SEP and women's management of symptoms in midlife

The literature suggests that SEP is related to some of the ways in which women manage their menopause. The use of hormone replacement therapy (HRT) was linked to both educational attainment and income, with women earning over $35,000 per annum more likely to use HRT (Finley, Gregg, Solomon, & Gay, 2001). However, this finding is from an American population where income-related factors are intrinsically linked with health care utilisation, due to the fee-paying-based health care system. In a UK-based study, where HRT is provided under the NHS (although there may be a prescription fee), a much more complex relationship between SEP and HRT was found. Lawlor et al. (2004) found that adulthood SEP was not associated with HRT use after controlling for other adult risk factors, including health related factors (eg, blood pressure and BMI) and health behaviours (eg, smoking and physical activity) and childhood SEP. Lower childhood SEP, however, significantly predicted lower use of HRT after controlling for adulthood SEP and other risk factors. These results suggest that SEP across the life course is both directly and indirectly associated with HRT use, involving a variety of health and social factors both in childhood and adulthood.

The relationship between SEP and HRT becomes increasing complex when the risks associated with HRT are considered, along with how these risks are communicated and influence HRT uptake. Mishra et al. (2006) examined HRT use in women in NSHD, particularly cessation of use following the Women's Health Initiative (WHI) trial (Writing Group for the Women's Health Initiative Investigators, 2002) which resulted in mass-media coverage of the cardiovascular risks associated with HRT use. The NSHD showed relatively consistent use of HRT between the ages of 53 and 56 but there was a reduction in use by age 57; this coincided with the year following the cessation of the WHI trial. Although these data are not reflected in this thesis, the results from Mishra et al. (2006) demonstrate how HRT use is likely to be influenced by social factors, including media messages, possibly peers and information from health care providers.

More years of formal education, an indicator of higher SEP, is associated with information seeking regarding the menopause and where women source information from. Whilst a higher level of education is associated with seeking professional help for menopausal symptoms (Avis, Crawford, & McKinlay, 1997), it is also associated with finding information from a more diverse range of sources (Anderson & Posner, 2002). This is particularly relevant to the study of health management as it considers how and why individuals might explore different options to manage their health.

2.3.1.4.2 Pathways between SEP and women's management of symptoms in midlife

To fully understand the associations between adult SEP and menopause management requires analysis to control for the frequency and severity of symptoms, which are often socially patterned. For example, in the NSHD, women with lower adult SEP experienced more severe symptoms than women with higher SEP (Mishra & Kuh, 2012). Lower adult SEP was also significantly associated with reporting certain clusters of menopausal symptoms (depressed mood, somatic symptoms, cognitive difficulties, anxiety/fears and sleep problems) in another study of N=850 pre-, peri- and post-menopausal British women although the correlations were small (0.10-0.22) (Hunter, Battersby, & Whitehead, 1986). Lower levels of education have been associated with greater frequency (Avis et al., 1997) and severity (Mishra & Kuh, 2012) of vasomotor symptoms.

The extent to which timing of menopause is socially patterned may also affect women's management of the menopause transition. Although adult SEP was found not to be strongly associated with the timing of the menopause, particularly the age at entering the menopause transition or the relative timing of the perimenopause (Hardy, Kuh, & Wadsworth, 2000), it has been linked to the timing of the onset of symptoms. For instance, holding a skilled occupation has been reported to reduce the risk of late onset of symptoms as women are nearing the end of the menopausal transition (Dennerstein, Dudley, Hopper, Guthrie, & Burger, 2000), although this longitudinal study was limited by its high rate of attrition and missing data.

HRT use is also associated with behaviours strongly linked to SEP, such as cigarette smoking (Hardy et al., 2000), demonstrating one of the potential pathways between SEP, various lifestyle and health factors and menopause management approach.

2.3.2 Adult health status and health management

A life course approach investigates the extent to which prior health throughout earlier adulthood will affect health outcomes in later life (Kuh, Power, Blane, & Bartley, 1997) and how an individual perceives, interprets and responds to a later health challenge.

Previous literature has described associations between adult health and both utilisation of professional health care services and individuals' health self-management.

2.3.2.1 Adult health status and health care utilisation

In a conceptual model of the individual-level factors associated with health care utilisation, Andersen & Newman (2005) identified previous illness (including how it is perceived and evaluated by the individual) as a predisposing predictor of health care utilisation. However, this framework does not specify the direction of the association between previous health and later health management. Whilst it would seem probable that individuals with worse health would be more likely to access health care services, there is evidence to suggest the opposite. In a sub-sample taken from the Manitoba Longitudinal study on Ageing (N=2422), Shapiro & Roos (1985) found that older adults who reported having one or two chronic conditions were less likely to access professional health services than those who reported none and those who reported three or more were even less likely to access services. However, the existing evidence is mixed. Worse reported physical health, measured by the presence of chronic conditions, has also been associated with higher rates of health care utilisation and this association strengthens with the increasing number of comorbid chronic conditions; in a sample of N=18941 patients aged 50+, Glynn et al (2011) found an association between the increasing number of chronic conditions reported and higher levels of primary care consultation and more hospital admissions, after controlling for sex and free medical care eligibility (in an Irish sample, where access to medical care is means tested).

Adult health, particularly self-rated health, is associated with health check attendance. In a cross-sectional study, postal questionnaires were delivered to N=2678 British individuals who had been invited to attend health checks to screen for cardiovascular diseases and cancer (Thorogood et al., 1993). Demographic and socioeconomic data from the questionnaires were then extracted to identify correlates of attendance and non-attendance to the health checks they were invited to. It was reported that participants who rated their health as either excellent or poor (the two extreme ends of an ordinal scale of self-rated health) were less likely to attend health checks than those who rated their health as very good, good or fair. However, having a chronic condition (reporting having a 'long-standing illness or disability') was not associated with attendance, suggesting that self-rated health was associated differently with health check attendance compared to a measure of health status defined by illness/disability. One limitation of this study is its self-selecting sample, as it depended on individuals who were motivated to return the questionnaire, thus it may not be representative of individuals not engaged with health care or preventive health care services. Labeit et al (2013) reported that poor

self-rated health was associated with increased attendance to blood pressure checks, cholesterol checks and eyesight tests, but not with screening for breast or cervical cancer. This study demonstrates the different attitudes towards different types of health checks, suggesting that people may consider different types of health checks (for instance, cardiovascular checks compared to cancer screening) as different approaches to managing one's health and therefore be more likely to engage with one and less so with another.

2.3.2.2 Adult health status and health self-management

As discussed in Chapter 1, managing comorbid conditions is becoming an increasingly important public health issue as the population ages and the prevalence of comorbidity increases (Brilleman et al., 2013; ONS, 2012). In a study of the predictors of health self-management, Kenning et al (2015) hypothesised that comorbidity was a potential barrier to self-management. However, the results of this prospective study found that, although it was related to self-rated health, comorbidity was not associated with self-management. This unexpected finding may reflect methodological limitations, as the measurement of self-management was restricted only to eliciting 'self-monitoring and insight' and the measure of comorbidity included only combinations of just five chronic conditions.

2.3.2.3 Women's prior health and management of health symptoms in midlife

There is existing literature to support the idea that women's experience of previous or additional health challenges is associated with both how they experience and manage the menopause and health symptoms in midlife. It is necessary to address both the association between women's health and management of symptoms in midlife and the other pathways that might contribute to this association, including symptom experience, and review the relevant literature.

There is little, though consistent, evidence describing the association between women's health status and the likelihood of health professional consultation, in that worse health is associated with greater help-seeking. One study reported that previous pre-menstrual symptoms and worse self-rated health were associated with consulting a professional for menstrual or menopausal symptoms (Avis & McKinlay, 1990). Furthermore, a cross-sectional study of N=453 Australian women in the menopausal transition reported that moderate to severe premenstrual symptoms assessed retrospectively were associated with the use of hormonal therapy in the menopausal transition (Guthrie, Dennerstein, Hopper, & Burger, 1996). Another cross-sectional study investigating health care

utilisation in menopausal women, found that women who did not engage in either treatment-related or preventive health care were more likely to be in better health, less likely to have experienced prior premenstrual complaints and have lower stress levels than 'health care utilisers' (Morse et al., 1994). There is a further body of literature (discussed below in section 2.3.2.3.1) that describes some of the pathways by which women's health may be related to the way in which women manage their symptoms in midlife.

2.3.2.3.1 Pathways between women's health and management of symptoms in midlife

Women's experience of symptoms during the menopausal transition is a possible mediator between women's prior health status and their management of symptoms in midlife. Symptomatology is associated with women's response to the menopause, particularly help-seeking behaviour. The literature consistently supports the idea that women with more bothersome symptoms are more likely to consult a health care professional regarding their symptoms. Avis et al (1997) concluded from analysis of the Massachusetts Women's Health Study data that greater frequency and severity of symptoms predicted more help-seeking.

Previous literature has also described associations both between health in earlier adulthood and in midlife and women's experience of symptoms in midlife. The effect of health status from earlier adulthood (both physical and psychological health) influences menopausal symptomatology as physical and emotional health conditions from over ten years prior to the menopause were found to be linked to higher levels of somatic symptoms (Kuh, Wadsworth, & Hardy, 1997). Greater prevalence of vasomotor symptoms is also reported by women who have previously experienced migraines, with the rate of symptomatology increasing with the severity of migraines (Smith & Waters, 1983). Worse self-rated health and having chronic conditions were associated with reported higher levels of a wide range of symptoms throughout the perimenopause and the menopausal transition in a cross-sectional study of N=2000 women between the ages of 45 and 55 (Dennerstein et al., 1993).

Health events specific to women that occur throughout reproductive life (from menarche to menopause) are associated with the experience of the menopause. Symptomatology has been associated with a number of factors associated with a woman's reproduction, such as the age at which she had her first child and experiences of miscarriage, still-birth and termination (Smith & Waters, 1983). Moreover, there is evidence demonstrating the link between women's history of menstrual problems and symptomatology and wellbeing throughout the menopausal transition. Experiencing more pre-menstrual complaints prior

to the menopause is associated with more menopausal symptoms (Dennerstein et al., 1993), particularly vasomotor symptoms (Guthrie et al., 1996; Hunter, 1992; Smith & Waters, 1983) and lower wellbeing throughout the menopause transition (Dennerstein, Smith, & Morse, 1994).

2.3.3 Previous health care utilisation and adult health management

Several studies have reported associations between previously accessing professional health care services and attending preventive health checks in later life. Individuals who reported previously attending routine health checks and who had recently visited their GP surgery were more likely to attend a general health check in a UK study exploring the predictors of health check attendance and non-attendance (Pill et al., 1988). A positive association between previously visiting the GP and higher likelihood of attending health checks was also supported by Thorogood et al (1993) and, more recently, Labeit et al (2013).

There is a lack of literature investigating the life course trajectory of health care utilisation, other than preventive health care, using epidemiological studies. The majority of literature concerning health care utilisation is cross-sectional and generally aims to explore the sociodemographic predictors of utilisation rather than exploring how prior health care utilisation affects subsequent health management. This is a gap in the research that will be addressed by this thesis.

Individuals' experiences of health care services may influence their subsequent self-management behaviours. In a study of N=410 adults from the UK, a measure of the difficulties in navigating the health care system faced by patients was found to be the strongest predictor of self-management; in that greater difficulties were associated with lesser health monitoring and treatment adherence (Kenning et al., 2015).

2.3.3.1 Pathways between previous health care utilisation and management of health

There is very little literature describing possible mediators between previous health care utilisation and management of health in later life. However, it is possible that the health outcomes associated with health care utilisation may contribute towards the pathway between previous health care utilisation and later health management. It is likely that more health-related information is available to those who regularly access health care services. A Canadian study investigating the characteristics of adults aged over 65 who had not visited a health care professional in the last two years found that, despite

reporting the same level of health, there were health implications for the 'non-users', as they were more likely to be hospitalised, suggesting that not using health care resources when required is detrimental to health and results in the need for emergency care, reflecting poor management of health (Shapiro & Roos, 1985).

2.3.3.2 Women's health care utilisation and management of health

Health care utilisation throughout the life course differs between men and women; this could be due to women's reproductive health throughout the life course, for example, trying to conceive, pregnancy and childbirth and management of reproductive health, such as obtaining contraceptives. In a study exploring how health care resources are divided between men and women, it was reported that spending per capita was greater for women than for men (Mustard, Kaufert, Kozyrskyj, & Mayer, 1998). This was partly explained by the fact that a fifth of spending for female patients was attributed to health matters specific to women, whereas just 3% of male spending was related to conditions specific to men. Total expenditure, including both acute hospital care and on physicians' services was markedly greater for women from approximately age 15 and remained so until users reached age 65, the difference peaking between ages 25-35. These findings portray the significance of women's health and the subsequent access to health care resources for health care needs specific to women or for those where women may take responsibility (eg, contraception). The necessity of health care utilisation throughout women's adult life needs to be considered when investigating the use of professional health services and needs to be assessed in the context of women's health care needs, not just as a crude measure of consumption of resources. This might suggest there may also be sex differences in the way in which previous health care utilisation is associated with individuals' management of health in mid and later adulthood.

Although there is little literature supporting a direct relationship between women's previous health care utilisation and management of symptoms in midlife, there are several studies that describe associations between health care utilisation and factors that may contribute towards the pathway between health care utilisation and symptom management in midlife.

2.3.3.2.1 Previous health care utilisation and management of symptoms in midlife

Previous utilisation of women's health care services predicts a medicalised response to the menopause. Having attended cervical screening and a mammogram significantly predicted consulting a professional regarding menopausal symptoms and attending a mammogram predicted HRT use in a population-based Australian sample (Anderson &

Posner, 2002). The previous use of oral contraception is associated with use of professional health care services during the menopausal transition (Avis & McKinlay, 1990) and with HRT use (Egeland et al., 1991; Kuh, Hardy, & Wadsworth, 2000). These findings suggest that some women may be more likely to adopt a medicalised approach to managing their health across the life course. Oral contraceptives offer a medical means of managing reproduction at the times a woman chooses. The fact that women who choose to adopt this method of managing their reproductive health may then be more likely to opt for a medical response to managing menopausal symptoms suggests that there might be a trend for using hormones or other medications to manage women's health care needs at different stages throughout the life course.

2.3.4 Adult health behaviours and health management

Depending on the health challenge, adopting or maintaining particular health behaviours may be an appropriate approach to health management. Examples of this include dietary modifications or adhering to exercise regimes. For those who have demonstrated positive health behaviours throughout the life course, maintaining or upholding them may form their response to the health challenge. However, some individuals will be required to adopt new behaviours to manage their health in response to a new challenge. There is a gap in the literature assessing patterns of health behaviours across the life course in relation to health management. This thesis will address this gap by exploring associations between health behaviours in earlier adulthood and health management in later adulthood.

2.3.4.1 Adult health behaviours and health care utilisation

There is consistent research supporting an association between health behaviours and engagement with preventive health care. Individuals who attended a general health check - in a UK study of engagement with preventive health care - were more likely to report more positive health behaviours, such as not smoking, getting the recommended amount of sleep and participating in exercise (Pill et al., 1988). More recently, Dalton et al (2011) and Labeit et al (2013) also provided support for an inverse association between smoking and attending recommended health checks.

2.3.4.2 Pathways between health behaviours and health management

As indicated by life course models of health outcomes (Chandola, Clarke, Morris, & Blane, 2006; Kuh et al., 1997), health behaviours are one of the factors in adulthood that influence individuals' health in later life. They are also one of the potential mediators

between other explanatory variables and health outcomes, as health behaviours are associated with education and SEP and other factors in adulthood.

Health status may mediate associations between adult health behaviours and subsequent health management. There is a large amount of longitudinal research demonstrating the relationship between poor health behaviours (including low levels of physical activity) across the life course and adverse health outcomes in later life (Andersen et al., 2000; Clennell, Kuh, Guralnik, Patel, & Mishra, 2008; Scarborough et al., 2011; Wang et al., 2014). Moreover, analysis of UK economic data has revealed that the diseases associated with poor diet, lack of exercise, smoking and alcohol consumption result in high levels of health care utilisation (Scarborough et al., 2011).

Certain health behaviours are associated with how individuals rate their health. Poor health behaviours, particularly smoking, low levels of physical activity and poor fruit and vegetable consumption are associated with poorer self-rated health in a sample of N=1691 British adults, using Office for National Statistics data (Wardle & Steptoe, 2003). Self-rated health is likely to indicate how individuals interpret health events and whether they perceive them as a challenge or not, ultimately influencing how they will respond. This suggests one possible pathway between health behaviours, adult health and health management in adulthood. Furthermore, Wardle & Steptoe (2003) also reported that smoking, low levels of physical activity and poor fruit and vegetable consumption were associated with lower likelihood of thinking about things to do to stay healthy, after adjusting for age, sex and self-rated health. Thinking about things to do to stay healthy is part of managing health and is one of the determinants of forming a response to a health challenge.

2.3.4.3 Women's health behaviours and health management

Research shows that health behaviours demonstrated both throughout the life course and in midlife can impact how women experience and respond to the menopause. Health behaviours are particularly relevant to women's health as the lifestyle habits a woman forms throughout her adult life have an impact on her reproductive health (Royal College of Obstetricians and Gynaecologists, 2011).

Health behaviours, particularly physical activity, are associated with menopause management. In the Melbourne Women's Midlife Health Study (N=2001), Morse et al (1994) found that women who exercised weekly were more likely to utilise professional services throughout the menopause transition. However, in further analysis Morse et al (1994) differentiated between prevention related and problem related help-seeking and found that women who exercised were more likely to be prevention related utilisers,

which involves attending health checks, such as cervical screening and mammogram. This would suggest that women who exercise regularly may be more likely to take a proactive approach to managing their health, particularly regarding any potential future health risks.

2.3.4.3.1 Pathways between women's health behaviours and management of symptoms in midlife

The pathway between health behaviours in earlier adulthood and women's health management in midlife may be mediated by health-related factors, particularly symptomatology during the menopausal transition.

Findings on the impact of physical activity on symptoms during the menopause transition are mixed. Cross-sectional studies have reported the benefits of regular exercise for women during the menopausal transition. Women who exercise demonstrated higher levels of positive affect, lower negative affect, improved well-being (Dennerstein et al., 1994), improved mood (Slaven & Lee, 1997), better self-rated health (Dennerstein, 1996) and experienced fewer symptoms (Dennerstein et al., 1994). However, a review of the evidence concluded that results are mixed (Daley, Stokes-Lampard, & Macarthur, 2009), with one study reporting that physical activity actually increases the risk of severe vasomotor symptoms (Aiello et al., 2004). The logic behind this adverse effect on symptoms is plausible, as women are recommended to keep their body temperature cool to avoid bothersome hot flushes and avoid behaviours that raise the core temperature. However, Daley et al's (2009) review concluded that there is a lack of high quality randomised controlled trials and that the findings of observational and cross-sectional studies are mixed and that results seem to vary according to sample size, many lacking statistical power, suggesting methodological limitations.

The literature is much more conclusive for the impact of smoking on women's experience of the menopause. Cigarette smoking is consistently linked to the menopausal transition, which is likely to influence how women subsequently manage their symptoms. Smoking is associated with the timing of the menopause (Hardy et al., 2000; Torgerson, Thomas, Campbell, & Reid, 1997), symptom severity (Avis et al., 1997) and frequency (Dennerstein et al., 1993) and more erratic menstruation throughout the menopausal transition (Torgerson et al., 1997). Women who smoke are also more likely to use HRT during the menopausal transition (Torgerson et al., 1997), probably due to the impact smoking has on symptom severity. These results support the idea that the pathway between health-risk behaviours (ie, smoking) and management of symptoms in midlife is mediated by the experience of more bothersome symptoms.

2.3.5 Personality, health beliefs and attitudes and adult health management

2.3.5.1 Personality and health management

Although there is a lack of literature describing a direct link between personality and health management approaches, it is plausible that certain domains of personality are related to an individual's approach to managing their health. For instance, neuroticism and extraversion are associated with coping behaviours (such as appraisal of stressful events and coping resources) (Carver & Connor-Smith, 2010) and this may be particularly relevant for individuals who are required to manage chronic conditions, where coping with the demands of a condition is necessary for effective self-management. It is more likely that personality is associated with health management via a number of other adult health and social factors, some of which are included in this thesis. Personality is associated with health in adulthood through several mechanisms, including the relationship between personality and health behaviours, such as drinking and sexual activity (Cooper, Agocha, & Sheldon, 2000) and smoking (Munafo & Black, 2007).

2.3.5.2 Health beliefs and health management

The Health Belief Model (Rosenstock, 1974) predicts health behaviours (including responses to health challenges) depending on health beliefs including: the individuals' perceived susceptibility to an illness; perceived severity of an illness; the perceived cost and benefits of a health behaviour, health motivation and self-efficacy. Health beliefs have been directly associated with several approaches to managing health, including self-management of chronic conditions (Berman & Iris, 1998), utilisation of health care services (Andersen & Newman, 2005) and adherence (Gherman et al., 2011). Moreover, health beliefs are associated with social class (Wardle & Steptoe, 2003), demonstrating one possible pathway by which health beliefs might be associated with health management. Individuals' health beliefs may also be associated with the other factors discussed in this chapter as potential explanatory variables, particularly health behaviours, health status and health care utilisation, in terms of influencing health and health management.

2.3.5.3 Personality, health beliefs and attitudes and management of women's health

Given that women's experiences of health challenges and their subsequent management of health are different to that of men's, it is worth considering the role of

women's personality, health beliefs and attitudes, concerning women's health, including the menopause.

2.3.5.3.1 Personality and women's experience of the symptoms in midlife

A small amount of research has reported an association between particular personality traits, namely neuroticism, and women's experience of symptoms and coping styles during the menopausal transition, which could contribute towards the pathway between personality and women's health management. In an American randomised controlled trial, bivariate associations showed that neuroticism is strongly correlated with psychological symptoms (r=0.68), moderately correlated with somatic symptoms (r=0.33) and weakly correlated with sexual and vasomotor symptoms (r=0.18 and r=0.21 respectively) (Elavsky & McAuley, 2009); as discussed previously, women's experience of symptoms is associated with how symptoms are managed, thus symptomatology may form part of the pathway between personality and management of symptoms in midlife. A study of 170 American women found that finding the menopausal transition a stressful experience was weakly but significantly correlated with neuroticism (r=0.26) and although personality, on the whole, was not strongly correlated with most coping techniques, neuroticism was moderately associated with avoidance coping (r=0.41) (Bosworth, Bastian, Rimer, & Siegler, 2003).

2.3.5.3.2 Attitudes towards the menopause and management of symptoms in midlife

Women's attitudes towards both the menopause and ageing are likely to influence the experience of the menopause and women's response to symptoms throughout the menopausal transition. Attitudes are particularly relevant to the menopause as, for many women, the menopause is symbolic of the end of their reproductive life and signifies ageing. There is also a social stigma around the menopause and for many women the issue is a taboo subject, which may be reflected in negative beliefs and attitudes.

Attitudes towards the menopause are related to how women manage the menopause, as negative attitudes towards the menopause significantly predicted consulting a professional regarding menopausal symptoms and HRT use (Anderson & Posner, 2002). Attitudes towards the menopause are likely to reflect an individual's approach to managing the menopause, as taking a medicalised approach to treating menopausal symptoms or taking a holistic approach to coping with the menopausal transition using more behavioural techniques will depend on how the menopause is perceived.

There may also be an additional pathway between women's attitudes towards the menopause and subsequent management of symptoms via experience of symptoms. The evidence consistently supports the relationship between negative attitudes towards

the menopause and more severe symptoms. This was demonstrated by a systematic review including studies from a wide range of cultures from Europe, North America, Central America and Asia, which reported that 10 out of the 13 studies reviewed found that negative attitudes towards the menopause were associated with higher prevalence of menopausal symptoms (Ayers, Forshaw, & Hunter, 2010).

Negative attitudes towards the menopause do not only predict vasomotor symptoms, but, in a large population based study, a higher prevalence of up to 22 self-reported menopausal symptoms were associated with both negative attitudes towards the menopause and towards ageing (Dennerstein et al., 1993). A similar list of 22 midlife symptoms was also used in NSHD. However, in cross-sectional studies, women's attitudes towards the menopause may be influenced by their experience of symptoms, therefore it may not be possible to infer a causal association in one particular direction. This is a limitation in the literature that this thesis aims to address by measuring attitudes before/at the beginning of the menopausal transition.

There are also sociodemographic differences in attitudes towards the menopause as negative attitudes towards the menopause have been associated with higher educational attainment (Avis & McKinlay, 1991), demonstrating an additional potential pathway (ie, higher educational attainment is associated with negative attitudes, which is associated with more symptoms) between women's attitudes towards the menopause and how it is experienced and managed.

2.3.5.3.3 Health beliefs and women's health management

Women are exposed to routine screening procedures throughout their adult lives; there is a large amount of research exploring the factors associated with mammogram and cervical screening attendance. Previous research has reported an association between women's health beliefs and attendance to preventive health care procedures, specifically cervical screening. In a study exploring the barriers to cervical screening attendance, embarrassment, worrying about the pain involved and worrying about the possible results of the procedure were frequently cited reasons for non-attendance (Waller et al., 2009).

2.3.6 Family circumstances and adult health management

As mentioned in Chapter 1, individuals' experience and management of their health is influenced by social context and networks; one potential source of social support is family.

2.3.6.1 Family support and health care utilisation

There are several studies that report associations between family circumstances and support and utilisation of different health care services, including access to primary care and engagement with preventive health care.

There is existing literature describing the association between marital status and primary health care utilisation. Dunlop, Coyte, & Mcisaac (2000) found that being single, compared to being married, partnered, divorced or widowed, was associated with lower likelihood of visiting the GP in the last 12 months in men; this association was not significant for women, suggesting sex differences in the association between marital status and health care utilisation. Joung, Van Der Meer, & Mackenbach (1995) reported that, from a sample of N=2662 Dutch individuals taken from a longitudinal study of health economics, divorced individuals more frequently consulted their GP, used more prescribed medications and were more likely to be admitted to hospital. Although reporting chronic health conditions explained the associations with GP consultation and medication use (indicating one pathway between marital status and health care utilisation via health status), the association with hospital admission remained significant after adjusting for sociodemographic and health related factors. This research suggests differences in the associations between marital status and access to different types of health care services.

Family circumstances have been linked to engagement in preventive health care, as measured by attendance to recommended health checks. Having fewer family responsibilities and demands, as measured by having no young children or dependents and fewer regular contacts with close friends and relatives, is associated with attending more general health check-ups in the UK (Pill et al., 1988). Thorogood et al (1993) reported that married individuals were more likely to attend health checks in a large British sample (N=2678), including participants from mid to late adulthood (ages 35-64). Moreover, in a study of cervical screening attendance in UK-based women, compared to their married counterparts, single women were more likely to be overdue for screening, although the association did not reach conventional statistical significance (Waller et al., 2009).

2.3.6.2 Family support and health self-management

For those with a chronic condition who are required to manage their health on a day-to-day basis, outside of professional health care services, marital status may impact an individual's health self-management, as a family member may be highly involved in a person's care. In a sample of patients with cardiometabolic chronic conditions, of those

who reported having a caregiver, 65% named their spouse (Rosland, Heisler, Choi, Silveira, & Piette, 2010).

Families can be a motivating factor in encouraging and supporting effective health self-management. In a qualitative study, N=52 Australian health service users with diabetes described motivation from their families to manage risk factors and were also motivated to practice self-management behaviours when supported by their families (Jowsey, Pearce-Brown, Douglas, & Yen, 2014). Families also provided reminders to adhere to self-management practices.

Multivariate analysis from a cross-sectional study found that married/partnered status was significantly associated with higher levels of family support for self-management of heart failure and diabetes after adjusting for age and sex (Jerant, von Friederichs-Fitzwater, & Moore, 2005). The same study concluded that more family support was associated with better self-management adherence, whereas reported family-related barriers were associated with worse adherence. This study demonstrates the benefits for effective health self-management married/partner status can have for individuals, but also suggests that poor-quality support can be detrimental to self-management practices.

Families may not always provide support when managing one's health. In a qualitative study which invited people with chronic conditions to attend focus groups (N=54), participants reported that spouses were not always helpful in supporting chronic illness self-management, as there were reports of not providing or facilitating correct diets and failing to understand that previous home or family responsibilities could not be upheld to the same level as they were previously, when the individual was in good health (Jerant et al., 2005). Furthermore, individuals who had to cease working due to ill health also reported that this could cause problems for the family dynamic. Family structures may also reflect cultural contexts. For instance, as reported by participants from patriarchal societies, women may be expected to care for the family, regardless of her own health (Jerant et al., 2005), which is likely to be detrimental to health for those with chronic conditions and impinge on a woman's capacity to manage her health adequately. Thus, it may be that the quality of the relationship is more important than simply being married compared to being single or otherwise.

Sex related differences in the role of family support in people's capability to self-manage their health were also reported by Rosland et al. (2010). It was found, in a cross-sectional sample of N=438 patients with either heart failure or diabetes (both conditions require patients to take responsibility for their daily care (Rockwell & Riegel, 2001)), 77% of men reported receiving support from their families to self-manage their health, whereas 64%

of women reported receiving family support. Women were also more likely to report experiencing family-related barriers to self-management, as 30% of women reported that their families were a hindrance to adhering to their self-management regimes, compared to 21% of men.

2.3.6.3 Family related stress and women's management of health in midlife

At the time a woman experiences the menopausal transition, she is often faced with many family-related stressors common in midlife, including children leaving or returning home, caring responsibilities for parents or partners and marital stress (Dennerstein, 1996). Family worries are cited as a source of stress by women in midlife (Hunter & Liao, 1995) and stress was reported to be associated with higher levels of health care utilisation in women throughout the menopausal transition (Morse et al., 1994), demonstrating an association between family relations and health management.

2.3.6.3.1 Pathways between family-related stress and women's management of health in midlife

One possible way that family-stress might be associated with women's management of health midlife is through an association with women's experience of symptoms or their wellbeing in midlife.

Pressure from family life can influence women's experience of symptoms in midlife in several different ways. Worsening family life was associated with more severe vasomotor symptoms and greater family-related stress increased the risk of lower quality of life during the menopausal transition in NSHD (Hardy & Kuh, 2002; Mishra & Kuh, 2006), which may then influence how women respond to symptoms in midlife. A cross-sectional study of peri- and postmenopausal English women reported that low mood increased during this transition and was frequently attributed to 'family problems' (Hunter, 1992). These studies support the idea that the impact family-related stress has on women's wellbeing and symptomatology in midlife may contribute to the pathway between family circumstances and management of health in midlife. There is relatively little literature to support this pathway, however, this thesis will aim to explore this further.

2.4 Summary

Having reviewed much of the literature relevant to the factors identified in the life course model presented earlier in this chapter (Figure 2.1) and their relative associations with health management, there are several gaps in the literature. Firstly, there is relatively little testing of the role of childhood health and social factors in later adult health

management; a hypothesised association is largely inferred from the well-reported associations between childhood factors and adult health, which then determines how an individual manages their health. Whilst it is likely that this pathway at least partly explains any associations between childhood factors and adult health management, further research is needed to investigate i) whether or not there are direct associations between childhood factors and health management and ii) any alternative pathways by which childhood factors might be associated with health management (ie, through other adult exposures, such as socioeconomic factors or health behaviours, amongst others).

Further gaps in the literature include the consideration of multiple means of managing health; the majority of literature looks at health care utilisation or self-management as completely unrelated behaviours, rather than considering them both as health management approaches. Furthermore, whilst some of the existing research does control statistically for adult explanatory and confounding variables, a large amount of the research does not discuss the many possible pathways by which various exposures and experiences are associated with health management outcomes. This gap is particularly noticeable in the research on women's management of symptoms in midlife, where often women's experience of symptoms is not taken into account. These are research gaps that this thesis will address.

Ultimately, what this area of research would benefit from is a life course approach, which could take into account both factors from childhood and adulthood and assess the various pathways by which exposures and events from across the life course are associated with health management (including both health care utilisation and self-management) as different stages throughout adulthood. This is a research gap that can be addressed by NSHD data, which includes measures of health management from different time points across adulthood and measures of the health and social factors that may be associated with individuals' health management approaches. The next chapter will report the aim, objectives and hypotheses of this thesis and describe the NSHD, along with the explanatory variables used and the outcome health management variables used in this thesis.

2.5 Associations between health and social factors from childhood and adulthood and health management reported in the literature

Of the health and social factors identified in Figure 2.1 and included in the literature search, several associations were found with proactive health management (particularly

with health care utilisation, health self-management and engagement with preventive health care). These associations are demonstrated below in Figure 2.2.

Evidence to support direct associations between explanatory variables and proactive health management was found for the following health and social factors: previously utilising health care services, worse health in adulthood, higher adulthood SEP, positive health behaviours and being married. However, considering some of the potential pathways by which various factors might be associated with proactive health management demonstrated potentially conflicting pathways and associations. For instance, the literature shows that higher SEP in adulthood and positive health behaviours are both associated with more proactive health management (see sections 2.3.1 and 2.3.4 respectively), yet both are inversely associated with worse health in adulthood, which is associated with more proactive health management. This suggests mixed support for the potential associations with health management, which may be partly explained by much of the literature not making mutual adjustments for both health and social factors. This thesis will address these conflicts in the existing literature by adjusting for both health and social factors in the analysis, which will be explained further in Chapter 3 and throughout the results chapters, Chapters 4, 5 and 6.
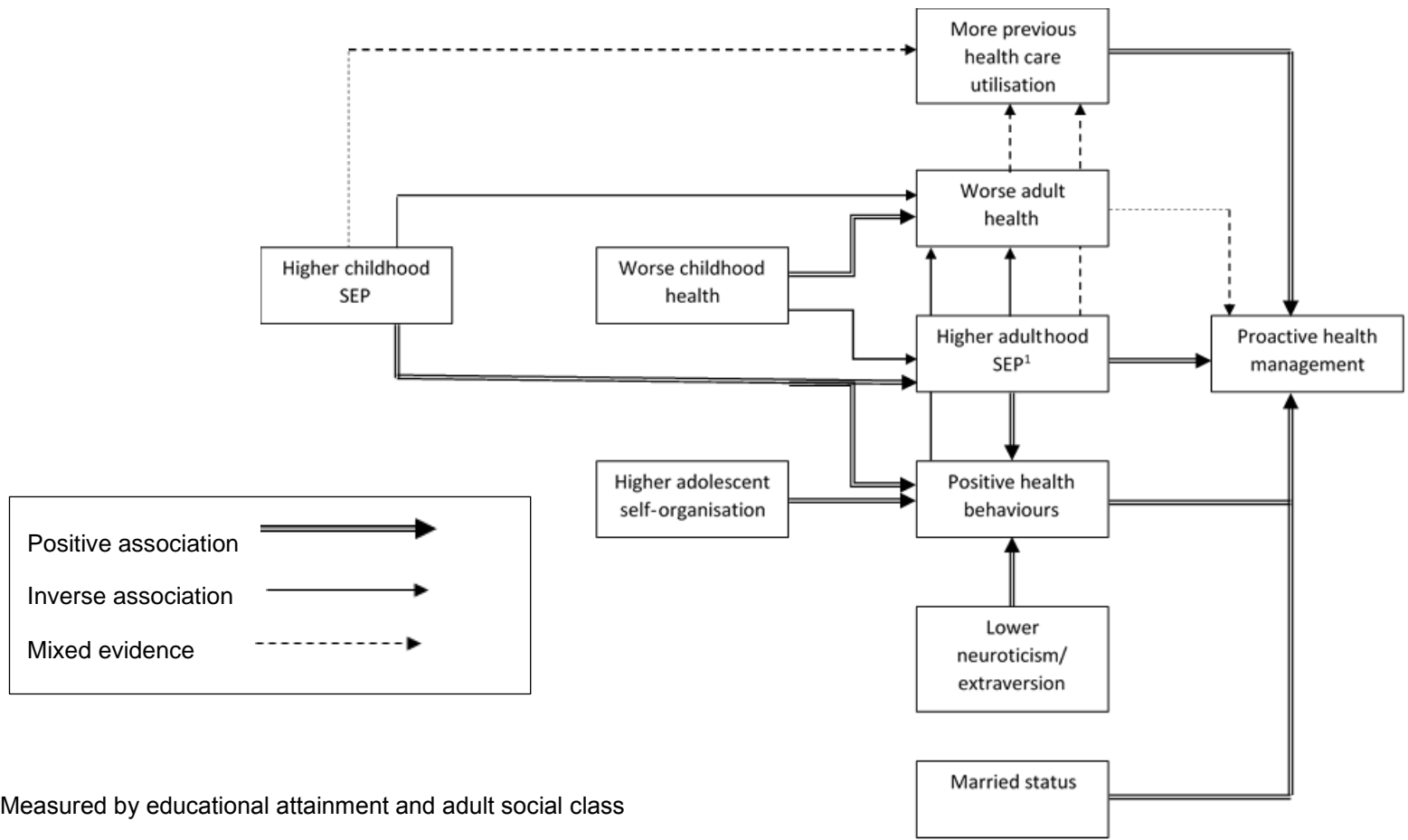
Figure 2.2 Associations between health and social factors from childhood and adulthood and health management for which evidence was found in the literature

[1] Measured by educational attainment and adult social class

As the literature review also addressed some of the potential correlates of women's management of health, particularly management of women's symptoms in midlife, additional associations and pathways were identified in the literature and are depicted in Figure 2.3 below.

Again, taking into account the pathways by which associations might operate, there were conflicting associations and pathways, for example, the positive association between positive health behaviours and proactive management of symptoms is at odds with a possible pathway formed of the inverse association between positive health behaviours and greater symptom burden and the positive association between greater symptom burden and proactive management of symptoms.

Considering the associations and pathways presented in these models (Figures 2.2 and 2.3), there is mixed support for the hypothetical associations and pathways represented in the conceptual framework used throughout this thesis (Figure 2.1). This is partly putdown to some of the gaps in the literature this thesis aims to address, namely not accounting for both health and social factors in analyses and the lack of a life course perspective. This thesis will consider the competing role of health and social factors in health management by adjusting for the appropriate variables.

The hypotheses to be tested in the thesis are described in Chapter 3 and will be discussed in light of the conceptual framework (Figure 2.1) and the associations found in the existing literature (Figures 2.2 and 2.3).
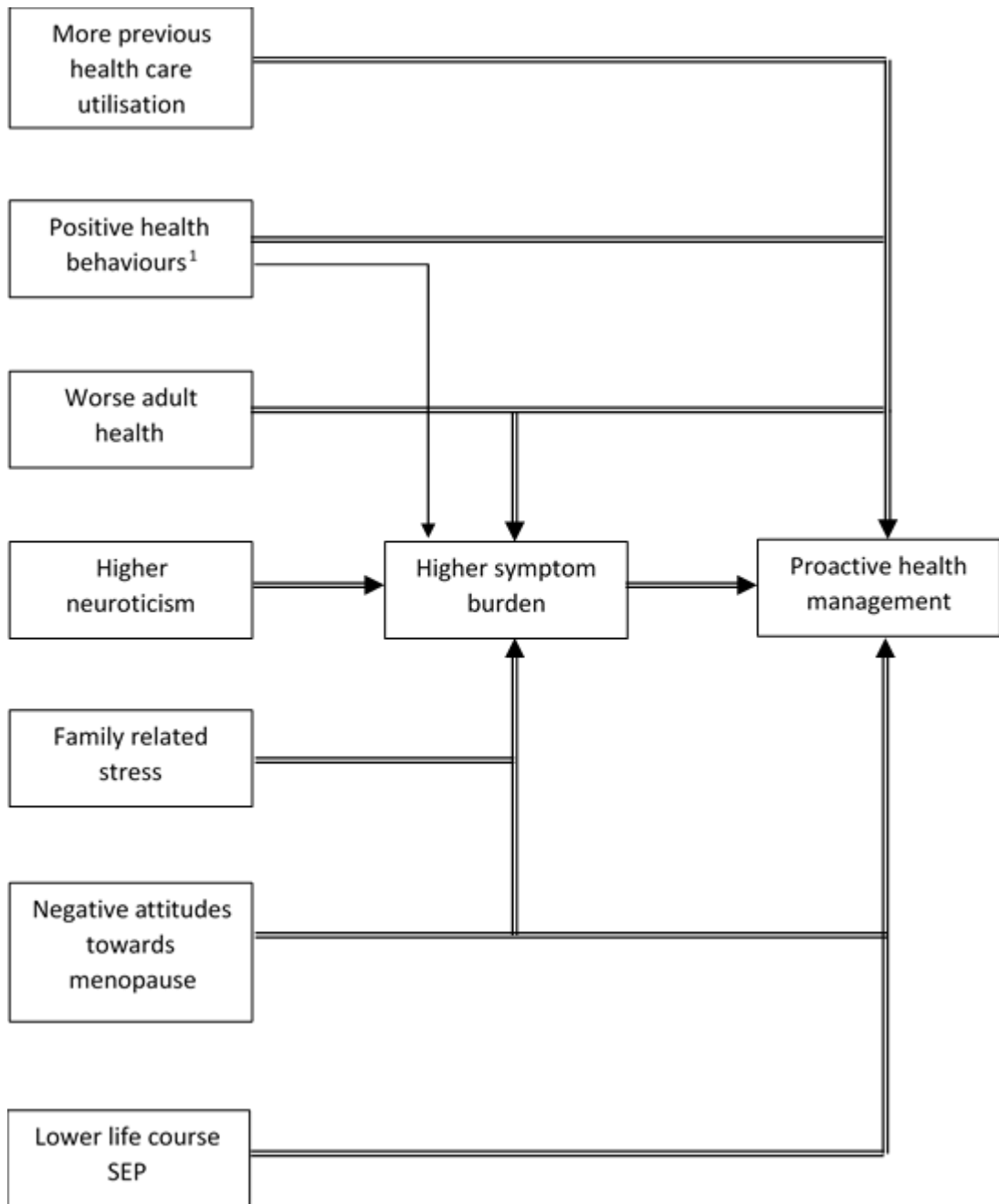
[1] Predominantly not smoking; mixed evidence was found for physical activity

Figure 2.3 Associations between health and social factors and management of women's health for which evidence was found in the literature

3 Data and Methods

3.1 Aim, objectives and hypotheses

The aim of this thesis is to investigate how study members from the MRC National Survey of Health and Development (NSHD) manage their health at various points in the life course and identify the health and social factors associated with different health management approaches.

The results presented in this thesis will meet this aim by investigating the health and social factors from childhood and adulthood associated with i) health professional consultation for health conditions and symptoms reported at age 43, ii) women's management of symptoms in midlife (between ages 47 and 54), iii) women's self-management of general health in midlife and iv) health check attendance at age 68. These health management approaches will be collectively referred to as proactive health management in the objectives described below.

The objectives of this thesis and hypotheses tested throughout the chapters are shown below.

Objective 1
Describe NSHD study members' management of health in adulthood and later life, specifically:

- Health professional consultation for health conditions and symptoms at age 43
- Women's consultation for and self-management of symptoms in midlife (between ages 47 and 54)
- Women's self-management of general health in midlife
- Attendance for recommended health checks at age 68

The thesis will also assess whether rates of consultation differed between different types of symptoms at age 43 and in midlife for women.

Hypothesis 1
It was hypothesised that rates of consultation would differ between different types of symptoms at age 43 and, in women, age 54.

This hypothesis was based on the assumption that symptom type would be associated with the likelihood of consulting. This assumption was informed by the literature describing the 'illness iceberg' (Hannay, 1980) that suggests that individuals do not consult for most symptoms, which could indicate that consultation occurs more for some

symptoms than others. Furthermore, previous literature has reported that women's experience of symptoms in midlife is associated with the likelihood of consultation (Avis et al., 1997), demonstrating the role of symptoms in health management, thus 'health challenge' (including health symptoms) was included in the conceptual framework as a correlate of health management. There is also evidence to suggest that psychological symptoms are often under-reported (Aneshensel, Estrada, Hansell, & Clark, 1987; Bwtvelt & Van Dam, 1991; Lyness et al., 1995), suggesting that symptom type may influence reporting and subsequent symptom management.

Objective 2

Describe the associations between socioeconomic factors - including lifetime social class and educational attainment - and management of health.

Hypothesis 2

It was hypothesised that socioeconomic advantage - ie, higher social class, both in childhood and adulthood, and higher educational attainment - would be associated with more proactive management of health. Moreover, it was hypothesised that any associations between childhood social class and health management in adulthood would be attenuated by adult health and social factors.

There was some mixed evidence for the association between socioeconomic position (SEP) and proactive health management, particularly regarding adult social class and consultation (see section 2.3.1.1). However, there was fairly consistent evidence for a positive association between socioeconomic advantage and more self-management, screening attendance and health check attendance (Goldman & Smith, 2002; Pill et al., 1988; Rockwell & Riegel, 2001; Waller et al., 2009). Given that this thesis will consider only consultation in symptomatic study members, this was considered to be proactive health management, thus socioeconomic advantage was hypothesised to be associated with more consultation, more self-management and higher health check attendance.

Objective 3

Describe the associations between health in childhood and adulthood and management of health.

Hypothesis 3

It was hypothesised that those with poorer health in childhood and adulthood would be more likely to proactively manage their health. Also, it was hypothesised that any associations between worse health in childhood and proactive management of health would be explained by adult health and social factors.

The evidence regarding the association between adult health status and health management was mixed and there was very little evidence for the role of childhood health (see sections 2.3.2 and 2.2.1 respectively). However, given that there was some evidence for an association between worse health in adulthood and more proactive health management (in the form of primary health care access and health check attendance) this informed the hypothesis (Glynn et al., 2011; Labeit et al., 2013). Moreover, specific to women's health, the literature consistently supported an association between adverse health experiences in earlier adulthood and more proactive management of women's symptoms in midlife (Avis & McKinlay, 1990; Guthrie et al., 1996; Morse et al., 1994).

Objective 4

Describe the associations between health care utilisation in earlier adulthood and management of health.

Hypothesis 4

It was hypothesised that accessing health care services in earlier adulthood would be associated with a higher likelihood of proactive management of health in later adulthood.

This hypothesis was informed by consistent evidence for associations between previous attendance to professional health services and engagement with health checks (Labeit et al., 2013; Pill et al., 1988; Thorogood et al., 1993) and between women's prior utilisation of professional health care services and medicalised management of symptoms in midlife (Anderson & Posner, 2002; Avis & McKinlay, 1990; Egeland et al., 1991; Kuh et al., 2000).

Objective 5

Describe the associations between health behaviours in adulthood and management of health.

Hypothesis 5

It was hypothesised that reporting healthier behaviours (specifically, not smoking and higher levels of physical activity) would be associated with more proactive management of health and, conversely, reporting poorer health behaviours (such as smoking and lower levels of physical activity) would be associated with less proactive management of health.

The literature indicated that positive health behaviours were associated with greater health check attendance (Dalton et al., 2011; Labeit et al., 2013; Pill et al., 1988) and, in women, with engagement with preventive health care, including screening (Morse et al., 1994). Although there was no evidence to suggest an association between positive

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health behaviours and health professional consultation, the hypothesis that positive health behaviours would be associated with all forms of proactive health management was formed in light of this evidence for associations with preventive health care engagement.

Objective 6

Describe the associations between personality and attitudes towards to health and management of health.

Hypothesis 6

It was hypothesised that higher levels of self-organisation in adolescence would be associated with more proactive management of health and that this association would be explained by other childhood and/or adult health and social factors. It was hypothesised that higher levels of extraversion and neuroticism would be associated with more proactive management of health. For women who experienced symptoms in midlife, it was hypothesised that those who reported more negative attitudes towards the menopause would be more likely to proactively manage symptoms.

Although there was not any evidence to suggest that higher self-organisation was associated with proactive health management, previous literature reported that higher self-organisation was associated with positive health behaviours (Moffitt et al., 2011; Nishida et al., 2016). As positive health behaviours were shown to be associated with some forms of proactive health management, as discussed above, it was hypothesised that an association between adolescent self-organisation and proactive health management would operate through adult health behaviours and perhaps other health and social factors from across the life course.

There was also a lack of literature assessing the role of extraversion and neuroticism in health management. However, previous literature suggested that higher levels of extraversion and neuroticism were associated with several other factors likely to be associated with health management, namely health behaviours (Cooper et al., 2000; Munafo & Black, 2007), in women, symptoms in midlife (Bosworth et al., 2003; Elavsky & McAuley, 2009) and, although not measured in this thesis, coping behaviours (Carver & Connor-Smith, 2010), thereby demonstrating a number of pathways by which extraversion and neuroticism might be associated with proactive health management.

Objective 7

Describe the associations between family circumstances (particularly marital status and, where possible, family-related stress) and management of health.

Hypothesis 7

It was hypothesised that being married would be associated with more proactive health management and that, for women, lower levels of family related stress in midlife would be associated with more proactive management of health.

There was some consistent evidence demonstrating an association between married status and more health care utilisation (Dunlop et al., 2000; Thorogood et al., 1993), including access to preventive health care, and with more health self-management (Jerant et al., 2005; Jowsey et al., 2014; Rosland et al., 2010) to inform the hypothesised association between being married and proactively managing health.

Although there was no previous literature describing associations between family related stress and health management, it was hypothesised that experiencing more family related stress would be associated with less proactive health management, as this would lead to greater burden for women and make caring for and managing their own health less of a priority.

Objective 8

In women who reported symptoms in midlife, describe the associations between symptom experience (severity and duration) and management of symptoms and investigate whether symptom experience mediates associations between childhood and adult health and social factors and management of symptoms.

Hypothesis 8

It was hypothesised that women who reported more bothersome symptoms and experienced symptoms for a longer duration would be more likely to proactively manage symptoms. Additionally, it was hypothesised that the experience of more bothersome, enduring symptoms would mediate the associations between exposures from childhood and adulthood described above.

This hypothesis was informed by the evidence for an association between symptom frequency and severity and health professional consultation (Avis et al., 1997). Moreover, as previous literature demonstrated the role of various health and social factors in women's experience of symptoms in midlife (Avis et al., 1997; Dennerstein et al., 1993; Kuh et al., 1997; Mishra & Kuh, 2012; Smith & Waters, 1983), illustrating the potential pathways by which various health and social factors might be associated with management of women's symptoms via the experience of bothersome symptoms.

Objective 9

Finally, this thesis will describe the associations between health management approaches in adulthood and later life (ie, consultation at age 43, women's management

of symptoms and self-management of general health in midlife and health check attendance at age 68). The analysis will assess whether health management differs across adulthood (between ages 43 and 68) and if the approaches to managing different types of health conditions vary.

Hypothesis 9

It was hypothesised that proactive management of health would be consistent throughout adulthood and into later life, thus consultation at age 43 would predict consultation and self-management in midlife in women and health check attendance in later life and, for women, consultation and self-management in midlife would predict health check attendance at age 68.

There was no existing research to inform or support this hypothesis as this was a gap in literature that this thesis aimed to address, using a novel approach to health management research by investigating different approaches to health management and assessing whether or not they were associated at different stages in adult life.

3.2 Data

3.2.1 Introduction to the MRC NSHD

The NSHD is the longest running British birth cohort study, which has collected information from a sample of 2547 women and 2815 men (totalling N=5362) born in England, Scotland and Wales in one week in March 1946 from birth to the present day (Kuh et al., 2011; Wadsworth, Kuh, Richards, & Hardy, 2006). The sample was drawn from a national maternity survey of all mothers who had a baby in that week. The sample included all single births to married parents from a non-manual SEP and one in four randomly selected from married parents from manual occupations (Wadsworth et al., 2006). The purpose of the initial maternity survey was to investigate factors affecting fertility rates, pregnancy outcomes and infant feeding, such as the costs of childbearing, care received during pregnancy, childbirth and postnatal period, socioeconomic circumstances and maternal characteristics (Douglas & Rowntree, 1948). Follow-up in the first five years focused on infant and child health, growth and development in relation to the home environment (Douglas & Blomfield, 1958). In later childhood and adolescence, these topics widened to include cognitive ability, educational progress, and the role of the school as well as the home environment, collecting data from teachers as well as study members, their parents, health visitors and school doctors.

A wide range of data has been collected 24 times to date, at every other year throughout childhood and at ages 26, 36, 43, 53, 60-64 (Kuh et al., 2011; Wadsworth et al., 2006)

and most recently at age 68-69 (Kuh et al., 2016) allowing researchers to investigate how biological, psychological and social factors influence development and the ageing process. Funded by the Medical Research Council since 1962, there has been a focus on physical and mental health and ageing throughout most of adult life (Wadsworth et al., 2006). In mid-adulthood, the study's aims shifted to focus on the pathways that contribute to physical and mental health outcomes (Wadsworth et al., 2006), demonstrating the impact of childhood and adulthood experiences and exposures on later health outcomes.

The study has benefitted from diligent follow up, ensuring that response rates remain high and that the cohort remains representative of people born in mainland Britain in 1946 (Stafford et al., 2013). At age 68-69, at the time of the most recent data collection sweep to this thesis, there were 2816 remaining study members (52.5% of the original 5362 study members); 18% of the original cohort had died, 12% had withdrawn from the study, 11% had emigrated and 7% were untraceable (Kuh et al., 2016). Attrition was highest in early adulthood, when study members often changed names and addresses (Wadsworth et al., 2006). However, retention of study members into older adulthood has been successful, with an overall response rate of 84% of the target sample at age 60-64 (Stafford et al., 2013) and 94% at the most recent data collection, age 68-69 (Kuh et al., 2016). Participation in the study (both at age 68-69 and throughout adult life) was associated with higher social class, educational attainment and cognitive ability in childhood (Kuh et al., 2016).

At the time of writing this thesis, data from the latest sweep (at age 68-69) were becoming available, thus this work benefitted from recent health management data (which is presented in Chapter 6) and more repeated measures for many health and social variables (including social class, smoking behaviour and marital status). However, due to timings of availability of some data and the timeline of the work done for this thesis, the latest data for some measures were not available for use at the time the analysis was performed for Chapter 6. This was the case for the measure of adult health (a count measure of health conditions, described in section 3.4.2.3). In Chapter 6, the analysis assessing health management at age 68 uses the measure of health taken from age 53, used in Chapter 5, as the best available measure of adult health.

The focus of data collection has changed over time. Although management of health and symptoms and health care use has not been a primary focus, NSHD does have a reasonable amount of information relating to this, captured at several points during the life course. In consideration of this in addition to other strengths, including the nationally representative sample who, at the time of this thesis, were the first generation to grow

up with access to the NHS, the repeated measures and extensive health and social information collected throughout life and the high quality data collected for research purposes (Wadsworth et al., 2006), it was concluded that NSHD would be an appropriate and an interesting dataset to use to further explore health management using a novel approach for this thesis.

3.2.2 Introduction to the MRC NSHD Women's Health sub-study

The Women's Health sub-study aimed to track women's health and wellbeing through the menopausal transition. Between 1993 and 2000 (age 47-54) women in the study were sent annual postal questionnaires and asked each year about menstrual regularity and last menstrual period, and various women's health symptoms (Kuh, Wadsworth, & Hardy, 1997). Each year women were asked about the symptoms they experienced and how bothersome they were. In addition, women were asked about hormone replacement therapy (HRT) use, attitudes towards the menopause, general health and wellbeing and life circumstances. Postal questionnaires were completed at least once between ages 47 and 54 by 1572 (87.5%) women out of the eligible sample of 1797 women who were still alive and had not withdrawn or been lost to follow-up. Of these 1572 women, 1005 (63.9%) completed the questionnaire every year and 1164 (73.9%) completed at least 7 out of the 8 questionnaires.

At age 54, women were asked in more detail about how they had managed some of their symptoms over the previous 10 years, specifically hot flushes and night sweats (HFNS), trouble sleeping, vaginal dryness, nervous and emotional symptoms and urinary symptoms. Women reported for each of these five symptoms whether or not they had consulted a health professional in the last 10 years and if they had managed their symptoms using non-prescribed medicines or treatments or changing behaviour (to be referred to as self-management from hereon in). These particular symptoms were looked at in more detail as they were common in midlife, although not necessarily directly associated with the menopause. In NSHD, some symptoms, such as HFNS, vaginal dryness and difficulties with intercourse, were found to be associated with the menopause but other symptoms, such as nervous and emotional symptoms were not generally related to timing of menopause (Hardy & Kuh, 2002; Kuh, Hardy, Rodgers, & Wadsworth, 2002). Symptoms considered to be secondary to symptoms of the menopause are common in midlife; for instance, trouble sleeping is not directly related to the menopause but may be caused by disrupted sleep due to night sweats (Deeks, 2003). In NSHD, symptoms of stress incontinence but not symptoms of urge incontinence were associated with the menopause (Mishra, Cooper, & Kuh, 2010).

Urinary symptoms, particularly symptoms of urge incontinence, are more associated with increasing age (Rekers, Drogendijk, Valkenburg, & Riphagen, 1992; World Health Organisation, 1996). For these reasons, the symptoms women experienced in midlife explored in this thesis (HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms) shall be referred to generally as women's symptoms rather than labelled as menopausal symptoms.

3.3 Measures of health management

Examples of the questionnaires, from which the measures of health management described in this section (and women's symptom experience, described in section 3.4.2.8) are included in the Appendix 1. A table summarising all health management variables is included below (Table 3.1) and a full table detailing all explanatory and outcome variables is also found in Appendix 2 (Table A.1).

Table 3.1 Summary of health management measures

Response to health challenge	Health challenge	Age	Details of symptoms or conditions and coding
Health professional consultation at age 43	Any conditions	43	Whether consulted or not in the last 12 months for 1 or more conditions or symptoms from the list given in Table 3.2
	Psychological symptoms	43	Whether consulted or not in last 12 months for psychological symptoms (nervous/emotional symptoms or trouble sleeping)
	Musculoskeletal symptoms	43	Whether consulted or not in last 12 months for musculoskeletal symptoms (arthritis or back pain)
Management of women's symptoms in midlife		54	Symptom management for each of the following symptom (HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms, urinary symptoms) (coded: consulted professional, self-managed, both consulted and self-managed, neither)
			Propensity to consult a professional across multiple women's symptoms
			Propensity to self-manage across multiple women's symptoms
Women's general health self-management		54	Whether self-managed general health
Health check attendance		68	Number of recommended health checks not attended by men and women

3.3.1 Health professional consultation at age 43

At age 43, 3262 study members (1634 men and 1628 women) were interviewed at home by research nurses and asked whether they had experienced 27 health conditions (shown in Table 3.2) either once or multiple times, when they last experienced each condition and if they had consulted a doctor or health professional regarding that condition in the last 12 months. Of the 3262 study members, 2585 (79.3%) reported one or more of these conditions and the remaining 20.7% reported none.

Table 3.2 Health conditions reported by study members at age 43[1]

Health condition	Number (%)
No symptoms/conditions	677 (20.7%)
Sciatica, lumbago or severe backache	761 (23.3)
Severe headaches or migraine	710 (21.8)
Arthritis/rheumatism	469 (14.4)
Piles or haemorrhoids	467 (14.3)
Allergies	441 (13.5)
Hay fever	431 (13.2)
Skin trouble	409 (12.5)
Trouble with sleeping	408 (12.5)
Stomach trouble	405 (12.4)
Nervous or emotional trouble	384 (11.8)
Varicose veins	381 (11.7)
Dizziness/unsteadiness	254 (7.8)
High blood pressure	207 (6.4)
Gums/mouth trouble	207 (6.4)
Kidney/bladder infection	142 (4.4)
Persistent constipation	128 (3.9)
Anaemia/blood disorder	122 (3.7)
Asthma	120 (3.7)
Bronchitis	187 (3.5)
Heart trouble	63 (1.9)
Hernia	60 (1.8)
Cataracts/glaucoma/serious eye trouble	52 (1.6)
Diabetes	33 (1.0)
Liver trouble	32 (1.0)
Epilepsy	29 (0.9)
Cancer	26 (0.8)
Gall bladder trouble	21 (0.6)

[1] Frequencies of symptom reporting are presented by sex in Table 4.2 (Chapter 4)

Study members who reported they last experienced any of these conditions at ages 42, 43 and 44 were identified. As 90% of interviews were carried out in the first 6 months following participants' 43rd birthdays, this was considered an 18 month prevalence measure (Kuh, Coggan, Mann, Cooper, & Yusuf, 1993). It was also recorded whether study members had had each condition just once or if it was recurring.

A binary variable was created to identify any study members who experienced any one of these conditions at ages 42, 43 or 44. For those study members who reported at least one condition between 42-44 years (N=2585), an additional binary variable was created to distinguish study members who reported consulting either a doctor or other health professional for at least one condition from those who had no consultations. This variable was coded as 0 if study members did not consult a health professional regarding their health condition(s) and 1 if they did consult.

To explore whether the correlates of consultation differed between different types of symptoms (as per hypothesis 1, see section 3.1), certain groups or clusters of symptoms were identified from the list of the 27 conditions (shown in Table 3.2). An exploratory factor analysis (EFA) that included all conditions indicated that most did not appear to load onto any meaningful factors (the factor loadings were generally low and most of the factors did not represent logical clusters of symptoms), however, nervous/emotional symptoms and trouble sleeping loaded on to one factor and arthritis/rheumatism (which will be abbreviated to arthritis) and sciatica, lumbago or severe backache (to be referred to collectively as back pain) loaded on to another. It was thought that nervous/emotional symptoms and trouble sleeping were indicative of psychological symptoms and that both arthritis and back pain represented musculoskeletal symptoms. To assess whether these groupings were reflected in the data, a confirmatory factor analysis (CFA) was performed, where these four conditions were loaded on to two factors. The factor analysis showed that the symptoms loaded onto the respective factors (shown in Figure 3.1), confirming the two factors and justifying the further analysis of these 'clusters' of symptoms. The goodness of fit statistics for this model were: RMSEA<0.01 (<0.05 is considered indicative of a good fit), CFI=1.00, TLI=1.00 (>0.95 indicates a good fit) and SRMR=<0.01 (<0.08 indicates a good fitting model) (Hu & Bentler, 1999; Steiger JH, 1989).
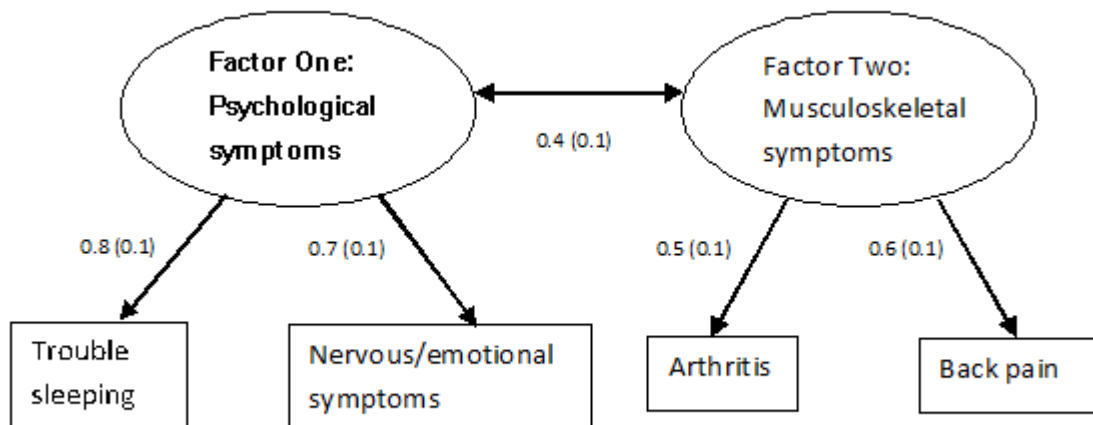
Figure 3.1 A two-factor confirmatory factor analysis model of symptoms showing standardised estimates and (standard errors)

To measure consultation for psychological and musculoskeletal symptoms, two binary variables were created to identify study members who had reported having psychological symptoms (either nervous/emotional symptoms or trouble sleeping) and musculoskeletal symptoms (either arthritis or back pain) between ages 42-44. Binary variables were created to measure frequency (once or recurring) and consultations for psychological and musculoskeletal symptoms. Each of these variables included only study members who reported psychological or musculoskeletal symptoms between ages 42-44.

3.3.2 Management of women's symptoms in midlife

Annually, between the ages of 47 and 54, women were asked if they had experienced HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms and, if so, had it bothered them: not at all, a little, or a lot.

At age 54, women were asked if, in the last ten years: (1) they had consulted a doctor or health professional about each symptom and (2) if they had regularly taken any non-prescribed medicines or treatments or changed their behaviour to relieve that symptom (to be summarised as self-management from hereon in). For each symptom, consultation and self-management were measured using binary variables, where 0 indicated study members did not consult/self-manage and 1 indicated study members did consult/self-manage. Using these binary variables, for each of the five symptoms, a four-level categorical variable was created to identify four mutually exclusive groups of women (including only women who reported experiencing a particular symptom): (1) those who sought professional help and did not self-manage their symptom, (2) those who self-managed their symptom and did not consult a professional, (3) those who both self-

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managed and consulted a professional and (4) those who did neither. These variables represented four management approaches for each of the five individual symptoms and where used in analyses, included only study members who experienced the symptom. These variables included four mutually exclusive groups of symptom management types for the purpose of investigating what factors were associated with adopting a particular management type and then comparing across symptoms.

3.3.3 Women's self-management of general health in midlife

Also at age 54, as part of the Women's Health sub-study, study members were asked if they "regularly take non-prescribed medicines, use alternative treatments or therapies or follow a special diet or exercise regime to maintain or restore your health, reduce your risk of chronic health problems or to slow down the effects of ageing on your body or your brain?".

In a free text section of the questionnaire, study members listed up to nine behaviours, treatments or non-prescribed medications they used to manage their general health. Their free text responses were coded for each particular behaviour, treatment type, or a non-prescribed medication. These behaviours/techniques broadly fell into the following categories: non-prescribed medication, exercise/physical activity, complementary and alternative medicine (CAM), diet and 'other' approaches. To assess whether the correlates of different types of self-management behaviours differed within the sample, women's responses were grouped collectively as self-management behaviours, with diet and exercise grouped together as one category of behaviour, and use of CAM and non-prescribed medication grouped together as another category. Associations between the childhood and adulthood factors used in the models throughout this thesis (described in section 3.4) and the summary and sub-categorical measures of self-management were tested (shown in Table A.2, in Appendix 2). Although the sample size for each measure differs, the size and direction of the odds ratio are generally similar indicating that the associations with each of the childhood and adulthood health and social factors are similar for both types of self-management (diet and exercise/CAM and non-prescribed medication use). As these results suggested that there were generally no differences in the correlates of different self-management behaviours, they were collectively analysed using one summary measure of general health self-management.

Although women provided up to nine responses, they were not quantitatively comparable across the sample; for example, some women listed "exercise" as one item, whereas others itemised the different types of exercise or activities they did, eg, "swimming",

"walking", "cycling". A similar contrast between the use of 'umbrella terms' and individual behaviours was found in other categories of behaviours, including diet, thus, it was not appropriate to use a count measure of self-management behaviours. A binary variable measuring women's self-management of general health was created to identify study members who reported utilising at least one behaviour or treatment type in response to the question. This binary measure was used to identify women who reported self-managing their general health (coded as 1), compared to those who did not (coded as 0).

3.3.4 Health check attendance at age 68

At age 68, study members were asked in a postal questionnaire about their participation in preventive health care. Questions were based on a subscale of a health risk appraisal instrument designed for use in older people (Stuck et al., 2007). Health checks for blood pressure measurement, cholesterol measurement, colon cancer screening and influenza (flu) vaccination were included under the domain of 'preventive care' and oral health care and eye sight checks were included in the measure under their own respective domains. Stuck and colleagues developed and tested the instrument in England, Germany and Switzerland, with appropriate adaptations for regional differences in access to preventive care services. The preventive care subscale was further adapted for use in NSHD based on recommendations for preventive health care services in 2014, with regard to the recommended time frames within which to attend.

In NSHD, study members were asked about attendance to six health checks within the recommended time frame for over 60 year olds. The health checks study members were asked about included blood pressure and cholesterol checks, which are part of the NHS Health Check programme. These health checks are recommended to adults between ages 40-74 and take place in general practice and other community health care settings, with the aim of identifying cardiovascular risk in a non-clinical population (Artac et al., 2013). It is recommended that adults over 40 have their blood pressure and cholesterol checked at least every five years (NHS Choices, 2014b). Additional preventive health care measures NSHD study members were asked about were receiving the flu jab, which is recommended yearly for those over 65 (NHS Choices, 2016b), taking part in colon cancer screening, which is recommended every two years for adults aged 60-74 (NHS Choices, 2014a), eyesight checks and dental check-ups (recommended for all adults every two years (NHS Choices, 2015a, 2015b)). Although it could be said that the different health care settings applicable to these health checks (ie, in a GP practice compared to dentist's clinic or optician's) may be associated with different health and

social factors, they are all voluntarily attended, thus attendance to each of these health checks was considered to be proactive heath management behaviour.

When asked if they had attended each health check within the recommended time frame, study members responded either 'Yes', 'No' or 'Don't know'. Binary measures of attendance for each of the above health checks were created, where No responses were coded as 0 and Yes as 1 (Don't knows were coded as missing; the number of Don't Know responses ranged between N=3-47 across all measures of attendance), and a count measure totalling the number of health checks not attended within the recommended timeframe was generated. Study members' scores ranged from 0-6, where 0 indicated no missed checks (ie, study members reported attending all 6 health checks within the recommended time frame) and 6 indicated that study members did not attend any health checks.

3.4 Explanatory variables: Health and social factors from childhood and adulthood

3.4.1 Health and social factors from childhood

3.4.1.1 Childhood health

For each of the following age bands, 0-4 years, 5-10 years, 11-15 years, 16-20 years and 21-25, hospital admissions lasting more than 28 days were used to indicate serious illness and were coded to 32 broad categories, based on the International Classification of Diseases (ICD8). ICD is a standard health care classification tool, used to assign a numerical code to a health condition. For the purpose of this thesis, binary variables were created to indicate no serious health conditions resulting in hospital admissions (coded as 0) or any hospital admission lasting 28 days or more due to serious illness (coded as 1) between birth and age 25. This variable reflects more serious health conditions in childhood and early adulthood (0-25 years; although this measure will be referred to as 'childhood' illness), for which study members were admitted to hospital.

3.4.1.2 Childhood social class

Study members' childhood social class was coded using fathers' occupational classification. Father's occupation was recorded at ages 4, 11 and 15. Fathers' social class was defined as: 'professional', 'intermediate', 'skilled (non-manual)', 'skilled (manual)', 'partly skilled', 'unskilled', based on the Registrar General 1971 occupational classification system. A summary categorical variable for childhood social class used

social class at age 11 where available, and if not, social class at age 15 or 4 was used. This variable was coded 0-5, where 0 indicated study members' fathers were in an unskilled professional, representing low social class and 5 indicated professional occupational grade, ie, an upper social class, so that positive coefficients for the socioeconomic indicators were consistent for ease of interpretation.

3.4.1.3 Adolescent self-organisation

Adolescent self-organisation, a childhood measure of personality, was measured using teacher ratings of children's conduct in school, capturing behaviours such as attitudes to work, concentration, neatness and not daydreaming in class. These behaviours were identified as a latent measure of self-organisation in a factor analysis of adolescent conduct (Xu et al., 2013). Self-organisation was recorded twice, at ages 13 and 15. Where study members had data at both these time points, the mean of the two scores was taken as a measure of self-organisation. For those study members who were missing data at one time point, the single score of self-organisation either at age 13 or 15 was used (of the N=3502 study members who were included in this thesis (ie, provided data at ages 43, 54 and/or 68), N=3013 had self-organisation data at age 13 and N=2960 had data at age 15; utilising data from either one or both these time points meant that N=3100 study members had a score for adolescent self-organisation). The range of this factor score was -1.7 to 2.3, where a higher score represented worse self-organisation. The original factor score was transformed (reversed) for the purpose of this thesis so that higher scores represented higher self-organisation. The range for the transformed score was 1 to 5.05.

3.4.2 Health and social factors from adulthood

3.4.2.1 Educational attainment

Study members' educational attainment by age 26 (when most individuals have completed 'formal education' (Hatch, Feinstein, Link, Wadsworth, & Richards, 2007)) was measured using a summary variable based on the Burnham scale (Department of Education and Science, 1972) using education data from previous questionnaires. In this analysis, study members were grouped as having completed no qualifications, lower secondary (including vocational courses and sub GCE, O level or Burnham C level education), advanced secondary (including A level or Burnham B/A2 education) or degree-level education by the age of 26 (Silverwood, Pierce, Nitsch, Mishra, & Kuh, 2012). In this four-level categorical variable, the lowest score represented lowest levels of educational attainment and the highest score the highest levels of attainment.

3.4.2.2 Social class

A summary variable was used to categorise study members' own social class (using the same levels as described above for childhood social class) based on the most recent occupation (this was the case for both men and women). In Chapter 4, this variable used study members' own current social class at age 43. In Chapters 5 and 6, study members' social class was taken at age 53.

3.4.2.3 Health status

Several measures of adult health status were used throughout this thesis. In each chapter, a summary measure of the number of health conditions reported was used as an indicator of general health, where more conditions represented worse health and higher comorbidity burden. In Chapter 4, a measure was created to sum the number of health conditions study members reported experiencing in the last 10 years at age 43 (from the list of conditions shown in Table 3.2). At age 53, study members (both men and women) reported whether they had experienced any of the following conditions in the last ten years: anaemia, asthma, blood pressure problems, cancer, diabetes, gall bladder problems, headaches, heart attack, kidney or bladder infections, liver disease, chronic fatigue syndrome, skin problems, stomach trouble, stroke, thyroid disorder. A summary measure totalling the number of conditions reported at age 53 was used as a measure of health status in midlife in both Chapters 5 and 6.

As part of the women's health study, women were asked at age 51 if they had ever experienced premenstrual tension (PMT). A binary measure of previous PMT (0 = no previous PMT; 1 = ever experienced PMT) was used in Chapter 5 as a measure of adverse women's symptoms throughout reproductive years.

3.4.2.4 Health care utilisation

Several measures of previous health care utilisation were used in the analysis, although some were only applicable to the results involving women's management of health (Chapters 5 and 6).

Visits to the GP for any reason in the previous year were reported by study members at ages 20, 22 and 31. These data were used to indicate regularity of access to GPs in earlier adulthood. For this thesis, a binary variable of GP attendance in earlier life (where 0 = did not access GP services and 1 = did access GP services) used data of attendance at age 31 where available and, if not, at 20, then 22 (N=375 extra cases were added using data from age 20 or 22).

Women were asked at age 43 if they had ever taken the contraceptive pill. At age 47, they were asked if they had taken the contraceptive pill in the last four years. Using these variables, a summary variable was created to identify women who had ever used the pill up until age 47, when the women's health project commenced. This measure was used to indicate the medical management of women's reproductive health throughout her reproductive years.

Screening attendance was measured in female study members. Women reported when they last attended a cervical smear at age 43. They responded as having attended in the last year, in the last five years, at least five years ago, or never. For this thesis, a binary variable was created to identify women who had ever previously attended a cervical smear. During a nurse visit, women were asked at age 53 if they had ever attended a mammogram. In the UK, women are invited to attend routine mammograms from the age of 50 (Cancer Research UK, 2014), so by this point study members should have been invited to attend screening. A binary measure was also used to measure mammogram attendance by age 53. For both these measures of screening attendance, those who did not attend were coded as 0 and those who did attend as 1.

3.4.2.5 Health behaviours

Smoking status was recorded at ages 20, 26, 36, 43, 53, 60-64 and 68. A lifetime smoking trajectory variable collated smoking data to categorise study members as 'never smoked', 'predominantly non-smoker', 'predominantly smoker' or 'lifelong smoker' (Clennell et al., 2008). In Chapter 4, this measure included only smoking data up to the age of 43, in Chapter 5, up to age 53 and Chapter 6, this was updated up to age 68.

Summary variables for exercise levels at age 36 and 43 categorised study members as 'inactive', 'less active' or 'most active' were used in the analysis. At age 36, study members were asked about their participation in sports and leisure activities in the last four weeks; at age 43 no such time frame was used and study members were asked about their activities in general. Study members were coded as being either 'inactive', 'less active' if they participated in between one and four activities in the last month/per month or 'most active' if they participated in a least five activities in the last month/per month (Cooper, Mishra, & Kuh, 2011) and a low score (0) indicated no activity and a high score (2) indicated the highest level of activity. This measure used data from age 43 where available and from age 36 if not.

3.4.2.6 Personality and attitudes towards health

Personality data were collected at age 26 using the Maudsley Personality Inventory (Eysenck, 1958). Personality data were also collected at ages 13, 16 and 19, but data from age 26 was used as a measure of adult personality, as personality is generally considered to be a stable trait (McCrae, 2002). Each scale for both neuroticism and extraversion comprised of six items, to which study members responded either 'no', 'don't know' or 'yes', which were coded as 0, 1 or 2, respectively. Thus, for both neuroticism and extraversion, study members scored from 0 to 12, where 0 represents the lowest level of extraversion or neuroticism and 12 the highest.

At age 47, to mark the beginning of the women's health study, women were asked how they felt towards the menopause and could report whether they experienced feelings of regret or relief, mixed feelings or no feelings. A categorical measure of attitudes towards the menopause was included as an indicator of positive, neutral or negative feelings towards the menopause.

3.4.2.7 Family support

3.4.2.7.1 Marital status

A measure of current marital status was used in each chapter; a categorical measure defined study members as single, married, separated, divorced or widowed, at ages 43, 53 and 68. Due to low numbers for the separated, divorced and widowed categories, these categories were combined.

3.4.2.7.2 Family related stress

Throughout the Women's Health sub-study, each year between ages 47-54, women reported whether or not they experienced any family related stress, particularly if they had experienced serious difficulties with a family member. Women responded if problems had got a little or a lot worse or a little or a lot better, reflecting an increase or decrease in stress in the last year. These scores ranged from 0-7, where a higher score represented higher levels of stress. For the analysis included in Chapter 5, a summary measure was created totalling the scores from each year (ranging from 0-49), thus a higher score represented enduring family-related stress (Kuh et al., 2002).

3.4.2.8 Women's symptoms in midlife

For the Women's Health sub-study, women were asked each year from age 47-54 if they had experienced HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms and the extent to which each symptom bothered them (not at all,

a little or a lot). Using these data, variables were created to denote symptom reporting, severity and duration. Binary variables were created to identify whether study members had reported each symptom on at least one occasion between 47 and 54 years, regardless of whether it had bothered them or not. These variables identified women who experienced symptoms in midlife. Additionally, binary variables were then created to measure how many women experienced each symptom every year between ages 47-54.

Symptom severity was measured for each symptom by creating a four-level variable to categorise women as having never reported the symptom, having reported the symptom but never being bothered by it, reporting the symptom at least once and being bothered, at most, a little by the symptom or having reported the symptom and, on at least one occasion, being bothered a lot by it. Binary variables were also created to identify, of those who reported a particular symptom, women who were not bothered by that symptom (coded as 0) and those who, at least once, reported being bothered either a little or lot by that symptom.

The number of years study members reported experiencing bothersome symptoms was measured by identifying study members who reported being bothered a little or a lot by a particular symptom each year, using binary codes for each year of the study, and creating a cumulative total variable to indicate how many years study members were bothered a little or a lot by each symptom. Given that the sub-study ran for 8 years, these variables ranged from 0-8 years. As these were cumulative totals, the years symptoms were reported were not necessarily consecutive, thus, these variables do not represent duration per se, but rather the proportion of time the study spanned that study members were bothered by symptoms. These variables were treated as continuous, with each incremental increase representing a further year study members were bothered by each symptom.

A table summarising all measures (outcomes and explanatory variables), the year they were measured and the section of analysis in which they were used is included in the appendices (see Table A.1).

3.5 Analytical sample

3.5.1 Consultation at age 43

The eligible sample used in Chapter 4 included male and female study members who completed the questionnaire at age 43 (N=3262), however the analytical sample included only men and women who reported experiencing at least one health condition (of those listed in Table 3.2) between the ages of 42-44 (N=2585; 79.3% of the eligible sample). For analyses specific to the health consultation outcome for psychological symptoms, only study members who reported psychological symptoms (nervous/emotional trouble or trouble with sleeping) were included (N=640). The models exploring consultation for musculoskeletal symptoms also included only study members who had reported these symptoms (arthritis or back pain; N=1044).

3.5.2 Women's health

For the analysis exploring the management of women's symptoms, the analytical sample comprised the 1005 women that completed the questionnaire every year between ages 47-54. This decision was made to allow for the most accurate measures of symptom experience, thus only study members who provided data each year were included (missing symptom data were not imputed).

Of the 1005 women, only three did not report any symptoms between the ages of 47 and 54. Of these women, 2 responded that they consulted a professional or self-managed symptoms. Possible explanations for this are the accidental omission of symptom experience in previous years or utilising these management strategies pre-emptively before symptoms manifested and thus avoiding symptoms altogether. This left 1 woman who did not experience symptoms and did not report managing symptoms. These women were kept in the analytical sample but as models addressing associations with symptom experience included only women who reported experiencing symptoms, they were not included in analyses which were not relevant to them.

For the analysis exploring women's self-management of general health, the analytical sample comprised women who completed the questionnaire at age 54 (N=1308).

3.5.3 Health check attendance in later life

The analytical sample comprised men and women who completed the postal questionnaire at age 68 (N=2452).

3.5.4Health management across the life course

The analytical sample included men who completed questionnaires at age 43 and 68 (N=1062) and women who completed the questionnaires at ages 43, 54 and 68 (N=1034). The women's health models where measures of management of symptoms in midlife were used either as an exposure or an outcome included all women who completed questionnaires at ages 43, 54 and 68, not just women who reported symptoms at age 54. This decision was made as, of the analytical sample (N=1034), only 10 women (0.97%) reported not experiencing trouble sleeping, vaginal dryness, nervous/emotional symptoms or urinary symptoms and 90 (8.70%) women reported not experiencing HFNS. Thus, the number of women in the analytical sample who did not report symptoms in midlife was low and they were retained in the analysis to preserve the analytical sample across women's health management models to allow for models to be compared.

3.6 Sample descriptives

The characteristics of all study members who provided data at either age 43, 54 (women only) or 68 (N=3502), and thus were included in the analyses presented in Chapters 4, 5 or 6, are shown in Table 3.3. Table 3.3 includes only descriptives for the common explanatory variables used in each chapter; where a variable is measured at a particular age and used only a certain chapter, the descriptives are presented in that chapter.

Table 3.3 Descriptive statistics of whole sample included in thesis; ie, men and women who provided data at ages 43, 54 or 68 (N=3502)

Potential explanatory variables			
		N	**%[1] [2]**
Childhood serious illness resulting in hospital admissions (age 0-25)	No reported admissions	2391	68.3
	Reported admission(s)	1110	31.7
	Missing[4]	*1*	*0.03*
		N	**%**
Childhood social class (father's occupational grade)	I. Professional	212	6.4
	II. Intermediate	666	20.1
	III (NM). Skilled (non-manual)	545	16.5
	III (M). Skilled (manual)	1057	31.9
	IV. Partly skilled	623	18.8
	V. Unskilled	209	6.3
	Missing	*190*	*3.6*
Mean self-organisation score age 13-15 ($\bar{x}$, SD)[3]		$\bar{x}$=3.36	SD=0.70
	Missing (N, %)	*402*	*11.5*
		N	**%**
Educational attainment at age 26	No qualifications	1222	37.2
	Lower secondary	912	27.7
	Advanced secondary	827	25.1
	Degree	328	10.0
	Missing	*213*	*6.1*
		N	**%**
Binary measure of GP visits in earlier adulthood	Reported not visiting GP	1382	41.0
	Reported visiting GP	1988	59.0
	Missing	*132*	*3.8*

[1] Percentage totals exclude unknown cases

[2] Where percentage totals do not add up to 100% this is due to rounding

[3] $\bar{x}$= Mean, SD= Standard deviation

[4] N, % of whole sample (N=3502)

			N	%
Health behaviours	Level of physical activity in earlier adulthood	Inactive	1699	52.1
		Less active	753	23.1
		Most active	810	24.8
		Missing	*240*	*6.9*
Personality		Mean extraversion age 26 ($\bar{x}$, SD)	$\bar{x}$=7.9	SD=3.0
		Missing (N, %)	*433*	*12.4*
		Mean neuroticism age 26 ($\bar{x}$, SD)	$\bar{x}$=6.3	SD=3.8
		Missing (N, %)	*435*	*12.4*

3.7 Management of missing data

All of the explanatory variables had missing data with the exception of family related stress. (The percentage of missing observations for each variable out of the sample of study members who provided data at age 43, 54 or 68 are shown in Tables 3.3, 4.1, 5.1, 5.2 and 6.1.) For each chapter, multiple imputation models using chained equations were used to impute missing explanatory variables so that each of the bivariate, multivariable or structural equation models (within one chapter/section of analysis) included the same analytical sample. Imputation models included all explanatory variables used in each chapter, irrespective of whether they were being imputed or were complete, as they were thought to be likely to be related to health management and to missingness. The models also included the relevant outcome measures to inform imputation (ie, consultation at age 43, women's symptom and general health management at age 54 and health check non-attendance in later life) and, where available, measures of symptom experience (symptom frequency at age 43 and women's symptom bothersomeness in midlife), but imputed outcome data were not used in the analytical part of the model. Five imputed values were generated for each variable with missing data, which were then combined as per Rubin & Schenker (1991). Comparisons between percentages and means of complete case and imputed data are reported in the Appendix (Tables A:3, A:4 and A:5), showing that distributions imputed data were very similar to complete case data.

3.8 Analytical strategy

All analyses described in this section and presented throughout this thesis were done using Stata 14 and MPlus 6. The specific analytical procedures used will be described in each chapter in detail. Generally, bivariate associations were examined using regression models, which were then followed by adjusted multivariable or structural equation models (including other childhood and adulthood health and social factors or, where available, measures of symptom experience) to understand the pathways between the explanatory variables and health management outcomes.

The following chapter, the first of four results chapters, will explore associations between the explanatory variables described in section 3.4 and the measures of health professional consultation at age 43, described in section 3.3.1, for any health conditions, psychological symptoms and musculoskeletal symptoms.

4 Management of health conditions and symptoms in mid adulthood

The aim of this chapter is to investigate the health and social factors from childhood and adulthood associated with consultation for health conditions, psychological symptoms and musculoskeletal symptoms reported at age 43. Objectives and hypotheses 1-7 (see Chapter 3, pages 74-79) are relevant for this chapter.

4.1 Analytical strategy

At age 43, MRC National Survey of Health and Development (NSHD) study members were asked about their experience of a wide range of health symptoms and conditions (henceforth called conditions) and whether they had consulted a doctor or other health professional. As described in more detail in Chapter 3, section 3.5, the analytical sample included 2585 men and women who reported experiencing at least one health condition between the ages of 42 and 44. The outcomes used in this chapter are consulting a health professional for any condition, consulting for psychological symptoms, or consulting for musculoskeletal symptoms. The childhood explanatory variables (early serious illness, childhood social class and adolescent self-organisation) and the adulthood health and social explanatory variables (educational attainment, adult social class, number of health conditions reported age 33-43 years, previous GP visits, current physical activity, smoking trajectory to age 43, extraversion, neuroticism and marital status) were described in section 3.4.

Logistic regression models were used to test for associations between childhood and adulthood health and social factors and consultation for any conditions, psychological symptoms and musculoskeletal symptoms. The first stage of analysis involved running bivariate regression models where the binary consultation measures were regressed onto each of the explanatory variables and adjusted for sex and (for psychological and musculoskeletal symptoms only) symptom frequency (using binary measures of experiencing symptoms for the first time compared to recurring symptoms) (Model 1). All explanatory variables were tested for sex interactions; none were found, so results were not stratified by sex but all models were sex-adjusted.

For the next analytical stage, multivariable regression models were created for each measure of health consultation (for any conditions, for psychological symptoms and for musculoskeletal symptoms). Model 2 included all childhood variables found to be associated bivariately with consultation, to examine whether childhood social class and health in childhood contributed independently to the likelihood of consultation. In Model

3, all adult explanatory variables bivariately associated with consultation were included, to assess which factors, if any, were associated with consultation independently.

In the fourth model, to assess which associations were attenuated following adjustments and which factors remained independently associated with consultation, the binary consultation outcomes were regressed on to all variables found to be bivariately associated with consultation. This model would demonstrate whether associations between childhood factors and consultation were explained by adult exposures and experiences.

A series of analyses were performed, first for consultation for any conditions, where models included study members who reported experiencing at least one condition (N=2585) and then for consultation for psychological symptoms and musculoskeletal symptoms, where only study members who reported experiencing either psychological or musculoskeletal symptoms were included in analysis (N=640 and N=1044, respectively).

4.2 Descriptive statistics

In addition to the explanatory variables shown in Table 3.3, measures specific to study members at age 43 were also used for this chapter. The descriptives for these variables are shown below in Table 4.1.

Table 4.1 Descriptive statistics for variables measured at age 43 in study members who completed the questionnaire at age 43 (N=3262)

Potential explanatory variables		N	%
Social class age 15-43	I. Professional	207	6.4
	II. Intermediate	1192	36.5
	III(NM). Skilled (non-manual)	752	22.2
	III(M). Skilled (manual)	578	17.7
	IV. Partly skilled	381	11.7
	V. Unskilled	122	3.7
	Missing	*30*	*0.9*
Number of health conditions age 33-43	No reported conditions	462	14.16
	One reported condition	662	20.29
	Two or more conditions reported	2138	65.55
	Missing	*0*	*0*
Smoking trajectory to age 43	Never smoker	948	29.15
	Ex-smoker	1330	40.90
	Smoker	974	29.95
	Missing	*10*	*0.31*
Marital status at age 43	Single	221	6.79
	Married	2595	79.67
	Separated/divorced/widowed	441	13.54
	Missing	*5*	*0.15*

4.3 Descriptive results

4.3.1 Health conditions and consultation frequency

Table 4.2 presents the health conditions study members were asked, at age 43, if they had experienced. The frequencies shown represent the number of study members who reported a particular condition, or reported no conditions, between ages 42-44 (considered an 18-month prevalence period, as described in section 3.3.1) and the percentage of the eligible sample (N=3262 study members who completed the questionnaire at age 43). No conditions were reported by 20.7% (N=677) of study members; these study members were excluded from further analysis, leaving an analytical sample of N=2585 study members who reported at least one condition for this chapter.

Table 4.2 Health conditions in the last year reported by NSHD study members at age 43

Health condition	Number (%)		
	Total N=3262	Male N=1635	Female N=1627
No symptoms/conditions	677 (20.7)	352 (21.5)	325 (20.0)
Sciatica, lumbago or severe backache	761 (23.3)	366 (22.4)	395 (24.3)
Severe headaches or migraine	710 (21.8)	264 (16.2)	446 (27.4)
Arthritis/rheumatism	469 (14.4)	191 (11.7)	278 (17.1)
Piles or haemorrhoids	467 (14.3)	231 (14.1)	236 (14.5)
Allergies	441 (13.5)	159 (9.7)	282 (17.3)
Hay fever	431 (13.2)	211 (12.9)	220 (13.5)
Skin trouble	409 (12.5)	211 (12.9)	198 (12.2)
Trouble with sleeping	408 (12.5)	195 (11.9)	213 (13.1)
Stomach trouble	405 (12.4)	234 (14.3)	171 (10.5)
Nervous or emotional trouble	384 (11.8)	141 (8.6)	243 (14.9)
Varicose veins	381 (11.7)	106 (6.5)	275 (16.9)
Dizziness/unsteadiness	254 (7.8)	93 (5.7)	161 (9.9)
High blood pressure	207 (6.4)	96 (5.9)	111 (6.8)
Gums/mouth trouble	207 (6.4)	94 (5.8)	113 (7.0)
Bronchitis	187 (5.7)	82 (5.0)	105 (6.5)
Kidney/bladder infection	142 (4.4)	26 (1.6)	116 (7.1)
Persistent constipation	128 (3.9)	25 (1.5)	103 (6.3)
Anaemia/blood disorder	122 (3.7)	22 (1.4)	100 (6.2)
Asthma	120 (3.7)	55 (3.4)	65 (4.0)
Heart trouble	63 (1.9)	30 (1.8)	33 (2.0)
Hernia	60 (1.8)	35 (2.1)	25 (1.5)
Cataracts/glaucoma/serious eye trouble	52 (1.6)	29 (1.8)	23 (1.4)
Diabetes	33 (1.0)	21 (1.3)	12 (0.7)
Liver trouble	32 (1.0)	16 (1.0)	16 (1.0)
Epilepsy	29 (0.9)	13 (0.8)	16 (1.0)
Cancer	26 (0.8)	6 (0.4)	20 (1.2)
Gall bladder trouble	21 (0.6)	5 (0.3)	16 (1.0)

With the exception of skin trouble, stomach trouble, hernia and cataracts/glaucoma/serious eye trouble, women generally reported more symptoms than men, however, most differences were fairly small. The biggest differences between symptom reporting were seen for severe headaches/migraines, varicose veins, allergies and nervous or emotional trouble, which women were more likely to report.

Of those who reported experiencing at least one of the health conditions shown in Table 4.2 between ages 42-44, 52.7% (N=1363) reported having consulted either a doctor or other health professional for one or more conditions in the last 12 months.

Table 4.3 shows the prevalence for psychological symptoms and musculoskeletal symptoms as defined by the factor analysis shown in Figure 3.1. As shown in Table 4.3, reporting musculoskeletal symptoms (32%) was more common than reporting psychological symptoms (19.6%). In the case of both psychological and musculoskeletal symptoms, most study members reported recurring symptoms (over 94%). Rates of health professional consultation were comparable, with 34% of study members with psychological symptoms between ages 42-44 consulting a professional in the last year and 38% of study members with musculoskeletal symptoms consulting a professional. Note that rates of consultation for psychological and musculoskeletal symptoms were lower than the rate of consultation for any conditions (52.7%).

Table 4.3 The 18-month prevalence, frequency and consultation at age 43 for psychological symptoms and musculoskeletal symptoms

N=3262		Psychological symptoms % (N)	Musculoskeletal symptoms % (N)
Reported symptom in the last 18 months % of eligible sample (N=3262), (N)		19.6 (640)	32.0 (1044)
Symptom frequency % of study members with symptom (N)	Once	5.9 (38)	5.8 (61)
	Recurring	94.1 (602)	94.2 (983)
Consulted professional % of study members with symptom (N)		34.2 (219)	37.6 (393)

4.4 Management of health conditions at age 43

Table 4.4 shows, for study members reporting at least one condition in the last 18 months at age 43 (N=2585), the sex-adjusted associations between childhood and adulthood health and social factors and health consultation for any conditions (Model 1), mutually adjusted associations between childhood factors and consultation (Model 2), mutually adjusted associations between adult factors and consultation (Model 3) and a fully

adjusted model including all variables significantly associated with consultation in Model 1 (Model 4).

Table 4.4 Sex adjusted associations between childhood and adulthood health and social factors and consulting health professional in the last year for any conditions at age 43

N=2585 **Potential explanatory variables**	**Model 1[1]** OR (95% CI)	**Model 2[2]** OR (95% CI)	**Model 3[3]OR** (95% CI)	**Model 4[4]** OR (95% CI)
From childhood				
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)	1.24 (1.05-1.46)**	1.18 (0.99-1.39)*		1.10 (0.92-1.31)
Childhood social class (per one class increase; unskilled → professional)	0.90 (0.85-0.96)**	0.93 (0.87-0.99)**		0.94 (0.88-1.01)*
Adolescent self-organisation (per one unit increase in the self-organisation factor score)	0.80 (0.71-0.91)**	0.84 (0.74-0.96)**		0.91 (0.78-1.06)
From adulthood				
Educational attainment at age 26 (per one level increase; no qualifications → degree level)	0.87 (0.81-0.94)**		0.91 (0.82-1.00)*	0.97 (0.86-1.09)
Adult social class (per one class increase; unskilled → professional)	0.92 (0.86-0.98)**		0.97 (0.90-1.05)	0.98 (0.91-1.06)
Total number of health conditions between ages 33-43 (per one condition increase)	1.41 (1.34-1.48)**		1.39 (1.32-1.46)**	1.39 (1.32-1.46)**
GP visits in earlier adulthood (compared to none)	1.40 (1.19-1.66)**		1.20 (1.01-1.43)**	1.20 (1.01-1.42)**
Level of physical activity in adulthood (per one level increase in activity; inactive → most active)	0.99 (0.90-1.08)			
Smoking trajectory to age 43 (Current smoker used as reference group) Never smoked	0.94 (0.77-1.15)			
Ex-smoker	1.07 (0.89-1.28)			
Personality age 26 Extraversion (per one unit increase)	1.02 (0.99-1.05)			
Neuroticism (per one unit increase)	1.04 (1.02-1.07)**		1.01 (0.99-1.04)	1.01 (0.99-1.03)
Marital status age 43 (married used as reference group) Single	0.95 (0.69-1.29)			
Separated/Divorced/ Widowed	0.87 (0.69-1.08)			

*p<0.10   **p<0.05

[1] Sex-adjusted
[2] Adjusted for childhood variables
[3] Adjusted for adult variables
[4] Adjusted for all variables associated bivariately with health consultation

4.4.1 Sex-adjusted bivariate associations between childhood and adulthood variables and health professional consultation for any condition

Bivariate results showed that each of the childhood explanatory variables were associated with consultation for any conditions at age 43 (Table 4.4, Model 1). Serious childhood illness was associated with an increased likelihood of consulting at age 43. Higher childhood social class and higher self-organisation in adolescence were both associated with a lower likelihood of consultation at age 43.

Of the health and social factors from adulthood, higher educational attainment and higher adult social class, both indicators of more advantageous SEP, were both associated with lower odds of consultation. Reporting more health conditions age 33-43 and previously consulting a GP in earlier adulthood were associated with a higher likelihood of consultation. Health behaviours (levels of physical activity in earlier adulthood and smoking trajectory) were not associated with consultation. Neuroticism, but not extraversion, was associated with greater likelihood of consultation. Marital status was not associated with consultation.

4.4.2 Multiply adjusted associations between childhood and adulthood variables and health professional consultation for any condition

In a multiply adjusted model including factors from childhood (Model 2), all associations were maintained although the estimates were slightly attenuated, mostly so for childhood serious illness.

After mutual adjustment for each of the adult factors associated bivariately with consultation (Model 3), reporting more health conditions and previously visiting a GP remained associated with a greater likelihood of consulting a professional. A slightly weaker association remained between higher educational attainment and a lower likelihood of consultation, but the associations between adult social class and consultation and neuroticism and consultation were fully attenuated.

In Model 4, the variables from both childhood and adulthood associated bivariately with consultation were included. The strongest associations remained those between previously visiting a GP and reporting more health conditions and a greater likelihood of consultation. A weak inverse association remained between childhood social class and consultation. All other associations were fully attenuated.

4.5 Management of psychological symptoms at age 43

Table 4.5 displays the bivariate associations, for study members who reported psychological symptoms (N=640), between health and social factors from childhood and adulthood and health professional consultation for psychological symptoms at age 43 (Model 1). Model 2 was not applicable for this section of analysis as childhood factors did not require mutual adjustment. The multiply adjusted model of health and social factors from adulthood associated with consultation is shown in Model 3 and the fully adjusted model of all childhood and adult factors associated with consultation for psychological symptoms is presented in Model 4. Note that all models are adjusted for sex and a binary measure of symptom frequency (experiencing psychological symptoms just once or recurring).

Table 4.5 Associations between childhood and adult health and social factors and consulting a health professional at 43 for psychological symptoms (adjusted for sex and symptom frequency)

N=640 Potential explanatory variables		Model 1[1] OR (95% CI)	Model 2[2] OR (95% CI)	Model 3[3] OR (95% CI)	Model 4[4] OR (95% CI)
From childhood					
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)		1.30 (0.92-1.84)			
Childhood social class (per one class increase; unskilled → professional)		0.92 (0.81-1.04)			
Adolescent self-organisation (per one unit increase in the self-organisation factor score)		0.74 (0.58-0.93)**			0.86 (0.65-1.13)
From adulthood					
Educational attainment at age 26 (per one level increase; no qualifications → degree level)		0.79 (0.66-0.94)**		0.97 (0.78-1.21)	1.01 (0.79-1.28)
Adult social class (per one class increase; unskilled → professional)		0.84 (0.74-0.95)**		0.89 (0.77-1.04)	0.89 (0.77-1.04)
Total number of health conditions between ages 33-43 (per one condition increase)		0.99 (0.93-1.07)			
Any GP visits in earlier adulthood (compared to none)		1.13 (0.78-1.65)			
Level of physical activity in adulthood (per one level increase in activity; inactive → most active)		0.79 (0.64-0.99)**		0.89 (0.70-1.12)	0.89 (0.70-1.12)
Smoking trajectory to age 43 (Current smoker used as reference group)	Never smoked	0.50 (0.32-0.77)**		0.56 (0.35-0.88)**	0.57 (0.36-0.91)**
	Ex-smoker	0.49 (0.33-0.71)**		0.52 (0.35-0.77)**	0.53 (0.36-0.78)**
Personality age 26	Extraversion (per one unit increase)	0.97 (0.92-1.03)			
	Neuroticism (per one unit increase)	1.06 (1.01-1.13)**		1.06 (1.00-1.12)*	1.06 (1.00-1.12)*
Marital status age 43 (married used as reference group)	Single	1.39 (0.77-2.52)			
	Separated/Divorced/Widowed	1.11 (0.73-1.68)			

*p<0.10   **p<0.05

[1] Sex and symptom frequency adjusted
[2] Adjusted for childhood variables
[3] Adjusted for adult variables
[4] Adjusted for all variables associated bivariately with health consultation in last year

4.5.1 Sex-adjusted bivariate associations between childhood and adulthood variables and health consultation for psychological symptoms

Bivariate analyses show that, after adjusting for sex and frequency of psychological symptoms, the only explanatory variable from childhood found to be associated with consultation was adolescent self-organisation, which was associated with a lower likelihood of consultation (Table 4.5, Model 1).

Higher educational attainment and adult social class were bivariately associated with a lower likelihood of consultation, as was reporting higher levels of physical activity in earlier adulthood and being a non-smoker or an ex-smoker, compared to being a smoker. Increasing levels of neuroticism were associated with increased likelihood of consultation. Number of heath conditions, previously visiting a GP and marital status were not associated with consultation.

4.5.2 Multiply adjusted associations between childhood and adulthood variables and health consultation for psychological symptoms

After mutual adjustment for all explanatory variables from adulthood associated bivariately with consultation for psychological symptoms (Model 3), associations remained between being a non- or an ex-smoker and a lower likelihood of consultation and, albeit weaker, between higher neuroticism and higher likelihood of consultation. Associations between educational attainment, social class and physical activity and consultation were all attenuated.

In the final multivariable model including all the factors bivariately associated with consultation (Model 4), being a non-smoker or ex-smoker remained associated with a lower likelihood of consultation and neuroticism remained weakly associated with a higher likelihood of consultation; however, the inverse association between self-organisation and consultation was attenuated.

4.6 Management of musculoskeletal symptoms at age 43

Table 4.6 shows the results from bivariate models testing the associations between each of the explanatory variables and a binary measure of consultation for musculoskeletal symptoms (Model 1) in study members who reported symptoms (N=1044). Table 4.6

also presents results from the multivariable model adjusted for childhood factors (Model 2), adult factors (Model 3) and all variables bivariately associated with consultation (Model 4). All models were adjusted for sex and a binary measure of symptom frequency (whether study members reported having symptoms once or recurring).

Table 4.6 Associations between childhood and adult health and social factors and consulting at 43 for musculoskeletal symptoms (adjusted for sex and symptom frequency)

N=1044 **Potential explanatory variables**	**Model 1**[1] OR (95% CI)	**Model 2**[2] OR (95% CI)	**Model 3**[3] OR (95% CI)	**Model 4**[4] OR (95% CI)
From childhood				
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)	1.32 (1.01-1.72)**	1.27 (0.97-1.66)*		1.26 (0.96-1.66)*
Childhood social class (per one class increase; unskilled → professional)	0.92 (0.84-1.01)*	0.94 (0.85-1.04)		1.00 (0.89-1.12)
Adolescent self-organisation (per one unit increase in the self-organisation factor score)	0.82 (0.68-0.99)**	0.84 (0.70-1.03)*		0.86 (0.70-1.06)
From adulthood				
Educational attainment at age 26 (per one level increase; no qualifications → degree level)	0.88 (0.77-1.01)*			0.94 (0.79-1.11)
Adult social class (per one class increase; unskilled → professional)	0.95 (0.86-1.05)			
Total number of health conditions between ages 33-43 (per one condition increase)	1.04 (0.98-1.10)			
GP visits in earlier adulthood (compared to none)	1.20 (0.91-1.57)			
Level of physical activity in adulthood (per one level increase in activity; inactive → most active)	1.10 (0.95-1.28)			
Smoking trajectory to age 43 (Current smoker used as reference group) Never smoked	1.04 (0.75-1.45)			
Ex-smoker	1.13 (0.84-1.52)			
Personality age 26 Extraversion (per one unit increase)	1.03 (0.98-1.07)			
Neuroticism (per one unit increase)	0.98 (0.95-1.02)			
Marital status age 43 (married used as reference group) Single	0.73 (0.40-1.35)			
Separated/Divorced/ Widowed	0.98 (0.68-1.42)			

*p<0.10   **p<0.05

[1] Sex-adjusted and symptom frequency
[2] Adjusted for childhood variables
[3] Adjusted for adult variables
[4] Adjusted for all variables associated bivariately with health consultation

4.6.1 Sex-adjusted bivariate associations between childhood and adulthood variables and health consultation for musculoskeletal symptoms

Serious illness in childhood was bivariately associated with an increased likelihood of consulting for musculoskeletal symptoms (Table 4.6, Model 1). Higher self-organisation and childhood social class were associated with a lower likelihood of consultation, although the association with childhood social class was somewhat weaker.

Of the explanatory factors tested from adulthood, only educational attainment was weakly associated with consultation, in that higher attainment was associated with a lower likelihood of consulting (Table 4.6, Model 1).

4.6.2 Multiply adjusted associations between childhood and adulthood variables and health consultation for musculoskeletal symptoms

In a multiply adjusted model including childhood factors (Model 2), the association between childhood illness and an increased likelihood of consulting remained but was slightly attenuated. Associations between childhood social class and self-organisation and consultation were fully attenuated.

In a final model including all variables bivariately associated with consultation (Model 4), the only association that remained was between childhood illness and a higher likelihood of consultation. The associations between self-organisation and educational attainment and lower consultation were attenuated.

4.7 Summary of results and discussion

The main factors independently associated with consultations for health conditions at age 43 varied depending on the condition/symptom type. Consultation for any condition was primarily driven by the number of health conditions over the previous ten years and GP visits in earlier adulthood; childhood social class remained inversely associated with consultation. Consulting for psychological symptoms was associated with higher levels of neuroticism and being a non-smoker was associated with a reduced likelihood of consultation. Consulting for musculoskeletal symptoms was associated with childhood hospitalisations for serious illness only. Therefore, one factor from childhood was independently associated with consultation for musculoskeletal symptoms, whereas associations with consultation for any conditions and psychological symptoms all operated through adult factors.

Across the three different categories of conditions/symptoms, self-organisation and educational attainment were bivariately associated with consultation and the directions of the associations were consistent (in that higher self-organisation and education were associated with lower consultation). However, as it was just these two variables that were similar across models, the results seem to suggest that the pathways and correlates of consultation vary between different types of symptoms. The only variables not associated with consultation for any of the symptom types were extraversion and marital status. Support for and against the hypotheses described in Chapter 3 will be summarised in sections 4.7.1-4.7.6 below.

The findings of this chapter resonate with the illness behaviour literature described in section 1.3. The majority of study members who reported conditions/symptoms did not consult a professional (47% of study members who reported any conditions, 66% of study members who reported psychological symptoms and 62% of study members who reported musculoskeletal symptoms did not consult). These results illustrate the 'illness iceberg' described by Hannay (1980), which suggests that individuals do not consult a professional regarding many of their symptoms. However, it should also be considered that consultation in mid-adulthood, including early 40s, when these data were collected, is at its lowest point across adulthood; rates of consultation begin to rise after the age of 45 (Hobbs et al., 2016). Both the illness iceberg and these data suggest that many individuals with conditions/symptoms are managing their health by ways other than consulting a professional; this may include self-managing and doing nothing. The results from this chapter are in line with this aspect of the illness behaviour literature and expand upon by investigating the correlates of consulting and not consulting in a symptomatic population/individuals with health conditions.

It is also worth noting that, whilst previous literature has consistently reported sex differences in consultation rates in mid-adulthood (in that consultation is higher in women than in men and the correlates of consultation differ between men and women (Briscoe, 1987; Corney, 1990; Gijsbers van Wijk, Kolk, van den Bosch, & van den Hoogen, 1995)), no sex interactions were found in these results (hence why results were not stratified and models were just adjusted for sex). This is may be because one of the reasons why consultation is higher for women than for men in mid-adulthood is due women consulting regarding reproductive health; a health challenge not included in this chapter. All conditions/symptoms for which consultation was explored in this chapter were not sex specific.

4.7.1 Socioeconomic circumstances and consultation

In contrast to Hypothesis 2 (described in Chapter 3), participants from a higher childhood social class were less likely to consult for any conditions in mid-adulthood. However, as was hypothesised, this association was attenuated by adult health and social factors. They were also less likely to consult for musculoskeletal symptoms and this was explained by them having less childhood illness resulting in hospitalisations and more adolescent self-organisation, which were associated with reduced likelihood of consulting for musculoskeletal symptoms.

Again contrary to the hypothesis, higher educational attainment and adult SEP were associated with a lower likelihood of consulting for any health condition; however, these associations were attenuated by worse adult health and more health care utilisation in earlier adulthood. Higher educational attainment and adult SEP were also associated with less consultation for psychological symptoms. Inclusion of smoking status partly explained these socioeconomic differences because consultation for psychiatric symptoms was lower for non- and ex-smokers than current smokers. This does not imply a causal pathway, although smoking is a negative health behaviour commonly associated with both lower SEP (Lynch et al., 1997) and poor mental health (Burki, 2016). Those with higher educational attainment also consulted less for musculoskeletal symptoms – in this case, attenuated by lower childhood serious illness.

It would appear that, across the conditions/symptoms investigated in this chapter, with the exception of a weak association between higher childhood social class and lower consultation for any symptoms/conditions, associations between socioeconomic factors and consultation were attenuated by health and health behaviour related variables. This is a particularly notable result given how conflicting the previous research is concerning this area (summarised in section 2.2.2, Chapter 2). However, this thesis, in particular this chapter, differs from previous research when considering and exploring the association(s) between socioeconomic circumstances and health care utilisation. Whereas previous literature, although often inconsistent, reported associations between lower SEP and higher access to primary care health services (Adamson et al., 2003; Lindsay, 2009; Morris et al., 2005), this thesis considered health professional consultation (not limited to GPs) as a means of proactive health management, hence it was hypothesised to be associated with measures of socioeconomic advantage. However, the results generally supported previous literature in showing associations between socioeconomic advantage and lower rates of consultation.

These results add to the existing literature by exploring the pathways between socioeconomic factors and consultation. Most previous studies did not adjust for the range of potential confounders included in this thesis and did not identify the pathways presented in these results. The present results suggest that associations between socioeconomic factors and consultation operate through adult health, health behaviours and earlier health care utilisation.

4.7.2 Health status and consultation

As was hypothesised, serious illness in childhood was associated with an increased likelihood of consulting for any condition in mid-adulthood and this was attenuated by adult health factors. Those with serious illness in childhood were also more likely to consult for musculoskeletal symptoms, consistent with previous NSHD findings that this group had greater adult disability (Kuh, Power, Blane, & Bartley, 1997) (although results were adjusted for musculoskeletal symptom frequency and number of health conditions in adult, it is possible that other aspects of poor health and disability were not captured in these results). This measure of childhood illness was not only an indicator of serious illness in childhood but also of access to health care services, thus, it could be that early exposure to health care services may influence individuals' propensity to access services and expectations of consulting medical professionals later in life.

Adult health (denoted by the number of health conditions reported in mid-adulthood) was the strongest correlate of consultation for any conditions, following all adjustments, in support of the hypothesis. This indicates that adults with more health conditions, and thus greater heath burden, were more likely to consult a professional, independently of socioeconomic factors or other adult factors. These results could mean that those with poorer health may develop ways of managing their health that require professional input in order to cope with and manage health conditions or symptoms.

Although existing literature describing the associations between health status and health care utilisation is limited, the present results are in line with a previous study that reported that, not only was worse health associated with higher health care utilisation, but an increasing number of comorbid conditions was associated with a higher rates of consultation (Glynn et al., 2011), as was demonstrated in this chapter by using a count measure of number of health conditions. Furthermore, these results support a model of health care utilisation presented by Andersen & Newman (2005), where previous illness was identified as a predictor of health care utilisation.

It is also worth noting that neither measure of health from childhood or adulthood was associated with management of psychological symptoms, possibly highlighting a difference between consultation for physical and psychological health problems.

4.7.3 Previous GP visits and consultation

In line with the hypothesis, previously visiting a GP in earlier adulthood was associated with an increased likelihood of consultation and was one of the strongest correlates of consultation for any conditions. Although this association was not found with consultation for psychological or musculoskeletal symptoms, these results support the idea that seeking professional help for a general range of conditions is a consistent response to health challenges at different stages in adulthood.

There is an absence of existing research exploring the relationship between health care utilisation (specifically GP visits) in earlier adulthood and later health professional consultation for particular health conditions or symptoms. However, previous studies have shown that prior use of primary care services are associated with later engagement in preventive health care (Labeit et al., 2013; Pill et al., 1988; Thorogood et al., 1993), thus it could be inferred that individuals who attend health care services are more likely to continue to do so; the present results support this assumption.

4.7.4 Health behaviours and consultation

It was hypothesised that healthier behaviours would be associated with an increased likelihood of consulting a professional. Although there is a gap in the literature regarding health behaviours and consultation, previous research has reported associations between positive health behaviours, including not smoking and higher rates of physical activity, and attendance to general health checks (Dalton et al., 2011; Labeit et al., 2013; Pill et al., 1988). In contrast to this hypothesis, no association was found between physical activity and consultation for any conditions and the association between higher level of physical activity and lower consultation for psychological symptoms was attenuated by other adult factors. Furthermore, compared to being a smoker, having never smoked or being an ex-smoker was associated with a reduced likelihood of consultation for psychological symptoms, which is the opposite to what was hypothesised. This hypothesis was based on the assumption that those who report healthier behaviours would be more likely to take the proactive approach of seeking professional help in response to their symptoms, but given that not smoking was associated with less professional help-seeking, one alternative explanation could be that non-smokers were more likely to independently manage their symptoms through other positive health behaviours, such as maintaining a healthy lifestyle, rather than consult.

Although the analysis included only study members who reported symptoms and controlled for symptom frequency, it is also possible that, given the reported association between smoking and worse mental health (Burki, 2016), study members who were smokers experienced more severe psychological symptoms (a factor not possible to capture in this analysis) and were therefore more likely to seek professional help.

In addition, this hypothesis was informed by the previously reported associations between health behaviours and engagement with preventive health care. An alternative explanation for these results is that the association between health behaviours and primary care and with preventive health care is fundamentally different, thus a positive association between health behaviours and more consultation perhaps should not have been hypothesised based on previous findings concerning health check attendance.

4.7.5 Personality and consultation

In contrast to what was hypothesised, greater self-organisation in adolescence was associated with a lower likelihood of consultation (for any symptoms, psychological symptoms and musculoskeletal symptoms), however these associations were explained by measures of adult socioeconomic circumstances and health related factors, as was hypothesised. Previous literature has shown associations between self-organisation and health behaviours in adulthood, particularly smoking; Nishida et al. (2016) reported that greater self-organisation was related to lower levels of smoking in NSHD. Thus, the association between self-organisation and consultation observed here may be due to better health and health behaviours among those with higher self-organisation. Although the literature describing self-organisation in relation to health and health management is limited, this chapter adds to the existing research by expanding on the previously described associations between self-organisation and health behaviours and investigating the implications of these associations for health management.

Supporting the hypothesis, a weak association between higher neuroticism and consultation (for psychological symptoms only) remained following adjustments. This might suggest that neuroticism was associated (albeit weakly) with management particularly of psychological symptoms (compared to general health conditions and musculoskeletal symptoms), possibly because neuroticism was associated with the heightened awareness of or perhaps less confidence in coping independently with psychological symptoms. Furthermore, as higher neuroticism is often associated with mental health conditions, particularly depression (Enns & Cox, 1997), it may be that neuroticism is a marker of psychological symptoms, hence study members with higher levels of neuroticism were more likely to consult.

4.7.6 Marital status and consultation

In contrast to what was hypothesised, marital status was not found to be associated with consultation. This was found for consultation for any conditions, psychological symptoms and musculoskeletal symptoms. This contrasts with previous literature that has reported associations between being married and higher rates of health care utilisation (Dunlop et al., 2000). An alternative explanation to this hypothesis could be, as suggested by Joung, Van Der Meer, & Mackenbach (1995), that married individuals may have more access to informal care provided in the home; this explanation could not be tested in the present study.

4.7.7 Strengths and limitations

One of the strengths of this analysis was that it explored consultation across a wide variety of conditions/symptoms. Although specific differences between symptoms were not explicitly tested, the results were able to demonstrate the apparent differences in the correlates of consultation for different categories of symptoms; this is something not tested in previous literature. Whereas previous literature has generally looked at crude rates of consultation across different populations, only study members who reported conditions/symptoms were included in this analysis. Although it was not possible to adjust for symptom severity, including just study members who reported conditions/symptoms meant that any associations between explanatory variables and consultation were not due to associations between explanatory variables and having symptoms/conditions (as far as was possible to control for).

Another strength of this chapter is that it considered consultation of 'health professionals' as a medicalised approach to managing health, through access to primary care services, rather than limiting the analysis to GP consultation. It is possible that the measure of consultation used in this chapter includes consulting a wide range of health professionals, including pharmacists, nurses and other allied health professionals, thus, the results may not be comparable to previous research examining rates of correlates of GP consultation. This needs to be considered when comparing the results to other literature describing the predictors and correlates of health care utilisation, which has predominantly explored GP visits. However, on the whole, the inclusion of a range of health professionals is a strength of this analysis, as it broadens the body of literature on consultation and health management. Including health professionals other than GPs is increasingly relevant to assessing how individuals manage their health, as individuals are being encouraged to consult other health professionals (eg, pharmacists (NHS Choices, 2016a)) before immediately referring to a GP, in an attempt to relieve pressure on GP services.

There are also several limitations to this analysis. As reported in section 3.7, there are missing data throughout this thesis; this is one of the limitations of using a longitudinal cohort study and applies to each of the following chapters. This will be discussed further in Chapter 8. However, as shown in tables 3.3 and 4.1, the percentage of missing data for this chapter is generally low (with the exception of self-organisation, missing data were less than 10%). Furthermore, as shown in Table A.3, the frequencies and proportions of complete data and imputed data indicated that imputed data were comparable to complete data, thus this approach (multiple imputation using chained equations) was an appropriate way of managing the problem of missing data.

Although the analysis is limited to symptoms experienced in the last year, one of the limitations of this analysis is the lack of a measure of symptom severity or duration, which is likely to be associated with many of the explanatory variables and to influence the likelihood of consultation. This has been addressed as far as possible by adjustment for symptom frequency in the analysis of psychological and musculoskeletal symptoms, though this was included in binary form and so the possibility of residual confounding by symptom severity cannot be ruled out.

A further limitation of this chapter is the lack of detailed information regarding study members' response to conditions/symptoms. A binary variable of consultation does not capture individuals' pathway of health care, including factors such as the type of health professional, the number of professionals consulted and the length of time between the onset of symptoms and consultation. The 'timeliness' of consultation is particularly relevant to the study of health management, as 'optimal access' to health care services, as described by Rogers, Flowers, & Pencheon (1999), is fundamental to collaborative health care, by which individuals achieve the best possible health care and outcomes (Bodenheimer et al., 2002; Oliver et al., 2014).

Furthermore, there is no information on the outcome of the consultation, including whether study members were satisfied by or adhered to the advice provided by the professional. It could be argued that a measure of consultation alone is an inadequate measure of proactive health management, as it is not known what action the individual took thereafter to manage their health. However, measures of consultation were the best available measures of health management for this chapter.

The health conditions reported at age 43 (shown in table 4.2) are diverse (they include harmless conditions such as hayfever and potentially life threatening illness such as cancer). It could be argued that using a summary measure of consultation for any of these conditions/symptoms could be problematic, as consultation for one condition may

not be comparable to consultation for another. However, this chapter aimed to explore consultation for a wide range of conditions/symptoms and then compare with more specific categories of symptoms (specifically, psychological and musculoskeletal symptoms), which the use of the measure of consultation for any conditions allowed. Exploring consultation for clinically different health challenges was beyond the scope of this chapter, thus an over-arching measure of consultation for any conditions was favoured.

Finally, a limitation of using a cohort study is the defined sample size. When assessing consultation for specific symptoms (ie, psychological and musculoskeletal symptoms), the sample sizes are smaller and this may have implications for statistical power. This may limit the comparison of results between symptom types. This limitation applies to the rest of the thesis and the possibly of low statistical power needs to be acknowledged.

4.7.8 Conclusions

This chapter illustrates how different the correlates of consultation are for different categories of symptoms. For a wide range of conditions, health and health care utilisation were the strongest correlates of consultation, whereas for psychological symptoms, smoking behaviour was the strongest correlate. For musculoskeletal symptoms, there were no strong correlates, however a weak association between childhood health and consultation remained, independent of other adult factors.

The differences between management of symptom types will be looked at further in the next chapter, which will address the determinants of different approaches to managing a number women's symptoms and health challenges in midlife.

5 Management of women's health in midlife

The aim of the first part of this chapter is to investigate how women study members managed symptoms in midlife and the factors associated with different management approaches, including health and social factors from childhood and adulthood and women's experience of symptoms in midlife. The aim of the second part of this chapter is to explore the health and social factors associated with women's self-management of general health in midlife. Objectives and hypotheses 1-8 (see Chapter 3, pages 74-79) are relevant for this chapter.

5.1 Descriptive statistics

In addition to the explanatory variables shown in Table 3.3, measures specific to women in midlife were also used in analyses. The descriptives for these variables are shown below in Table 5.1 for women who were included in analysis in this chapter (those who completed the questionnaire at age 54; N=1308).

Table 5.1 Descriptive statistics of measures used only in Chapter 5 (N=1308)

Potential explanatory variable		N	%
Social class age 15-53	I. Professional	27	2.1
	II. Intermediate	455	34.8
	III(NM). Skilled (non-manual)	472	36.1
	III(M). Skilled (manual)	98	7.5
	IV. Partly skilled	176	13.5
	V. Unskilled	65	5.0
	Missing	15	1.1
Number of health conditions age 43-53	No reported conditions	254	19.4
	One reported condition	322	24.6
	Two or more conditions reported	629	48.1
	Missing	103	7.9
Smoking trajectory to age 53	Never smoker	419	32.0
	Ex-smoker	630	48.2
	Smoker	167	12.8
	Missing	*92*	7.0
Marital status at age 53	Single	58	4.4
	Married	948	72.5
	Separated/divorced/widowed	212	16.2
	Missing	*90*	6.9
Mean family related stress age 47-57		$\bar{x}$=6.1	SD=5.9
	Missing (N, %)	303	23.2

5.2 Women's management of symptoms in midlife

5.2.1 Analytical strategy

As described in more detail in Chapter 3, the analytical sample included 1005 female study members who completed all of the annual postal questionnaires between ages 47 and 54 years, as part of the Women's Health sub-study. The outcomes used in this chapter distinguished between women who sought professional help but did not self-manage certain common symptoms (hot flushes and night sweats (HFNS), trouble sleeping, vaginal dryness, nervous/emotional symptoms, urinary symptoms), those who had self-managed but not sought help, those who had done both, and those who had done neither. The common childhood explanatory variables (early serious illness, childhood social class and adolescent self-organisation) and the adult health and social factors (educational attainment, adult social class, previous GP visits, current physical activity, smoking trajectory to age 53, extraversion, neuroticism, and marital status) were used, as described in section 3.4. In addition, factors related specifically to women's health and experience of symptoms in midlife were used, including previous experience of premenstrual tension (PMT), previously using the contraceptive pill, attitudes towards the menopause at age 47, family-related stress in midlife and experience of bothersome common symptoms in midlife (the descriptives for these variables are presented in section 5.2).

Multinomial logistic regression models were used to explore how symptom experience was associated with the likelihood of consulting a professional, self-managing or doing both, compared to taking no action (used as the base outcome throughout the analysis in Chapter 5), for each type of symptom. This analysis included only study members who had reported experiencing each symptom. The categorical measures of symptom management (described in section 3.3.2) were regressed onto the relevant dichotomised measures of symptom experience (not bothered by symptoms compared to being bothered a little or a lot; described in 3.4.2.8). Neither consulting nor self-managing was used as the base outcome as the other three responses were considered to be 'proactive', rather than inactive, management approaches.

To explore the relationship between increasing number of years bothered a little or a lot by symptoms and the likelihood of consulting a professional, self-managing or both for each symptom, multinomial logistic regression models were used using the count variable totalling the number of years study members reported being bothered a little or a lot by each symptom (described in section 3.4.2.8) and the categorical measures of management for each type of symptom. These models included the whole analytical

sample (N=1005) with women who did not report symptoms included in the count variables as having reported bothersome symptoms for 0 years. The regression models present the relative risk ratios (RRR) of consultation per one year increase of symptom duration.

To identify the life course correlates of women's symptom management approaches, multinomial logistic regression models were used to explore associations between childhood and adulthood health and social factors (using the measures described in section 3.4) and the likelihood of consulting a professional, self-managing or both for each symptom reported between age 47 and 53, compared to the inactive group (those who reported neither consulting nor self-managing).

Structural equation modelling (SEM) was then used to test whether associations between childhood and adulthood health and social factors and consultation for and self-management of symptoms were mediated by the experience of more bothersome symptoms. Only explanatory variables found to be bivariately associated with either consultation or self-management were tested for mediation. Structural equation modelling produces estimates of the direct effect of the explanatory variable on the outcome measure (ie, type of management), an indirect effect, where the pathway between the explanatory variable and outcome measure is mediated by the measure of symptom experience, and a total effect. The total effect is the sum of the direct and indirect effects. The standardised path coefficients are interpreted as an increase/decrease in the outcome variable, for every increase of one standard deviation by the explanatory variable. Note that as only explanatory variables were imputed, measures of symptom experience and management had missing data, hence the Ns (shown in the first set of models for childhood social class; Table 5.10) vary between the outcome measures.

5.2.2 Descriptive statistics

In addition to the explanatory variables shown in Tables 3.3 and 5.1, measures hypothesised to be relevant to management of women's symptoms in midlife were also used in analysis in the first part of this chapter. The descriptives for these variables are shown below in Table 5.2 for the analytical sample used in this section (N=1005).

Table 5.2 Descriptive statistics of measures used in Chapter 5 for women who completed the Women's Health questionnaire every year between age 47-54 (N=1005)

		N	%
Feelings towards the menopause age 47	Feelings of regret	48	4.8
	Feelings of relief	391	38.9
	Mixed feelings	255	25.4
	No feelings	277	27.6
	Missing	*34*	*3.4*
Experience of premenstrual tension in earlier adulthood	Did not have PMT	498	49.6
	Reported having PMT	480	47.8
	Missing	27	2.7
Contraceptive pill use in earlier adulthood	Did not use pill	196	19.5
	Reported using pill	757	75.3
	Missing	52	5.2

5.2.3 Sample characteristics

As mentioned in section 3.5.2, the analytical sample included only women who completed the questionnaire every year between ages 47-57 (N=1005). This was 63.9% of the study members who completed at least one questionnaire for the Women's Health sub-study (N=1572). To explore whether women who completed the questionnaire every year were more likely to report symptoms, compared to those who did not complete it every year, associations were tested between questionnaire completion and symptom reporting. Table 5.3 shows the number of times study members reported symptoms divided by the number of times they completed the questionnaire for the group of women who completed the questionnaire every year (N=1005) and for the group who did not (N=567). There were no significant differences in the average proportion of times study members reported HFNS, trouble sleeping, vaginal dryness or nervous and emotional symptoms, depending on how many times they completed the questionnaire; there was no evidence that non-response was associated with symptom reporting. However, study members who completed the questionnaire every year reported urinary symptoms more frequently than those who did not complete it every year, although this single significant association did not suggest that generally symptom experience was associated with questionnaire completion.

Table 5.3 Number of times study members reported symptoms between ages 47-53 per the number of times they completed the questionnaire between study members who completed the questionnaire every year and less than every year

Symptom	Completed questionnaire, Mean (Standard deviation)		T tests
	Every year (N=1005)	Less than every year (N=567)	
HFNS	0.55 (.33)	0.58 (.36)	t(1570) = -1.66, p=0.098
Trouble sleeping	0.66 (.33)	0.63 (.37)	t(1570) = 1.82, p=0.068
Vaginal dryness	0.33 (.35)	0.30 (.36)	t(1570) = 1.59, p=0.112
Nervous/emotional symptoms	0.64 (.34)	0.65 (.37)	t(1570) = -0.21, p=0.837
Urinary symptoms	0.58 (.35)	0.53 (.39)	t(1570) = 3.07, p=0.002

5.2.4 Symptomatology

Table 5.4 shows the numbers and percentages of women who reported each symptom on at least one occasion between ages 47 and 54 and to what extent it bothered them. The most common symptom was HFNS, reported at least once by 915 (91%) of study members and vaginal dryness the least common (N=644, 64.1%).

Table 5.4 Study members' experience of symptoms between ages 47-54

Symptom (N=1005)	N (%) did not report symptom	N (%) reported symptoms and were not bothered	N (%) bothered a little by symptom	N (%) bothered a lot by symptom
HFNS	90 (9.0%)	150 (14.9%)	379 (37.7%)	386 (38.4%)
Trouble sleeping	72 (7.2%)	125 (12.4%)	448 (44.6%)	360 (35.8%)
Vaginal dryness	361 (35.9%)	210 (20.9%)	279 (27.8%)	155 (15.4%)
Nervous/ emotional symptoms	91 (9.1%)	151 (15.0%)	371 (36.9%)	392 (39.0%)
Urinary symptoms	139 (13.8%)	257 (25.6%)	377 (37.5%)	232 (23.1%)

The percentage of women reporting experiencing symptoms (bothersome or not) each year is shown in Figure 5.1. The table describing the rates of reporting each symptom every year can be found in the Appendix (Table A.6).
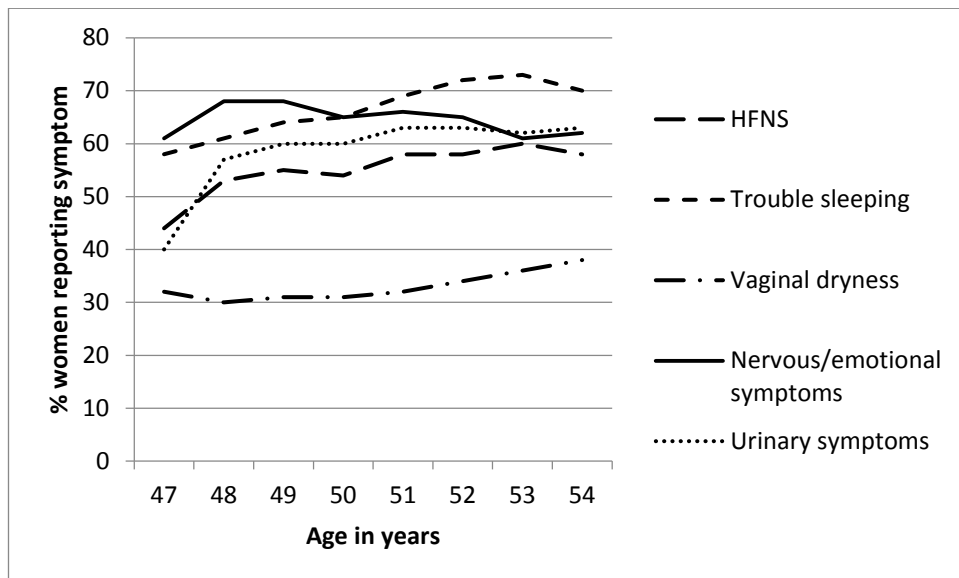
Figure 5.1 Percentage of women who reported experiencing symptom each year (47-54 years)

Table 5.5 presents data on the duration of bothersome symptoms, showing how many years, ranging from 0 to 8, women reported being bothered either a little or a lot by each symptom between age 47-54.

Table 5.5 Number of years study members reported being bothered a little or a lot by each symptom between age 47-54

Number years study members reported being bothered a little or a lot by symptom (N=1005)	HFNS N (%)	Trouble sleeping N (%)	Vaginal dryness N (%)	Nervous/ emotional symptoms N (%)	Urinary symptoms N (%)
0	240 (23.9)	197 (19.6)	571 (56.8)	242 (24.1)	396 (39.4)
1	166 (16.5)	134 (13.3)	148 (14.7)	132 (13.1)	165 (16.4)
2	124 (12.3)	111 (11.0)	80 (8.0)	116 (11.5)	99 (9.9)
3	141 (14.0)	100 (10.0)	57 (5.7)	105 (10.5)	64 (6.4)
4	102 (10.2)	87 (8.7)	41 (4.1)	91 (9.1)	56 (5.6)
5	80 (8.0)	87 (8.7)	38 (3.8)	68 (6.8)	68 (6.8)
6	71 (7.1)	84 (8.4)	29 (2.9)	77 (7.7)	68 (6.8)
7	43 (4.3	94 (9.4)	15 (1.5)	76 (7.6)	43 (4.3)
8	38 (3.8)	111 (11.0)	26 (2.6)	98 (9.8)	46 (4.6)

5.2.5 The role of symptom type, severity and duration in women's approach to managing symptoms

5.2.5.1 Symptom type and symptom management

Table 5.6 shows how study members responded to symptoms they experienced. For each symptom (HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms), the frequency of each management approach (consulting a health professional, self-managing, both consulting and self-managing and neither consulting nor self-managing) is shown for the women who reported experiencing that symptom at least once between age 47-54. Neither consulting nor self-managing was the most common approach for every symptom. Study members were most likely to only consult a health professional for HFNS and least likely to only consult for trouble sleeping or vaginal dryness. Self-management alone was most common for vaginal dryness.

Table 5.6 Frequency and percentage of women reporting each symptom's response to symptoms

Symptom	Consulted professional N (%)	Self-managed N (%)	Both N (%)	Neither N (%)
HFNS (N=915)	259 (28.3%)	55 (6.0%)	86 (9.4%)	515 (56.3%)
Trouble sleeping(N=933)	93 (10.0%)	64 (6.9%)	56 (6.0%)	720 (77.7%)
Vaginal dryness (N=644)	72 (11.2%)	54 (8.4%)	28 (4.4%)	490 (76.1%)
Nervous/emotional symptoms (N=914)	144 (15.8%)	47 (5.2%)	58 (6.4%)	665 (72.8%)
Urinary symptoms (N=866)	182 (21.0%)	13 (1.5%)	50 (5.8%)	621 (71.7%)

5.2.5.2 Symptom experience and symptom management

Table 5.7 shows the associations between a binary measure of symptom experience (reporting symptom and not being bothered by symptom compared to being bothered a little or a lot by symptom) and management approach (with neither consulting a professional nor self-managing as the base outcome) in study members who reported each symptom. Being bothered a little or a lot by symptoms (compared to not being bothered) was associated with a greater likelihood of active management (consulting a health professional, self-managing or both), compared to doing neither, for all symptoms, although the association with self-management of HFNS and urinary symptoms was weaker.

Table 5.7 Associations between symptom experience (being bothered a little or a lot compared to not at all) and response to symptoms (neither consulting nor self-managing used as base outcome)

Symptom experience (being bothered a little or a lot compared to not being bothered by symptom)	Response		
	Consulted professional RRR (95% CI)	Self-managed RRR (95% CI)	Both RRR (95% CI)
HFNS (N=915)	4.25 (3.25-5.56)**	1.29 (0.87-1.91)	4.29 (2.83-6.49)**
Trouble sleeping (N=933)	6.24 (3.93-9.90)**	3.02 (1.93-4.74)**	14.24 (6.46-31.36)**
Vaginal dryness (N=644)	4.50 (3.00-6.74)**	3.03 (1.99-4.61)**	5.12 (2.71-9.67)**
Nervous/emotional symptoms (N=914)	6.06 (4.10-8.95)**	2.41 (1.50-3.88)**	3.69 (2.26-6.03)**
Urinary symptoms (N=866)	2.33 (1.83-2.95)**	1.53 (0.73-3.23)	2.44 (1.61-3.70)**

** $p<0.05$

5.2.6 Symptom duration and symptom management

Being bothered a little or a lot by symptoms for an increasing number of years was associated with an increased likelihood of consulting a health professional and both consulting a professional and self-managing symptoms, for all symptoms (see Table 5.8). The number of years study members were bothered by symptoms was associated with self-management of all symptoms except urinary symptoms.

Table 5.8 Associations between number of years bothered a little or a lot by symptoms and response to symptoms (with neither consulting professional nor self-managing as the base outcome)

Symptom duration (per 1 year increase)	Response		
	Consulted professional RRR (95% CI)	Self-managed RRR (95% CI)	Both RRR (95% CI)
Number years bothered a little or a lot by HFNS	1.81 (1.60-2.05)**	1.32 (1.05-1.67)**	1.95 (1.67-2.27)**
Number years bothered a little or a lot by trouble sleeping	1.84 (1.64-2.07)**	1.55 (1.34-1.79)**	2.10 (1.83-2.41)**
Number years bothered a little or a lot by vaginal dryness	2.21 (1.84-2.65)**	1.72 (1.38-2.16)**	2.52 (2.03-3.14)**
Number years bothered a little or a lot by nervous/ emotional symptoms	1.77 (1.60-1.97)**	1.43 (1.22-1.69)**	1.75 (1.53-1.99)**
Number years bothered a lot by urinary symptoms	1.33 (1.21-1.47)**	1.03 (0.66-1.58)	1.32 (1.13-1.54)**

**$p < 0.05$

5.2.7 Associations between childhood and adult health and social factors and women's approach to managing symptoms in midlife

Results from multinomial regression models are shown in Table 5.9. These results report the bivariate associations between the potential explanatory variables (ie, health and social factors from childhood and adulthood) and categorical management type outcome variables for each symptom and demonstrate how management types vary across symptoms and if the patterning of the determinants of different management types differs between symptoms. Neither consulting a professional nor self-management was used as the base outcome throughout. For each symptom, models included only women who reported experiencing that symptom at least once between ages 47-54.

Table 5.9 Associations between health and social factors from childhood and adulthood and management of each symptom in women who reported symptoms at least once between age 47-54

Potential explanatory variables	Symptom	Management type		
		Consulted RRR (95% CI)	Self-management RRR (95% CI)	Both RRR (95% CI)
From childhood				
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)	HFNS[1] (N=915)	0.99 (0.71-1.38)	0.88 (0.47-1.66)	1.12 (0.68-1.84)
	TS[2] (N=933)	0.81 (0.49-1.34)	0.54 (0.28-1.05)	1.04 (0.57-1.90)
	VD[3] (N=644)	1.09 (0.64-1.87)	0.71 (0.36-1.38)	0.54 (0.20-1.44)
	N/E[4] (N=914)	0.83 (0.55-1.26)	0.68 (0.33-1.39)	0.87 (0.47-1.61)
	US[5] (N=866)	0.87 (0.60-1.27)	0.75 (0.20-2.77)	0.71 (0.35-1.41)
Childhood social class (per one class increase; unskilled → professional)	HFNS	0.87 (0.77-0.97)**	1.16 (0.93-1.44)	1.10 (0.91-1.31)
	TS	0.99 (0.84-1.17)	1.08 (0.89-1.31)	1.13 (0.91-1.41)
	VD	1.28 (1.05-1.55)**	1.14 (0.91-1.41)	0.83 (0.61-1.12)
	N/E	1.05 (0.91-1.20)	1.00 (0.79-1.25)	1.21 (0.98-1.49)
	US	1.22 (1.07-1.38)**	1.15 (0.76-1.75)	1.34 (1.06-1.70)**
Adolescent self-organisation (per one unit increase in the self-organisation factor score)	HFNS	0.97 (0.76-1.25)	1.35 (0.86-2.13)	0.94 (0.66-1.34)
	TS	0.99 (0.66-1.47)	0.89 (0.59-1.35)	1.09 (0.69-1.74)
	VD	1.04 (0.71-1.52)	1.26 (0.81-1.94)	1.01 (0.55-1.85)
	N/E	0.98 (0.74-1.30)	0.96 (0.57-1.61)	0.98 (0.64-1.51)
	US	1.16 (0.89-1.51)	2.29 (0.96-5.47)	1.09 (0.69-1.72)
From adulthood				
Educational attainment at age 26 (per one level increase; no qualifications → degree level)	HFNS	0.82 (0.69-0.97)**	1.25 (0.89-1.75)	1.06 (0.83-1.36)
	TS	0.96 (0.76-1.23)	1.22 (0.93-1.60)	1.33 (0.99-1.79)
	VD	1.38 (1.05-1.81)**	1.35 (1.00-1.82)	1.25 (0.83-1.89)
	N/E	1.18 (0.97-1.44)	1.35 (0.98-1.87)	1.48 (1.10-1.97)**
	US	1.47 (1.23-1.76)**	1.73 (0.97-3.08)	1.93 (1.42-2.63)**

Adult social class (per one class increase; unskilled → professional)	HFNS	0.87 (0.77-0.98)**	1.30 (0.99-1.71)	1.10 (0.90-1.35)
	TS	0.93 (0.78-1.11)	1.44 (1.10-1.86)**	1.17 (0.92-1.50)
	VD	1.08 (0.87-1.33)	1.19 (0.92-1.54)	1.54 (1.02-2.32)**
	N/E	1.14 (0.98-1.34)	1.18 (0.90-1.55)	1.18 (0.92-1.51)
	US	1.08 (0.94-1.24)	2.12 (1.05-4.28)**	1.38 (1.04-1.84)**
Total number of health conditions between ages 43-53 (per one condition increase)	HFNS	1.10 (0.99-1.21)	1.01 (0.83-1.22)	1.04 (0.89-1.21)
	TS	1.23 (1.07-1.42)**	1.23 (1.04-1.44)**	1.30 (1.11-1.53)**
	VD	1.19 (1.02-1.38)**	1.07 (0.89-1.29)	0.91 (0.70-1.20)
	N/E	1.20 (1.07-1.35)**	1.16 (0.96-1.41)	1.36 (1.16-1.60)**
	US	1.23 (1.11-1.37)**	1.14 (0.79-1.64)	1.40 (1.18-1.66)**
Previous premenstrual tension (PMT) (compared to none)	HFNS	1.33 (0.97-1.81)	1.49 (0.84-2.67)	1.33 (0.83-2.12)
	TS	1.80 (1.15-2.82)**	1.25 (0.74-2.12)	1.71 (0.98-2.98)
	VD	1.37 (0.83-2.25)	1.57 (0.88-2.79)	1.69 (0.78-3.69)
	N/E	2.32 (1.58-3.39)**	2.71 (1.41-5.20)**	2.84 (1.57-5.13)**
	US	1.46 (1.05-2.04)**	0.95 (0.32-2.87)	2.75 (1.41-5.37)**
GP visits in earlier adulthood (compared to none)	HFNS	1.78 (1.27-2.50)**	1.05 (0.57-1.91)	2.38 (1.31-4.33)**
	TS	1.83 (1.05-3.18)**	0.92 (0.53-1.59)	2.02 (1.00-4.10)
	VD	1.33 (0.75-2.37)	1.24 (0.65-2.40)	2.66 (0.76-9.36)
	N/E	2.02 (1.29-3.16)**	1.38 (0.70-2.72)	3.21 (1.44-7.14)**
	US	1.65 (1.10-2.47)**	2.50 (0.55-11.40)	2.80 (1.23-6.33)**
Prior use of the pill (compared to none)	HFNS	1.41 (0.95-2.10)	1.90 (0.83-4.36)	1.36 (0.74-2.49)
	TS	1.00 (0.59-1.71)	3.83 (1.36-10.79)**	1.05 (0.53-2.09)
	VD	0.97 (0.53-1.79)	1.04 (0.50-2.16)	1.16 (0.43-3.18)
	N/E	1.36 (0.83-2.22)	1.21 (0.54-2.68)	1.10 (0.55-2.19)
	US	1.57 (1.00-2.46)**	1.59 (0.35-7.28)	1.48 (0.67-3.24)

Level of physical activity in adulthood (per one level increase in activity; inactive → most active)		HFNS	0.91 (0.76-1.10)	1.79 (1.28-2.50)**	1.27 (0.96-1.70)
		TS	0.94 (0.70-1.27)	1.65 (1.22-2.23)**	1.26 (0.90-1.75)
		VD	1.26 (0.91-1.71)	1.18 (0.83-1.69)	1.33 (0.84-2.08)
		N/E	1.06 (0.85-1.33)	1.25 (0.88-1.78)	1.64 (1.19-2.26)**
		US	1.39 (1.14-1.70)**	1.17 (0.58-2.37)	1.19 (0.84-1.69)
Smoking trajectory to age 53 (Current smoker used as reference group)	Ex-smoker	HFNS	0.70 (0.45-1.10)	1.48 (0.49-4.51)	0.99 (0.48-2.17)
		TS	0.77 (0.42-1.39)	1.57 (0.64-3.84)	0.80 (0.34-1.90)
		VD	3.51 (1.05-11.76)**	2.33 (0.43-12.66)	1.26 (0.41-3.87)
		N/E	0.90 (0.52-1.56)	1.36 (0.51-3.62)	1.37 (0.55-3.40)
		US	1.30 (0.75-2.25)	0.44 (0.11-1.76)	2.29 (0.68-7.78)
	Never smoked	HFNS	0.70 (0.44-1.10)	1.95 (0.64-5.95)	0.87 (0.41-1.85)
		TS	0.41 (0.20-0.83)**	1.04 (0.40-2.70)	0.80 (0.33-1.93)
		VD	4.75 (1.41-16.01)**	3.01 (0.63-14.35)	0.72 (0.19-2.63)
		N/E	0.68 (0.38-1.21)	0.95 (0.32-2.79)	0.96 (0.37-2.49)
		US	1.59 (0.89-2.83)	0.36 (0.07-1.72)	3.19 (0.93-10.98)
Attitudes towards the menopause at age 47	Regret	HFNS	1.25 (0.59-2.65)	2.96 (0.94-9.32)	1.62 (0.57-4.65)
		TS	0.91 (0.26-3.22)	3.24 (1.03-10.15)**	3.04 (1.15-8.05)**
		VD	0.37 (0.05-2.92)	0.60 (0.07-4.96)	1.26 (0.26-6.12)
		N/E	1.47 (0.59-3.65)	2.83 (0.69-11.57)	4.71 (1.83-12.09)**
		US	2.31 (1.08-4.93)**	1.56 (0.17-14.45)	1.78 (0.35-9.01)
	Relief	HFNS	1.02 (0.70-1.49)	1.32 (0.62-2.82)	1.04 (0.56-1.91)
		TS	1.09 (0.63-1.88)	2.14 (1.02-4.47)**	0.97 (0.49-1.93)
		VD	1.30 (0.70-2.43)	1.62 (0.75-3.51)	0.59 (0.23-1.48)
		N/E	1.34 (0.85-2.11)	1.92 (0.83-4.40)	0.90 (0.44-1.87)
		US	1.66 (1.06-2.60)**	0.75 (0.19-3.04)	2.36 (0.99-5.64)
	Mixed	HFNS	1.06 (0.70-1.61)	1.94 (0.88-4.27)	1.46 (0.77-2.78)
		TS	1.17 (0.65-2.10)	1.80 (0.80-4.06)	0.87 (0.40-1.91)
		VD	1.33 (0.66-2.65)	1.82 (0.79-4.20)	0.79 (0.29-2.14)
		N/E	1.06 (0.63-1.78)	1.68 (0.68-4.17)	1.17 (0.53-2.56)
		US	1.75 (1.08-2.83)**	1.21 (0.30-4.90)	3.27 (1.34-8.00)**

Personality at age 26	Extra-version	HFNS	1.00 (0.96-1.05)	0.96 (0.88-1.06)	1.02 (0.94-1.10)
		TS	0.96 (0.90-1.03)	1.04 (0.95-1.13)	0.97 (0.89-1.07)
		VD	1.07 (0.98-1.16)	0.95 (0.87-1.04)	1.13 (0.98-1.31)
		N/E	0.96 (0.91-1.02)	0.95 (0.87-1.05)	1.07 (0.98-1.18)
		US	1.03 (0.97-1.08)	0.96 (0.81-1.14)	1.00 (0.91-1.09)
	Neuroticism	HFNS	0.97 (0.93-1.01)	0.99 (0.92-1.07)	0.99 (0.93-1.06)
		TS	1.00 (0.94-1.07)	1.04 (0.96-1.12)	1.02 (0.94-1.11)
		VD	0.98 (0.91-1.05)	1.03 (0.95-1.12)	0.99 (0.87-1.12)
		N/E	1.07 (1.01-1.13)**	1.17 (1.06-1.30)**	1.04 (0.96-1.16)
		US	1.01 (0.96-1.05)	0.99 (0.84-1.15)	1.04 (0.96-1.13)
Marital status at 53 (married used as reference group)	Single	HFNS	0.48 (0.19-1.19)	1.10 (0.32-3.81)	1.29 (0.47-3.58)
		TS	1.25 (0.42-3.72)	1.78 (0.59-5.33)	2.84 (1.02-7.91**
		VD	0.47 (0.06-3.62)	1.17 (0.25-5.42)	1.48 (0.18-12.32)
		N/E	0.90 (0.34-2.38)	3.72 (1.43-9.66)**	1.58 (0.46-5.47)
		US	0.53 (0.18-1.58)	4.26 (0.87-20.90)	1.39 (0.40-4.85)
	Separated/ Divorced/Widowed	HFNS	0.98 (0.65-1.47)	0.66 (0.28-1.58)	0.75 (0.38-1.48)
		TS	0.93 (0.50-1.71)	0.68 (0.31-1.52)	1.18 (0.57-2.44)
		VD	0.22 (0.06-0.81)**	0.86 (0.37-2.01)	1.30 (0.47-3.57)
		N/E	1.23 (0.77-1.96)	1.34 (0.58-3.06)	2.23 (1.21-4.11)**
		US	0.76 (0.47-1.22)	1.18 (0.24-5.91)	0.23 (0.01-0.96)**
Family related stress between and 48 and 54 (per one unit increase)		HFNS	1.01 (0.99-1.04)	1.03 (0.99-1.08)	1.04 (1.00-1.07)**
		TS	1.04 (1.01-1.08)**	1.00 (0.95-1.04)	1.07 (1.03-1.11)**
		VD	1.03 (0.99-1.07)	0.99 (0.94-1.04)	0.99 (0.93-1.06)
		N/E	1.11 (1.07-1.14)**	1.06 (1.01-1.11)**	1.14 (1.10-1.18)**
		US	1.02 (1.00-1.05)	1.04 (0.96-1.13)	1.07 (1.03-1.11)**

**p<0.05

[1] Hot flushes and night sweats
[2] Trouble sleeping
[3] Vaginal dryness
[4] Nervous/emotional symptoms
[5] Urinary symptoms

Of the factors from childhood, higher childhood SEP was associated with a lower likelihood of consulting a health professional for HFNS and higher likelihood of consulting a health professional for vaginal dryness and urinary symptoms (Table 5.9). The other childhood factors, serious illness resulting in hospitalisations and self-organisation, were generally not associated with management of symptoms.

Several associations between adult explanatory variables and symptom management were apparent. Higher educational attainment was generally associated with a lower likelihood of consulting a health professional for HFNS and with a higher likelihood of consulting for vaginal dryness and urinary symptoms and a higher likelihood of both consulting and self-management for nervous/emotional symptoms and urinary symptoms. Adult SEP showed a similar pattern, with higher SEP being associated with a lower likelihood of only consulting for HFNS and generally with a higher likelihood of consulting for other symptoms. This pattern was not apparent for both consulting and self-management, where higher SEP was generally associated with an increased likelihood of both consulting and self-managing symptoms. One notable finding was a difference in the socioeconomic patterning of only consulting for HFNS and for other symptoms. Higher scores for socioeconomic measures (childhood social class, educational attainment and adult social class) generally showed a lower likelihood of consulting for HFNS, whereas for all other symptoms, a more advantaged SEP was more likely to be associated with a higher likelihood of consulting a professional.

A greater number of health conditions was associated with consulting for most symptoms, with self-management of trouble sleeping and with both management types for trouble sleeping, nervous/emotional symptoms and urinary symptoms. Previously visiting the GP was associated with an increased likelihood of consulting a professional for most symptoms and with both approaches for HFNS, nervous/emotional symptoms and urinary symptoms.

Higher levels of physical activity were associated with consulting a professional for urinary symptoms, self-managing HFNS and trouble sleeping and both consulting a professional for and self-managing nervous/emotional symptoms.

Previous PMT was associated with an increased likelihood of consulting for trouble sleeping, nervous/emotional symptoms and urinary symptoms, self-managing nervous/emotional symptoms and both consulting a health professional and self-managing nervous/emotional symptoms and urinary symptoms. Experiencing more family related stress was associated with a higher likelihood of consulting a health professional for trouble sleeping and nervous/emotional symptoms, self-managing

nervous/emotional symptoms and with utilising both management approaches for all symptoms, except vaginal dryness. Prior experiences likely to be associated with adverse emotional experiences (namely, family related stress and previous PMT) were associated with the management of nervous/emotional symptoms, and the magnitude of these associations was greater than for management of other symptoms. Higher levels of family related stress were associated with a greater likelihood of taking any proactive approach to managing nervous/emotional symptoms. In addition, previous PMT was associated with a higher likelihood of adopting all management types in response to nervous/emotional symptoms in midlife, compared with taking no action. No similar associations were apparent for other symptoms, suggesting that having experienced PMT throughout earlier reproductive life (note that psychological and emotional symptoms are aspects of PMT (NHS Choices, 2013)) is associated with the proactive management of nervous/emotional symptoms in midlife.

Marital status was generally not associated with management of symptoms. No consistent trends or associations were found between prior use of the contraceptive pill, smoking, attitudes towards to menopause, extraversion or neuroticism and management of symptoms in midlife.

The next stage of the analysis will explore, for the explanatory variables found to be bivariately associated with management of symptoms, whether the associations are mediated by symptom experience. Since the associations between childhood and adult variables and management approach were broadly similar across four of the symptoms (trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms), management of these symptoms will be assessed collectively, whereas management of HFNS will be treated separately.

5.2.8 Structural Equation Modelling

This section of analysis has two main purposes: (1) to use factors of management type to test for associations between explanatory variables and management across all symptoms and (2) to assess which associations were mediated by symptom experience.

5.2.8.1 Factor analysis for management type and symptom experience

As the associations between explanatory variables and the management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms were not widely different, in order to assess the correlates of management across these four symptom types, factor analysis was used to create latent variables of consultation and

self-management for these symptoms. These summary variables served as indicators of propensity to consult a health professional and self-manage symptoms, which could then be used in a SEM to demonstrate the pathways between the explanatory variables and management type and whether this was mediated by symptom experience.

Two factors of consultation and self-management were created. Initially, the model was tested loading the binary measures of consultation/self-management for all symptom types onto the respective factors. However, the models improved by excluding consultation and self-management of HFNS. The factor structures for the latent variables of consultation and self-management are shown in Figures 5.2 and 5.3. The fit statistics for the latent measure of consultation were: RMSEA= 0.013, CFI<1.000, TLI= 0.999, SRMR= 0.009 (indicating a good fitting model). For the latent measure of self-management, the fit indices were: RMSEA= 0.100, CFI=0.970,TLI=0.909, SRMR=0.031. (Note that RMSEA<0.05, CFI>0.95, TLI>0.95 and SRMR=/<0.08 indicate a good fitting model (Hu & Bentler, 1999; Steiger JH, 1989); RMSEA=/<0.100 indicates marginal fit (Browne & Cudeck, 1992; MacCallum, Browne, & Sugawara, 1996)). These better-fitting models (after removal of HFNS management variables) would appear to corroborate with the analysis reported in section 5.2.7, in that management type did generally not differ for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms, but the socioeconomic patterning was different for HFNS.
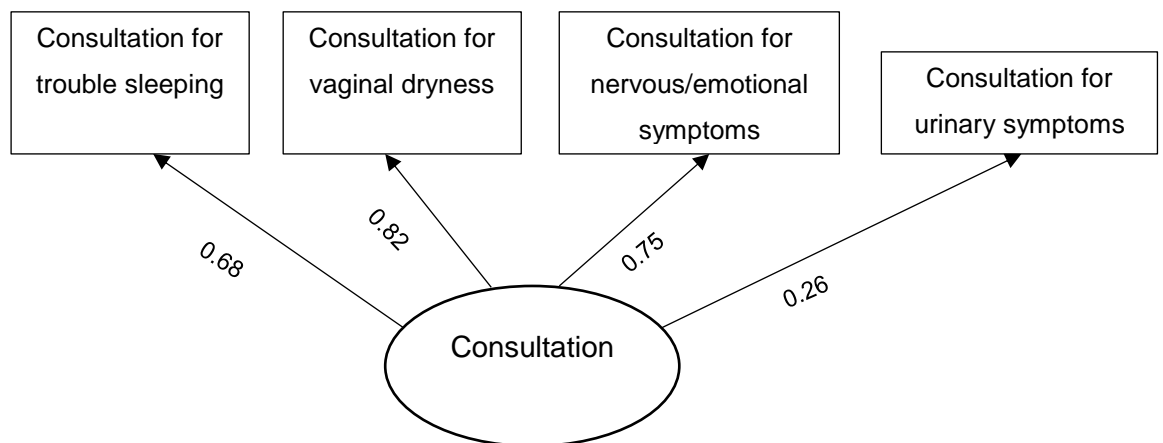
Figure 5.2 The factor loadings of binary measures of consultation on to a latent measure of propensity to consult a professional, showing standardised coefficients
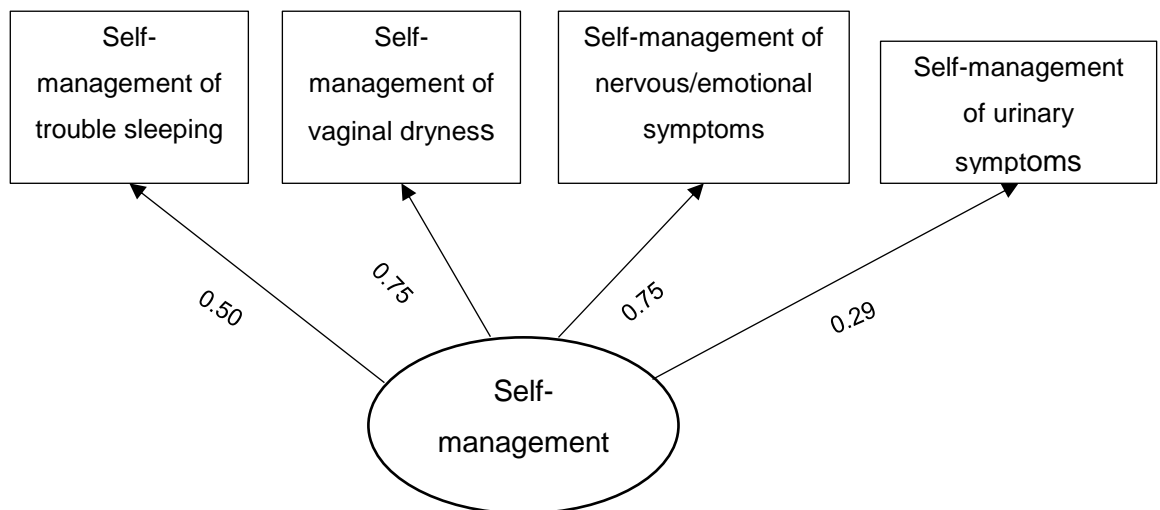
Figure 5.3 The factor loadings of binary measures of self-management on to a latent measure of propensity to self-manage, showing standardised coefficients

The factor of health care consultation (figure 5.2) captured whether the study member consulted a health professional for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms; a higher score indicated higher propensity to consult for these four symptoms. Similarly, the factor of self-management (figure 5.3) measured self-management across trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms and a higher score measured higher reporting of this behaviour.

The third factor included in the analysis measured the experience of bothersome symptoms (including trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms); a higher score for this factor measured more years study members were bothered a little or a lot by these four symptoms (figure 5.4). As the model fit improved by not including consultation for and self-management of HFNS, the experience of bothersome HFNS was not included in the factors of symptom experience but was considered separately. The fit indices for this factor of symptom experience were: RMSEA=0.050, CFI=0.992, TLI=0.975, SRMR=0.016.
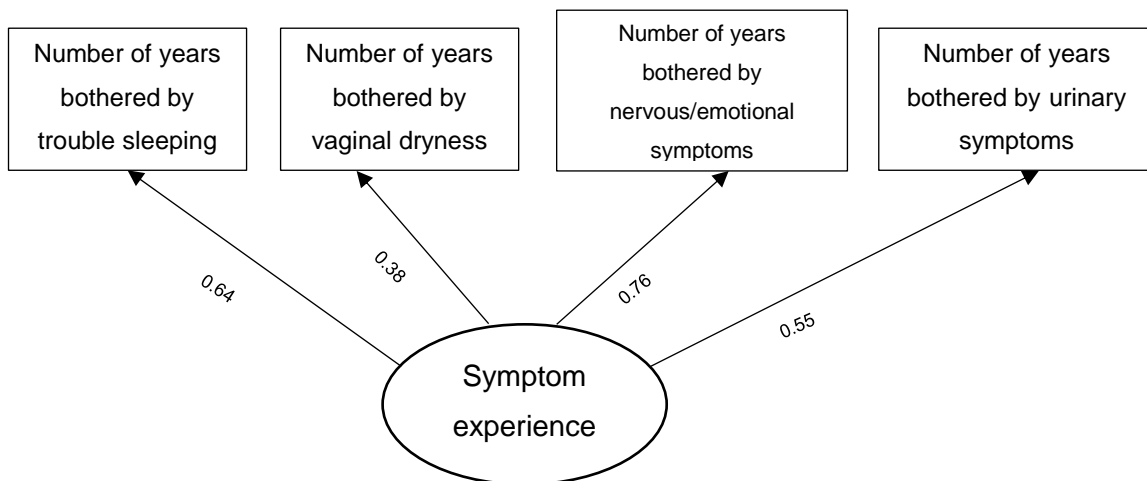
Figure 5.4 The factor loadings of measures of number of years bothered by symptoms on to a latent measure of symptom experience, showing standardised coefficients

For the SEMs presented in the following section, pathways were added between the latent measure of symptom experience and consultation and between symptom experience and self-management (see Figure 5.5).
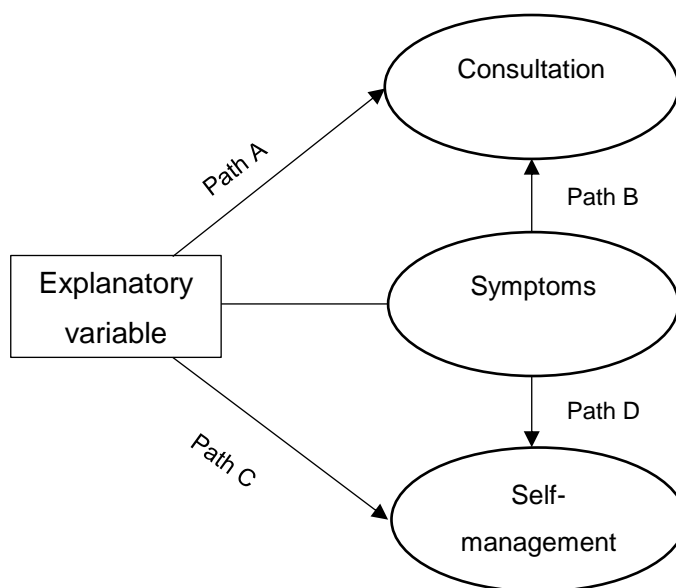
Figure 5.5 Example SEM model showing direct pathways between explanatory variable and factor of consultation (path A) and self-management (path B) and indirect pathways via factor of symptom experience (paths B and D)

The total association between explanatory variables and propensity to consult across the 4 symptoms is partitioned into direct and indirect pathways. Path A shows the direct association between exposure and propensity to consult across the 4 symptoms. Path B shows the indirect association between exposure and propensity to consult across the 4

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symptoms, mediated by symptom experience. Direct and indirect pathways -via symptom experience – between explanatory variables and propensity to self-manage symptom are also represented by paths C and D.

In a SEM where the measure of consultation was regressed onto the measure of symptom experience (Coefficient=0.167, p<0.001), the fit indices were: RMSEA=0.067, CFI=0.949, TLI=0.926, SRMR=0.032. In another SEM where the measure of self-management was regressed on to the measure of symptom experience (Coefficient=0.139, p=0.001), the fit indices were: RMSEA=0.037, CFI=0.980, TLI=0.970, SRMR=0.025.

The fit statistics reported here all suggest that factors of symptom experience, consultation and self-management fit the data and that SEMs including these factors and the pathways between symptom experience and management type were appropriate for the following analysis.

5.2.8.2 Mediation of associations between health and social factors and symptom management by symptom experience

Table 5.10 shows the associations between the explanatory variables and management type for four symptoms (trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms) and HFNS, including: direct associations, associations mediated by a measure of symptom experience (indirect effect) and the total effect of direct and indirect effects. (Note that, as estimates are often small, coefficients and confidence intervals are reported at 3 decimal places.)

The direct effects presented in the table represent the direct associations between the explanatory variable and the measure of management. The indirect effect shows the effect size of the pathway between the explanatory variable and outcome measure via a measure of symptom experience. The total effect is the sum of the direct and indirect effect.

Table 5.10 Table of associations between health and social factors from childhood and adulthood and management type, direct and mediated via symptom experience

Explanatory variable	Management type	Direct effect of explanatory variable on management factor/variable	Indirect effect via symptom experience	Total effect (direct effect + indirect effect)
		Standardised coefficients (95% CI)		
Childhood social class (per one class increase; unskilled → professional)	Consultation for 4 symptoms[1] factor (N=970)	0.012 (0.001 – 0.023)**	<0.001 (-0.007 – 0.008)	0.012 (<0.001 – 0.024)**
	Consultation for HFNS (N=896)	-0.021 (-0.045 – 0.002)*	-0.007 (-0.015 – 0.002)	-0.028 (-0.053 – -0.003)**
	Self-management of 4 symptoms[1] factor (N=930)	0.011 (-0.002 – 0.025)	0.001 (-0.005 – 0.007)	0.013 (-0.001 – 0.027)*
	Self-management of HFNS (N=891)	0.016 (-0.002 – -0.035)*	-0.002 (-0.005 – <0.001)	0.014 (-0.005 – 0.032)
Adult social class (per one class increase; unskilled → professional)	Consultation for 4 symptoms factor	0.017 (0.005 – 0.028)**	-0.008 (-0.017 – <-0.001)**	0.008 (-0.005 – 0.021)
	Consultation for HFNS	-0.016 (-0.041 – 0.010)	-0.015 (-0.025 – -0.006)**	-0.030 (-0.058 – -0.004)**
	Self-management of 4 symptoms factor	0.031 (0.015 – 0.046)**	-0.003 (-0.009 – 0.003)	0.027 (0.012 – 0.043)**
	Self-management of HFNS	0.026 (0.006 – 0.047)**	-0.005 (-0.009 – -0.001)**	0.021 (<0.001 – 0.041)**
Educational attainment at age 26 (per one level increase; no qualifications → degree level)	Consultation for 4 symptoms factors	0.028 (0.013 – 0.043)	-0.002 (-0.013 – 0.009)	0.026 (0.009 – 0.044)**
	Consultation for HFNS	-0.030 (-0.063 – 0.003)*	-0.014 (-0.027 – -0.002)**	-0.044 (-0.079 – -0.009)**
	Self-management of 4 symptoms factor	0.036 (0.017 – 0.055)**	<0.001 (-0.007 – 0.009)	0.037 (0.017 – 0.056)**
	Self-management of HFNS	0.022 (-0.005 – 0.048)	-0.005 (-0.009 – -0.001)**	0.017 (-0.010 – 0.043)

Previous premenstrual tension (PMT) (compared to none)	Consultation for 4 symptoms factor	0.016 (-0.014 – 0.046)	0.082 (0.058 – 0.107)**	0.098 (0.065 – 0.131)**
	Consultation for HFNS	0.036 (-0.026 – 0.097)	0.039 (0.016 – 0.062)**	0.075 (0.010 – 0.140)**
	Self-management of 4 symptoms factor	0.008 (-0.030 – 0.047)	0.065 (0.043 – 0.087)**	0.073 (0.037 – 0.109)**
	Self-management of HFNS	0.033 (-0.016 – 0.082)	0.013 (0.003 – 0.022)**	0.046 (-0.003 – 0.095)*
Total number of health conditions between ages 43-53 (per one condition increase)	Consultation for 4 symptoms factor	0.012 (0.002 – 0.022)**	0.022 (0.015 – 0.030)**	0.034 (0.023 – 0.046)**
	Consultation for HFNS	0.004 (-0.016 – 0.025)	0.011 (0.004 – 0.019)**	0.016 (-0.006 – 0.037)
	Self-management of 4 symptoms factor	0.015 (0.003 – 0.028)**	0.016 (0.010 – 0.022)**	0.031 (0.019 – 0.044)**
	Self-management of HFNS	-0.005 (-0.021 – 0.011)	0.004 (0.001 – 0.006)**	-0.002 (-0.018 – 0.015)
GP visits in earlier adulthood (compared to none)	Consultation for 4 symptoms factor	0.057 (0.026 – 0.088)**	0.040 (0.018 – 0.062)**	0.097 (0.062 – 0.133)**
	Consultation for HFNS	0.111 (0.044 – 0.177)**	0.026 (0.002 – 0.050)**	0.137 (0.067 – 0.207)**
	Self-management of 4 symptoms factor	0.020 (-0.018 – 0.058)	0.030 (0.012 – 0.048)**	0.050 (0.011 – 0.089)**
	Self-management of HFNS	0.029 (-0.024 – 0.082)	0.009 (<-0.001 – 0.017)*	0.038 (-0.015 – 0.091)
Family related stress between and 48 and 54 (per one unit increase)	Consultation for 4 symptoms factor	0.003 (<0.001 – 0.006)**	0.009 (0.006 – 0.011)**	0.012 (0.009 – 0.015)**
	Consultation for HFNS	-0.001 (-0.006 – 0.004)	0.005 (0.003 – 0.007)**	0.004 (-0.001 – 0.009)
	Self-management of 4 symptoms factor	Did not converge	0.007 (0.005 – 0.010)**	0.007 (0.005 – 0.010)**
	Self-management of HFNS	0.003 (-0.001 – 0.007)*	0.001 (<0.001 – 0.002)**	0.005 (<0.001 – 0.009)**

Level of physical activity in adulthood (per one level increase in activity; inactive → most active)	Consultation for 4 symptoms factor	0.019 (0.002 – 0.036)**	-0.001 (-0.012 – 0.012)	0.019 (-0.001 – 0.038)*
	Consultation for HFNS	-0.018 (-0.057 – 0.021)	-0.002 (-0.016 – 0.012)	-0.020 (-0.060 – 0.021)
	Self-management of 4 symptoms factor	0.040 (0.017 – 0.063)**	0.001 (-0.008 – 0.010)	0.041 (0.018 – 0.065)**
	Self-management of HFNS	0.059 (0.029 – 0.088)**	-0.001 (-0.005 – 0.004)	0.058 (-0.005 – 0.004)**

*p<0.10   **p<0.05

[1] Trouble sleeping, vaginal dryness, nervous/emotional symptoms, urinary symptoms

The right-hand column of Table 5.10 shows the total effect. Where this is statistically significant there is evidence of an association between the exposure and consultation (or self-management). Based on this, the table shows higher consultation for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms was associated with more advantaged childhood social class, higher educational attainment, previous PMT, more health conditions at age 43-53, more GP visits earlier in adulthood, and more family stress. With the exception of childhood social class and education these were all mediated by symptom experience. This is illustrated in the table by the statistically significant indirect effects via symptom experience and the fact that the direct effects are smaller in magnitude than the total effects.

The associations between childhood social class and consultation and self-management are shown in the path diagrams below. The pathways are labelled with the associations between the explanatory and outcome variables, the explanatory variable and the mediator and the mediator and the outcome variable. Each figure corresponds with a model reported in Table 5.10. The indirect effect reported in table represents the association between the explanatory variable and the mediator times by the association between the mediator and the outcome variable. The total effect is the indirect effect plus the direct association between the explanatory variable and the outcome variable. In the figures, where latent variables have been used in the SEM (eg, factors of consultation, self-management and experience of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms), these are depicted by oval-shaped variables whereas observed variables are presented as rectangles. The four models for the associations between childhood social class and measures of management are shown below in figures 5.6-5.9 as visual representations of the associations reported in Table 5.10. The models for all other explanatory variables reported in Table 5.10 are included in the Appendix (figures A.1-A.28).
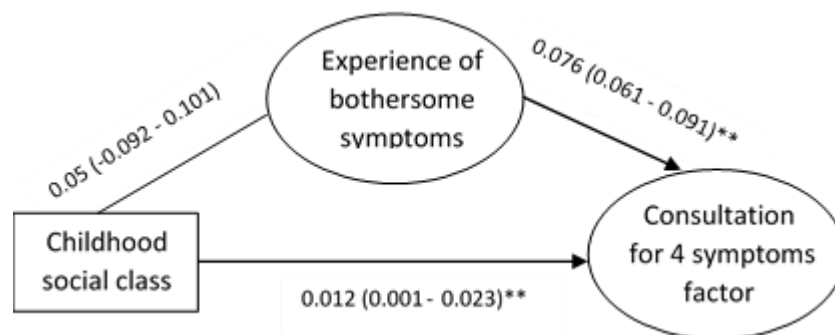
Figure 5.6 Path diagram of direct and indirect associations between childhood social class and factor of consultation
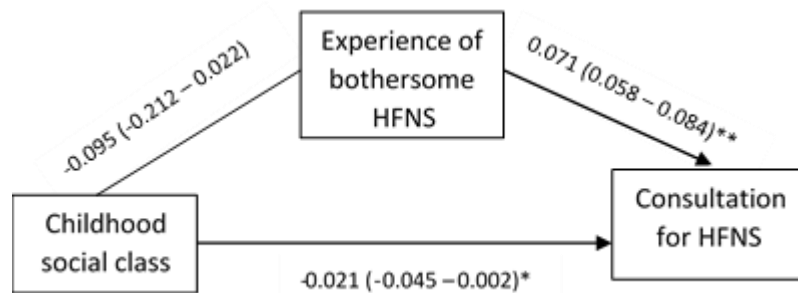
Figure 5.7 Path diagram of direct and indirect associations between childhood social class and consultation for HFNS
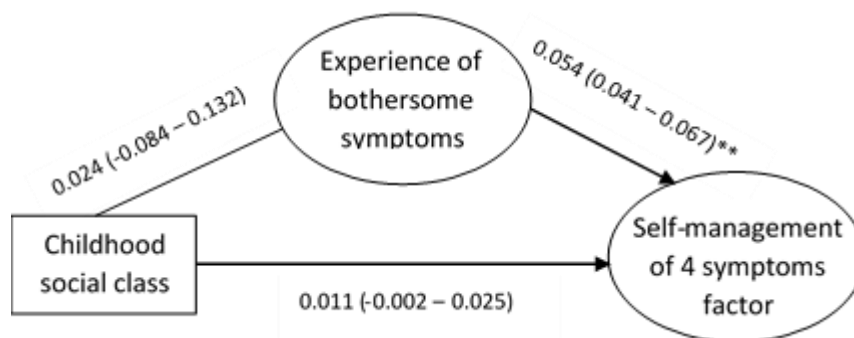
Figure 5.8 Path diagram of direct and indirect associations between childhood social class and factor of self-management
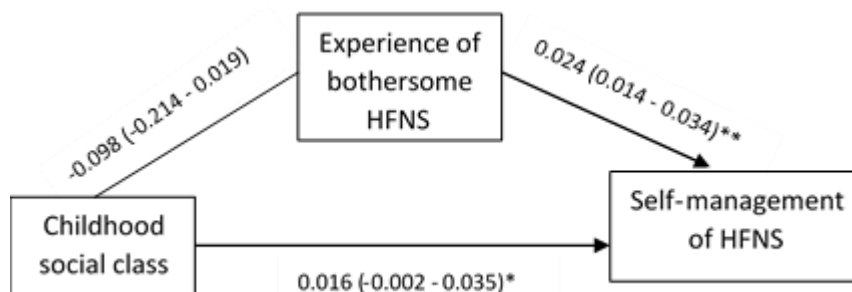
Figure 5.9 Path diagram of direct and indirect associations between childhood social class and self-management of HFNS

Higher consultation for HFNS, similar to consultation for the other four symptoms was associated with previous PMT, more health conditions, previous GP visits and higher family related stress; again, these associations were all mediated by symptom experience. However, higher childhood and adulthood social class and higher educational attainment were associated with lower consultation for HFNS, as indicated by the bivariate analyses. The associations between adult social class and educational attainment and consultation were mediated by symptom experience (ie, less bothersome

symptoms), however, a direct association remained between higher childhood social class and lower consultation for HFNS.

Higher levels of self-management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms were associated directly with higher adult social class, educational attainment and higher levels of physical activity in earlier adulthood; the associations between previous PMT, more health conditions, previous GP visits and higher family stress and self-management were all mediated by the experience of more bothersome symptoms.

Higher levels of self-management of HFNS were associated with higher adult social class, previous PMT, higher family related stress and more physical activity in earlier adulthood; however, the associations with previous PMT and family stress were mediated by symptom experience.

5.2.8.3 Mediation of childhood social class by adult health and social factors

To assess which factors from adulthood might explain the association between childhood social class and health professional consultation (both for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms, and for HFNS), further SEMs were tested using adult social class, education attainment and adult health as potential mediators. For each SEM, the measure of consultation (either the factor of consultation for 4 symptoms or the binary measure of consultation for HFNS) was regressed onto childhood social class and an indirect pathway via adult social class/educational attainment/adult health was added. Path diagrams for the SEMs shown in Table 5.11 are displayed in the appendix (figures A.29-A.34).

Table 5.11 Pathways between childhood social class and health professional consultation mediated by adult social class, educational attainment and adult health (each mediator considered separately)

Mediator Variable	Outcome measure of consultation	Direct effect Coefficient (95% CI)	Indirect effect Coefficient (95% CI)	Total effect[1] Coefficient (95% CI)
Adult social class	Consultation for 4 symptoms factor	0.009 (-0.002 – 0.020)	0.003 (<-0.001 – 0.006)*	0.012 (0.001 – 0.022)**
	Consultation for HFNS	-0.019 (-0.044 – 0.005)	-0.002 (-0.009 – 0.004)	-0.021 (-0.045 – 0.002)*
Educational attainment	Consultation for 4 symptoms factor	0.005 (-0.007 – 0.016)	0.007 (0.002 – 0.013)**	0.012 (0.002 – 0.022)**
	Consultation for HFNS	-0.015 (-0.042 – 0.011)	-0.006 (-0.018 – 0.005)	-0.021 (-0.045 – 0.002)*
Total number of health conditions between ages 43-53	Consultation for 4 symptoms factor	0.012 (0.001 – 0.022)**	<0.001 (-0.001 – 0.002)	0.012 (0.002 – 0.023)**
	Consultation for HFNS	-0.022 (-0.045 – 0.002)*	<0.001 (<-0.001 – 0.001)	-0.021 (-0.045 – 0.002)*

*p<.10   **p<.05

[1] Association between childhood social class and health professional consultation

These results (Table 5.11) suggest that the association between childhood social class and consultation for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms was partly mediated by adult social class and educational attainment (more so by educational attainment). Although indirect effects were not statistically significant, the direction of the estimates suggests that the inverse association between childhood social class and consultation for HFNS was partly mediated by adult social and education (again, more so by educational attainment). Adult health did not mediate the associations between childhood social class and consultation for any symptoms. These results support the hypothesis that associations between childhood social class and management of health (health professional consultation, is this case) were explained by adult socioeconomic factors.

5.3 Women's self-management of general health in midlife

The following section of this chapter will explore how women reported self-managing their general health at age 54 and identify the health and social factors associated with women's general health self-management in midlife.

5.3.1 Analytical strategy

The binary measure identifying women who reported self-management behaviours for general health was regressed onto each of the potential explanatory variables to identify which of these variables were bivariately associated with self-management (Model 1). The childhood factors which were associated with self-management in the bivariate analysis were then included in a multivariable model (Model 2), as were the adulthood health and social measures (Model 3) and, finally, a fully adjusted model including both variables from childhood and adulthood (Model 4), to demonstrate which associations were explained by other variables in the model and which variables remained independently associated with self-management.

5.3.2 Types of self-management behaviours and treatment types

At age 54, women were asked about how they managed their general health using self-management behaviours and techniques. Women provided free-text responses to the following question as part of the Women's Health sub-study: "Please specify name(s) of non-prescribed medicine, alternative therapy or treatment, special diet or exercise regime". The responses given by study members fell into four broad categories of behaviours or treatment types: non-prescribed medication, exercise/physical activity, complementary and alternative medicine (CAM) and diet, plus a miscellaneous group of 'other' approaches. Women were able to report up to nine behaviours/techniques. The number and percentage of women who reported each behaviour is shown in Table 5.12 for women who completed the questionnaire (N=1308).

Table 5.12 Frequency of types of behaviours/treatment types reported by women in midlife (N=1308)

Self-management category	N (% of all self-management approaches)
Non-prescribed medication	288 (22.0)
Exercise/physical activity	228 (17.4)
CAM	224 (17.1)
Diet	179 (13.7)
Other	24 (1.8)

By combining all of the above types of self-management, study members who reported at least one self-management behaviour were identified. As shown in Table 5.13, over a third of study members reported self-managing their general health in midlife. The percentage of women who reported self-managing their general health in midlife is comparable with the proportion of women who reported self-managing symptoms in midlife; 33.1% of women who completed the questionnaire in 2000 reported either just self-managing symptoms or both consulting a health professional and self-managing.

Table 5.13 Frequency of women who reported none or at least one self-management behaviour for general health in midlife (N=1308)

	N (% of women who completed the questionnaire)
Did not self-manage	805 (61.5)
Self-managed	503 (38.5)

5.3.3 Associations between childhood and adulthood health and social factors and women's self-management

Table 5.14 shows the associations between factors from childhood and adulthood and self-management of general health.

Table 5.14 Bivariate and adjusted associations between health and social factors from childhood and adulthood and a binary measure of general health in self-management in women in midlife

N=1308 Potential explanatory variables		Model 1[1] OR (95% CI)	Model 2[2] OR (95% CI)	Model 3[3] OR (95% CI)	Model 4[4] OR (95% CI)
From childhood					
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)		0.71 (0.55-0.91)**	0.74 (0.57-0.97)**		0.78 (0.59-1.04)*
Childhood social class (per one class increase; unskilled → professional)		1.30 (1.19-1.42)**	1.27 (1.17-1.39)**		1.12 (1.00-1.25)**
Adolescent self-organisation (per one unit increase in the self-organisation factor score)		1.28 (1.08-1.52)**	1.19 (0.99-1.42)*		1.06 (0.86-1.31)
From adulthood					
Educational attainment at age 26 (per one level increase; no qualifications → degree level)		1.52 (1.33-1.74)**		1.12 (0.95-1.32)	1.03 (0.85-1.26)
Adult social class (per one class increase; unskilled → professional)		1.43 (1.28-1.59)**		1.30 (1.14-1.48)**	1.27 (1.12-1.45)**
Total number of health conditions between ages 43-53 (per one condition increase)		1.13 (1.05-1.22)**		1.07 (0.98-1.16)	1.07 (0.99-1.17)
Any GP visits in earlier adulthood (compared to none)		1.47 (1.15-1.88)**		1.18 (0.89-1.57)	1.16 (0.87-1.54)
Level of physical activity in adulthood (per one level increase; inactive → most active)		1.52 (1.32-1.74)**		1.31 (1.11-1.53)**	1.31 (1.11-1.55)**
Smoking trajectory to age 43 (Current smoker used as reference group)	Never smoked	2.03 (1.37-3.00)**		1.65 (1.07-2.54)**	1.64 (1.03-2.61)**
	Ex-smoker	2.11 (1.46-3.06)**		1.63 (1.08-2.46)**	1.60 (1.02-2.48)**
Personality age 26	Extraversion (per one unit increase)	1.00 (0.96-1.03)			
	Neuroticism (per one unit increase)	1.00 (0.97-1.04)			
Marital status age 43 (married used as reference group)	Single	0.68 (0.38-1.22)			
	Separated/ Divorced/ Widowed	1.01 (0.74-1.38)			

Family related stress between and 48 and 54 (per one unit increase)	1.05 (1.03-1.07)**		1.04 (1.01-1.06)**	1.04 (1.01-1.06)**

*p<0.10   **p<0.05

[1]Bivariate associations between explanatory variables and general health self-management
[2]Multiply adjusted model of childhood factors associated bivariately with general health self-management
[3]Multiply adjusted model of adult factors associated bivariately with general health self-management
[4]Multiply adjusted model of all factors associated bivariately with general health self-management

5.3.4 Bivariate associations between childhood and adulthood health and social factors and women's self-management of midlife health

Each of the factors from childhood were associated with self-management; serious illness was associated with a lower likelihood of self-management and higher childhood social class and self-organisation were both associated with a greater likelihood of self-managing.

Higher educational attainment, higher adult social class, reporting more health conditions in midlife, previously visiting the GP, higher levels of physical activity in earlier adulthood, being a non/ex-smoker and reporting higher levels of family related stress were all associated with an increased likelihood of self-management was associated.

5.3.5 Multiply adjusted associations between childhood and adulthood health and social factors and women's self-management of general health in midlife

After mutual adjustment of childhood variables, the association between self-organisation and self-management was slightly attenuated but all associations remained. However, after adjusting for adult variables, having childhood illness remained weakly associated with lower self-management. The association between higher childhood social class and an increased likelihood of self-managing was maintained. The association with self-organisation was fully attenuated following adjustments.

Following adjustments for all factors, higher adult social class and physical activity, being a lifelong smoker or ex-smoker and higher levels of family related stress remained associated with self-management; associations with educational attainment, number of health conditions and GP visits were attenuated.

5.4 Summary of results and discussion

5.4.1 Socioeconomic circumstances and women's management of health

It was hypothesised that socioeconomic advantage would be associated with more proactive management of health; this would include both consultation and self-management of symptoms in midlife and self-managing general health in midlife. Initially, mixed support for this hypothesis was presented by the results for management of symptoms in midlife. Measures of higher socioeconomic advantage were generally found to be associated with an increased likelihood of consulting a health professional for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms. These results were in line with previous research that has reported measures of higher socioeconomic advantage, from both childhood and adulthood, were associated with greater use of hormone replacement therapy (HRT), a medicalised approach to management menopausal symptoms (Finley et al., 2001; Lawlor et al., 2004). However, the present results added to the existing literature by exploring the correlates of management of different symptoms and, in doing so, found an inverse association between socioeconomic advantage and likelihood of consulting for HFNS; ie, study members with greater socioeconomic advantage were less likely to consult for HFNS, an association not reported in the previous literature. The bivariate results that first demonstrated a difference in the way in women are likely to manage different types of symptoms (ie, HFNS compared to the other four symptoms; in terms of socioeconomic patterning of consultation) were corroborated by the SEM. The SEM results looked at the correlates of four symptoms together and HFNS separately and showed the same trends, in that socioeconomic factors were associated with how women managed different types of symptoms. However, the mediation analysis showed that the inverse association between childhood social class and consultation for HFNS was mediated by educational attainment (in line with hypothesis 2, which stated that associations between childhood SEP and health management would be explained by adult socioeconomic factors) and that the associations between higher adult social class and educational attainment and lower rates of consultation for HFNS were in fact mediated by lower reporting of bothersome HFNS. These results are in line with previous literature that describes associations between women's social class and their experience of symptoms in midlife, in that women with more disadvantaged socioeconomic circumstances are more likely to report more bothersome HFNS in midlife (Avis et al., 1997; Mishra & Kuh, 2012). Symptom experience generally did not explain the association between adult social class and consultation for the other 4 symptoms, suggesting that there was more

of a direct association between higher social class and higher consultation, irrespective of symptom experience. Therefore, there is mixed evidence for hypothesis 8 (page 78). Whilst there is a large body of existing research on the role of socioeconomic factors and women's experience of the menopause (discussed in section 2.3.1.4) and previous research has explored associations between socioeconomic circumstances and women's management of symptoms, the present results expand on the existing research by investigating the role of symptoms as a mediator of the pathway between socioeconomic factors and management of symptoms.

In support of hypothesis 2, higher childhood and adulthood social class were associated with an increased likelihood of self-managing symptoms and general health. Although this was a gap in the existing literature, these results are in line with a previous study that reported women with higher levels of education were more likely to source advice regarding symptom management from different arenas (Anderson & Posner, 2002), suggesting more educated women were more likely to explore alternative management approaches to professional health care. In contrast to what was hypothesised, the association between childhood social class and self-management was not explained by adult socioeconomic factors, and remained independently associated with self-management after adjustments.

5.4.2 Health status and women's management of health

As was hypothesised, poorer health, measured by the number of health conditions reported in midlife, was associated with proactive management of symptoms in midlife. This was also in line with previous literature, which reported that worse (self-rated) health was associated with consultation during the menopause (Avis & McKinlay, 1990). Previously experiencing premenstrual tension (PMT) (an adverse symptom of women's reproductive health) was also associated with more proactive management of symptoms in midlife, also supporting previous research (Avis & McKinlay, 1990; Guthrie et al., 1996). The results from this chapter add to the previous literature by exploring self-management of symptoms, as well as consultation, and suggest that health related factors are associated with both consultation and self-management in similar ways. The present results also build on previous research by exploring the role of symptom experience in the association between measures of health and consultation for symptoms in midlife. Mediation analysis found that these associations were mediated by the experience of more bothersome symptoms (as was hypothesised), indicating that women with poorer health and who previously experienced PMT were more likely to report bothersome symptoms, as was reported in the literature (Dennerstein et al., 1993; Hunter, 1992). Worse health was also found to be bivariately associated with a higher

likelihood of self-managing general health, in line with the hypothesis, however, this association was attenuated by adult social class, health behaviours and family related stress.

However, in contrast to the hypothesis, serious illness in childhood was associated with a lower likelihood of self-managing general health and this association remained, albeit weaker, after adjusting for adult health and health care utilisation. This direct association between childhood illness and self-management suggests that the associations between health in childhood and health in adulthood and self-management of general health are not consistent. The role of childhood health in women's management of health in midlife also differs as to whether women are managing symptoms or general health. It could be argued that the measure of childhood health used differs to the adulthood measure, as it captures hospitalisation, therefore could be considered a measure of health care utilisation. However, the association between hospitalisations in childhood and women's general health self-management is not comparable to that with previous GP visits (discussed below in section 5.4.3). Thus, it cannot be concluded that the difference in the directions between childhood and adult health and women's general health self-management are entirely due to the measure of childhood health also reflecting health care utilisation, rather than health alone. It is possible that these associations differ because they measure health at different points in the life course or because either childhood or adult health are also associated with other explanatory variables not measured in this analysis.

5.4.3 Previous health care utilisation and women's management of health

Women who reported accessing GP services in earlier adulthood were more likely to consult a professional regarding symptoms in midlife, as was hypothesised. These results address a gap in the literature as, although previous research has reported associations between screening attendance and use of oral contraception (which is a marker of health professional consultation) (Anderson & Posner, 2002; Avis & McKinlay, 1990; Egeland et al., 1991; Kuh, Hardy, & Wadsworth, 2000), these are aspects of health care specific to women. The present results investigated associations between non-specific health care utilisation (although it is possible the measure of GP visits includes visits regarding women's health) and women's consultation and self-management of symptoms and general health, aiming to explore associations between general health care utilisation in earlier adulthood and management of health in midlife.

Mediation analysis showed that associations between previously visiting the GP and proactive management of symptoms were at least partly mediated by the experience of more bothersome symptoms. It may be that women who consulted a GP in earlier adulthood also had worse health throughout adulthood and, as these results showed, worse health was associated the experience of more bothersome symptoms.

As with the measure of adult health, previous GP visits were associated with an increased likelihood of self-management bivariately, but this association was attenuated by adult social class, health behaviours and family related stress. These results support the idea that the associations between previous GP visits and proactive management of symptoms, via the experience of more bothersome symptoms, may also be explained by worse health in adulthood.

5.4.4 Health behaviours and women's management of health

In support of the hypothesis, being more physically active in earlier adulthood was associated with proactive management approaches, particularly with self-management of symptoms. These results add to the existing literature, as, although higher levels of physical activity are associated with consultation in midlife (Morse et al., 1994), associations between physical activity and self-management of symptoms in midlife have not previously been explored. Furthermore, the association between higher levels of physical activity and the greater propensity to self-manage was not mediated by symptom experience, suggesting an association between this health behaviour and the self-management of symptoms, independent of symptom experience. This could be explained by the fact that the question enquiring into study members' self-management behaviours for each symptom specifically referred to physical activity as a means of managing symptoms. Thus, women who have previously reported physical activity in earlier adulthood may have maintained this behaviour in midlife and therefore it formed at least part of their response to symptoms. This result was corroborated by the association found between higher levels physical activity and a higher likelihood of self-managing general health, which remained after adjusting for all other health and social variables.

In line the hypothesis, being a non/ex-smoker, compared to being a current smoker, was associated with an increased likelihood of self-managing general health. However, smoking was not associated with management of symptoms, in contrast to the consistent body of evidence that reports associations between smoking and a more troublesome

menopausal transition (Avis et al., 1997; Dennerstein et al., 1993; Torgerson et al., 1997).

These results show that there is variation in the correlates of self-management of different health challenges (ie, symptoms compared to general health in midlife). Being an ex- or non-smoker, compared to being a smoker, and reporting higher levels of physical activity were the strongest correlates of self-management of general health, whereas only physical activity was associated with management of symptoms.

5.4.5 Family relations and women's management of health

Family related stress was associated with both an increased likelihood of proactively managing symptoms and general health, in contrast to the hypothesis. The hypothesis was based on the assumption that, for women with higher levels of family-related stress in midlife, managing their health would be less of priority, however the results were in line with previous research that has shown as association between higher levels of stress and more health care utilisation in women in midlife (Morse et al., 1994). These results could be interpreted as an indication that women with higher levels of stress in midlife, rather than not have the capacity to manage their health, as was hypothesised, are actually more motivated to proactively manage their health; these women may have been more likely to prioritise caring for their health as a reaction to experiencing greater family related stress or burden.

However, in support of hypothesis 8 (that stated associations would be mediated by symptom experience), the association between family related stress and management of symptoms was mediated by the experience of more bothersome symptoms, suggesting that more bothersome symptoms were reported by women with higher levels of stress. This is in line with a previous study (also using NSHD data), which reported that more family related stress was associated with more bothersome (vasomotor) symptoms in midlife (Hardy & Kuh, 2002). The present results suggest that this association contributes towards that between family stress and proactive management of symptoms.

5.4.6 Strengths and limitations

One of the strengths of this analysis is its inclusion of experience and management of 5 different symptoms in midlife (HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms). Much of the literature exploring women's management of symptoms does not assess management of individual

symptoms, or looks only vasomotor symptoms. By investigating experience and management of these 5 symptoms, this chapter was able to demonstrate any differences in how women managed symptoms and in the correlates of management type. Given that only, of these 5 symptoms, HFNS and vaginal dryness are associated with the menopausal transition, whereas the others are associated more with ageing (Hardy & Kuh, 2002; Kuh, Hardy, Rodgers, & Wadsworth, 2002), this chapter was able to consider these symptoms independently as separate health challenges, rather than group them together. In addition to assessing the correlates of different types of symptoms independently, this chapter was able to explore associations between these same correlates and self-management of general health, an additional health challenge in midlife (with regard to maintaining health and wellbeing and managing signs and symptoms of ageing).

The findings of this chapter add to the existing literature by looking at the common factors associated with more than one approach to managing symptoms in midlife (consultation and self-management). As described in Chapter 2, much of the previous research into management of symptoms in midlife looks at the correlates or predictors of one type of management approach, such as consultation, use of HRT or use of CAM. The benefit of using NSHD data is that women were asked about both consultation and self-management, thus analysis could include comparing the factors associated with both consultation and self-management. Moreover, using data from the NSHD Women's Health sub-study allowed for the comparison of factors associated with self-management of specific symptoms in midlife and self-management of general health in midlife; again, something not covered by previous literature.

There were also limitations to this chapter. As described in section 4.7.7, missing data is often a problem when using longitudinal data. The limited sample size is also a limitation, particularly for this chapter, as only women with symptom data were included, therefore for some of the less common symptoms, sample sizes were smaller and models may lack statistical power.

This chapter would also have benefitted from information regarding when women consulted a professional, as they were asked only if they had or not if the last ten years. As discussed previously in section 1.2.1, 'timeliness' is an important element of appropriate access to health care services (Rogers et al., 1999) and, given that symptom duration was strongly associated with the likelihood of consultation (reported in section 5.2.5) the correlates of consultation for women who consulted a professional after experiencing symptoms for 1 year may be very different to those who consulted after multiple years of bothersome symptoms.

5.4.7 Conclusions

The results from this chapter show that management of symptoms was mostly driven by the experience of symptoms, rather than health and social factors from childhood and adulthood, with the exception of physical activity and the associations between socioeconomic advantage and increased management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms. Symptom experience was directly associated with proactive management of symptoms and mediated most of the associations that were found between explanatory variables and measures of management. These results support much of the previous literature, which showed that more bothersome symptoms did predict proactive management, particularly professional health care utilisation and the use of HRT, however, they possibly highlight a limitation of the previous research that has not accounted for symptom experience when describing associations between health and social factors and management of symptoms.

This chapter also showed that women's self-management of general health in midlife was primarily driven by life course socioeconomic advantage, positive health behaviours and reporting higher levels of family related stress. Independent of health in adulthood and socioeconomic exposures, serious illness in childhood was associated with a lower likelihood of general health self-management.

This chapter explored the factors associated with health professional consultation in response to particular symptoms and self-management of those symptoms and also of general health. The following chapter will look at how those same factors are associated with engagement with preventive health care, which generally involves consulting a health professional but not necessarily in response to an actual symptom, thus the cues for action may be different.

6 Health check attendance in later life

The aim of this chapter is to assess health check attendance in later life in the MRC National Survey of Health and Development (NSHD) and identify the health and social factors from childhood and adulthood associated with health check non-attendance. Objectives and hypotheses 1-7 (see Chapter 3, pages 74-79) are relevant for this chapter.

6.1 Analytical strategy

As described in Chapter 3, section 3.5, the analytical sample included 2452 men and women study members who completed the postal questionnaire at age 68 and answered questions about their attendance to six health checks that are recommended by the NHS for this age group. The outcomes used in this chapter were count measures of health check non-attendance in men and in women. The common childhood explanatory variables (early serious illness, childhood social class and adolescent self-organisation) and adulthood health and social explanatory variables (educational attainment, adult social class, adult health, previous GP visits, physical activity, smoking trajectory, extraversion, neuroticism, and marital status) were used, as described in section 3.4. In addition, measures of women's cervical screening and mammogram attendance in midlife were used (descriptives are presented in section 6.2).

Poisson regression models were used to regress the count measure of number of health checks not attended onto the explanatory variables listed above. A measure on non-attendance, rather than a measure of number of health checks attended, was used as this variable was positively skewed (see figure 6.1), thus was more appropriate for a Poisson model. Initial Poisson models included a sex by exposure interaction term. Likelihood ratio tests confirmed that sex interactions were evident for some of the explanatory variables included in these results: childhood social class, educational attainment, marital status and smoking trajectory. The results showed that a stronger association was found between higher childhood social class, higher educational attainment and being an ex- or non-smoker (compared to being a smoker) and lower health check non-attendance for women and the association between being separated/divorced/widowed (compared to be married) and higher health check non-attendance was stronger for men. (These results are reported in Table A:7.) Further analyses were stratified by sex.

The same analytical procedure was followed for both men and women. Bivariate models were used to assess associations between exposures and health check non-attendance

(Model 1). For women only, previous mammogram and cervical screening attendance were also included as potential explanatory variables. The models were sequentially adjusted as follows: i) variables from childhood bivariately associated with health check non-attendance were included simultaneously in a multivariable model (Model 2), ii) adult variables bivariately associated with attendance (Model 3), iii) all variables associated bivariately with health check non-attendance were entered into a fully adjusted model (Model 4). These steps were taken to investigate which associations where attenuated by either childhood or adult factors.

6.2 Descriptive statistics

In addition to the explanatory variables shown in Table 3.3, measures of smoking status and marital status at age 68 were used and measures of women's cervical screening and mammogram attendance in midlife were used. The descriptives for these variables are shown below in Table 6.1.

Table 6.1 Descriptive statistics for variables measured at age 68 in study members who completed the questionnaire at age 68 (N=2452 men and women; N=1276 women)

		N	**%**
Smoking trajectory to age 68	Non-smoker	670	27.3
	Ex-smoker	1432	58.4
	Current smoker	137	5.6
	Missing	*213*	*8.7*
Marital status at age 68	Single	91	3.7
	Married	1755	71.6
	Separated/divorced/widowed	*490*	*20.0*
	Missing	116	4.7
Women's cervical screening attendance in midlife (N=1276)	+5 years ago/never	131	10.3
	Within the last five years	*1032*	*80.9*
	Missing	113	8.9
Women's mammogram attendance in midlife (N=1276)	Never	60	4.7
	Yes	1108	86.8
	Missing	*108*	*8.5*

6.3 Descriptive results

6.3.1 Health check non-attendance in later life

Table 6.2 shows the frequency of non-attendance to each health check in men and women; blood pressure checks were the most frequently attended health check and the flu jab the least frequently attended, for both men and women. The percentages shown represent the percentage of study members (N=2452), men (N=1176) and women

(N=1276), who reported not attending the health check within the recommended timeframe.

Figure 6.1 shows the number of study members who reported not attending 0-6 health checks within the recommended time frame at age 68. The data are positively skewed as most study members reported not missing any health checks and few reported missing multiple health checks.

Table 6.2 Frequency of non-attendance within the recommended time frame for each health check reported age 68

Health check (recommended frequency)	Total (N=2452) % (N)	Men (N=1176) % (N)	Women (N=1276) % (N)
Blood pressure (within last year)	6.1 (149)	5.7 (67)	6.4 (82)
Eyesight (within last two years)	10.9 (268)	13.6 (160)	8.5 (108)
Dental (within last year)	14.6 (358)	16.8 (198)	12.5 (160)
Cholesterol (within last five years)	16.9 (414)	18.5 (236)	15.1 (178)
Colon cancer screen (within last two years)	22.5 (551)	23.0 (270)	22.0 (281)
Influenza immunisation (within last year)	24.2 (593)	23.6 (278)	24.7 (315)
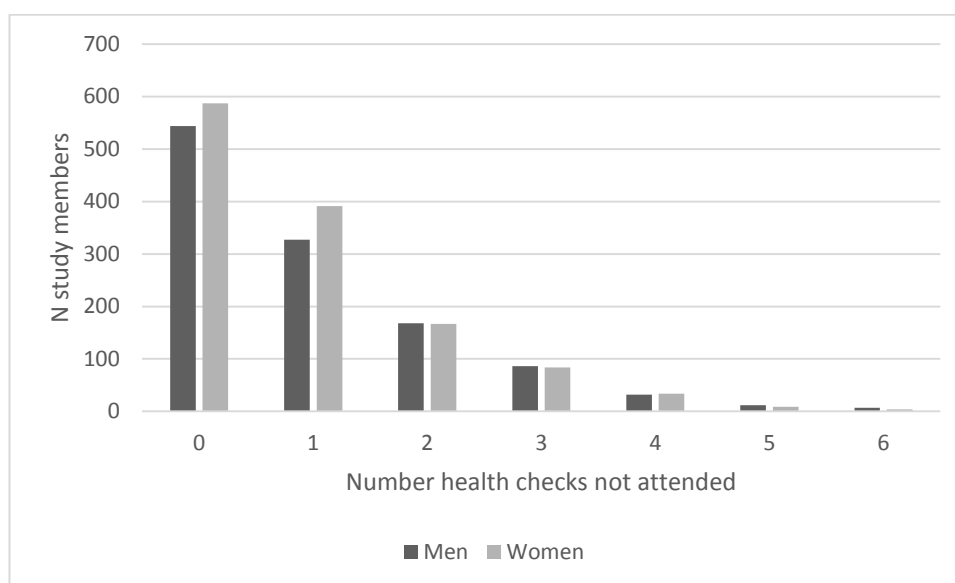
Figure 6.1 Number of health checks not attended by study members

Table 6.3 shows the reasons study members gave for not attending health checks. Study members were able to select more than one reason for not attending and the reasons were not associated with any one particular health check. The most frequently cited reasons for not attending, by both men and women, was having "*no need… no relevant health problems*". The reasons given for not attending are also presented in Table A.8 (in the Appendix), stratified by social class. Although the numbers are sometimes small, there does not appear to be any pattern by which members of a particular social class are more likely to cite a particular reason for not attending.

Table 6.3 Reasons given for not attending health checks by men and women at age 68

Reason for not attending	Total (N=2452) % (N)	Men (N=1176) % (N)	Women (N=1276) % (N)
I have no need to, I have no relevant health problems	20.7 (507)	23.2 (273)	18.3 (234)
My GP never recommended it	12.7 (311)	11.6 (136)	13.7 (175)
I had already had these checks earlier (before the period specified)	9.8 (239)	8.8 (104)	10.6 (135)
I do not have time/didn't get around to it	5.0 (122)	4.9 (57)	5.1 (65)
I've never thought about it	3.9 (96)	4.7 (55)	3.2 (41)
I don't think it's important	3.7 (91)	3.9 (46)	3.5 (45)
Financial reasons	1.9 (47)	1.8 (21)	2.0 (26)

6.4 Associations between factors from childhood and adulthood and health check non-attendance in later life in men

Table 6.4 shows the bivariate associations between childhood and adult health and social factors and health check non-attendance (Model 1) and multiply adjusted models (Models 2, 3 & 4).

Table 6.4 Table of associations between potential explanatory variables and number of health checks not attended in men

Potential explanatory variable N=1176	Model 1[1] IRR [5] (95% CI)	Model 2[2] IRR (95% CI)	Model 3[3] IRR (95% CI)	Model 4[4] IRR (95% CI)
From childhood				
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)	1.01 (0.89 - 1.14)			
Childhood social class (per one class increase; unskilled → professional)	0.97 (0.93 - 1.02)			
Adolescent self-organisation (per one unit increase in the self-organisation factor score)	0.84 (0.77 - 0.91)**			0.86 (0.78- 0.95)**
From adulthood				
Educational attainment at age 26 (per one level increase; no qualifications → degree level)	0.91 (0.87- 0.96)**		0.94 (0.88- 1.00)*	0.97 (0.91- 1.04)
Adult social class (per one class increase; unskilled → professional)	0.93 (0.89- 0.98)**		0.98 (0.92- 1.03)	0.98 (0.93- 1.04)
Total number of health conditions between ages 43-53 (per one condition increase)	0.89 (0.84- 0.94)**		0.90 (0.85- 0.96)**	0.90 (0.85- 0.96)**
Any GP visits in earlier adulthood (compared to none)	0.83 (0.73- 0.94)**		0.88 (0.77- 1.00)**	0.87 (0.77- 0.98)**
Level of physical activity in adulthood (per one level increase in activity; inactive → most active)	0.95 (0.89- 1.02)			
Smoking trajectory to age 68 (Current smoker used as reference group) Never smoked	0.66 (0.53- 0.82)**		0.76 (0.60- 0.95)**	0.78 (0.62- 0.99)**
Ex-smoker	0.65 (0.53- 0.79)**		0.73 (0.60- 0.90)**	0.74 (0.61- 0.91)**
Personality age 26 Extraversion (per one unit increase)	0.99 (0.97- 1.02)			
Neuroticism (per one unit increase)	1.00 (0.99- 1.02)			
Marital status age 68 (married used as reference group) Single	1.14 (0.86- 1.50)		1.11 (0.83- 1.47)	1.12 (0.84- 1.49)
Separated/ Divorced/Widowed	1.41 (1.21- 1.63)**		1.35 (1.16- 1.57)**	1.34 (1.15- 1.56)**

**p<0.05   *p<0.10

[1] Bivariate
[2] Adjusted for childhood variables
[3] Adjusted for adult variables
[4] Adjusted for all variables associated bivariately with health check attendance
[5] Incidence rate ratio

6.4.1 Bivariate associations between childhood and adulthood variables and health check non-attendance in men

In men, adolescent self-organisation was the only factor from childhood associated with health check attendance; higher self-organisation was associated with lower rates of non-attendance (Table 6.4, Model 1). Childhood health and childhood social class were not associated with health check attendance.

Higher educational attainment, higher adult social class, reporting more health conditions in midlife, previously visiting the GP and being an ex- or non-smoker were all associated with lower non-attendance. Compared to being married, being separated/divorced/widowed was associated with higher non-attendance. No associations were found for physical activity levels, neuroticism or extraversion.

6.4.2 Multiply adjusted associations between childhood and adulthood variables and health check non-attendance in men

As only one exposure from childhood was associated bivariately with health check non-attendance in men, no mutual adjustment for childhood factors was required and Model 2 was omitted from this section of analysis.

After adjusting for adult variables (Model 3), the association between educational attainment and non-attendance was weakened and between social class and non-attendance was fully attenuated. Associations between more reported health conditions, previous GP visits, being an ex- or non-smoker and lower non-attendance were maintained, as was the association being separated/divorced/widowed and higher non-attendance.

In a fully adjusted model (Model 4), higher self-organisation remained associated with lower non-attendance, independent of adult health and social factors. Associations also remained between reporting more health conditions, previously visiting the GP, being an ex- or non-smoker and being separated/divorced/widowed and lower non-attendance. The association between educational attainment and non-attendance was fully attenuated following adjustment for self-organisation.

6.5 Associations between factors from childhood and adulthood and health check non-attendance in later life in women

Table 6.5 shows the bivariate associations between childhood and adult health and social factors and health check non-attendance (Model 1) and multiply adjusted models (Models 2, 3 and 4).

Table 6.5 Table of associations between exposures and number of health checks not attended in women

Potential explanatory variable N=1276		Model 1[1] IRR (95% CI)	Model 2[2] IRR (95% CI)	Model 3[3] IRR (95% CI)	Model 4[4] IRR (95% CI)
From childhood					
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)		1.14 (1.01-1.29)**	1.12 (0.99-1.27)*		1.12 (0.98-1.27)*
Childhood social class (per one class increase; unskilled → professional)		0.90 (0.87-0.95)**	0.91 (0.87-0.95)**		0.95 (0.90-1.00)**
Adolescent self-organisation (per one unit increase in the self-organisation factor score)		0.87 (0.78-0.96)**	0.89 (0.81-0.99)**		0.93 (0.83-1.03)
From adulthood					
Educational attainment at age 26 (per one level increase; no qualifications → degree level)		0.86 (0.81-0.93)**		0.94 (0.87-1.02)	0.99 (0.91-1.08)
Adult social class (per one class increase; unskilled → professional)		0.93 (0.89-0.97)**		0.97 (0.92-1.03)	0.98 (0.92-1.03)
Total number of health conditions between ages 43-53 (per one condition increase)		0.91 (0.87-0.94)**		0.92 (0.88-0.96)**	0.92 (0.88-0.96)**
Any GP visits in earlier adulthood (compared to none)		0.93 (0.82-1.06)			
Mammogram attendance in midlife		0.44 (0.36-0.54)**		0.55 (0.44-0.68)**	0.55 (0.44-0.69)**
Cervical screen attendance in midlife		0.71 (0.59-0.85)**		0.83 (0.69-1.01)*	0.84 (0.69-1.01)*
Level of physical activity in adulthood (per one level increase in activity; inactive → most active)		0.88 (0.81-0.95)**		0.94 (0.86-1.02)	0.94 (0.86-1.02)
Smoking trajectory to age 68 (Current smoker used as reference group)	Never smoked	0.55 (0.44-0.68)**		0.70 (0.56-0.88)**	0.72 (0.57-0.90)**
	Ex-smoker	0.55 (0.44-0.68)**		0.68 (0.55-0.85)**	0.69 (0.55-0.86)**
Personality age 26	Extraversion (per one unit increase)	0.99 (0.97-1.01)			
	Neuroticism (per one unit increase)	1.01 (0.99-1.03)			

Marital status age 68 (married used as reference group)	Single	0.99 (0.71-1.38)		0.91 (0.66-1.27)	0.89 (0.64-1.24)
	Separated/ Divorced/ Widowed	1.16 (1.01-1.33)**		1.09 (0.95-1.25)	1.07 (0.93-1.23)

**p<0.05   *p<0.10

[1] Bivariate
[2] Adjusted for childhood variables
[3] Adjusted for adult variables
[4] Adjusted for all variables associated bivariately with health check attendance

6.5.1 Bivariate associations between childhood and adulthood variables and health check non-attendance in women

Worse childhood health was associated with higher rates of non-attendance (Model 1). Higher childhood social class and higher self-organisation were both associated bivariately with lower non-attendance. Associations between higher self-organisation and lower non-attendance were similar for both men and women.

Higher educational attainment, higher social class, reporting more health conditions, previously attending mammogram and cervical screening, reporting higher levels of physical activity and being an ex- or non-smoker were all bivariately associated with lower non-attendance. Being separated/divorced/widowed was associated with higher non-attendance. The direction of these associations (excluding screening attendance and physical activity) were similar to those found in men.

6.5.2 Multiply adjusted associations between childhood and adulthood variables and health check non-attendance in women

After mutual adjustment for childhood variables, the associations between higher childhood social class and higher adolescent self-organisation and lower non-attendance were maintained (Model 2), although the association between childhood serious illness and non-attendance was slightly weakened.

Associations between a higher number of health conditions, previous mammogram and cervical screening attendance and being an ex- or non-smoker and lower non-attendance were maintained following mutual adjustment for adult factors (although the association with cervical screening attendance was weaker) (Model 3). Associations between educational attainment, adult social class, previous physical activity levels and

being separated/divorced/widowed and non-attendance were attenuated following mutual adjustment for adult factors.

In a fully adjusted model (Model 4), childhood serious illness remained weakly associated with an increased likelihood of not attending all health checks and higher childhood social class remained associated with lower non-attendance. The association between adolescent self-organisation and attendance was fully attenuated after adjusting for adult variables. The associations between more reported health conditions, previously attending mammogram, previously attending cervical screening and being an ex/non-smoker and lower non-attendance were maintained after all adjustments.

6.6 Summary of results and discussion

For men, lower rates of health check non-attendance were primarily driven by greater adolescent self-organisation, reporting more health conditions in midlife, consulting a GP in earlier adulthood and being a non- or ex-smoker. Higher health check non-attendance was strongly associated with being separated/divorced/widowed, compared to being married. For women, higher childhood social class, reporting more health conditions in midlife, previously attending mammogram and cervical screening and being an ex- or non-smoker were the strongest correlates of lower health check non-attendance, whilst worse childhood health was weakly associated with greater non-attendance.

6.6.1 Socioeconomic circumstances and health check attendance

Socioeconomic circumstances were hypothesised to be associated with attending more health checks in later life. This was supported for men and women. The present results suggest that associations between socioeconomic factors and health check attendance largely operated through adult health-related variables (with the exception of the association between worse childhood health and higher non-attendance in women). Bivariate associations between higher adult social class and educational attainment for both men and women were attenuated by measures of adult health and health care utilisation and smoking behaviour, plus for men only being separated/divorced/widowed and for women only childhood social class and screening attendance. Women's results showed a direct association between higher childhood social class and lower health check non-attendance, this was in contrast to the hypothesis that associations between childhood social class and health management would be explained by adult factors.

The present findings that socioeconomic advantage across the life course is associated with health check attendance, generally operating through a number of other (largely health related) adult exposures, add to evidence from previous research. The present results are in line with previous studies that reported associations between socioeconomic advantage and higher health check attendance (Pill et al., 1988; Thorogood et al., 1993). However, these studies did not adjust for other potential explanatory variables or confounders. As such, the present results add to the existing body of evidence by exploring the associations and pathways between socioeconomic factors and health check attendance. Furthermore, other studies found either mixed results or no association between SEP and health check attendance. Labeit et al. (2013) found that greater educational attainment was associated mostly with dental checks only (from a list of 6 general health checks, similar to those explored in this thesis) and higher household income with dental and eyesight checks, demonstrating that associations between measures of SEP and health checks depend on the type of socioeconomic measure used and the type of health check. No association between social deprivation and NHS Health Check attendance following adjustments for sex, age, ethnicity, hypertension and smoking status was reported by Dalton et al. (2011), however these results were limited to a sub-urban area in south-east England. The discrepancies between previous and present results may be explained by the fact that they did not include measures of SEP from childhood, which was shown in this thesis to be a correlate of attendance in women, and they did not all adjust for the factors that explained the associations found in this thesis, such as comorbidities in midlife, previous screening attendance, health behaviours and marital status.

6.6.2 Health status and health check attendance

Poorer health in adulthood, measured by reporting more health conditions in midlife, was associated with lower health check non-attendance, suggesting that individuals with worse health were more likely to attend more health checks, in line with the hypothesis described in Chapter 3. This was found for both men and women. These results corroborate with previous literature (Labeit et al., 2013; Thorogood et al., 1993), yet add to the evidence by exploring potential pathways by which this association might operate not adjusted for in previous studies.

The association between worse health and greater attendance might be because individuals with greater awareness of their health state (a measure of self-reported health conditions was used) are perhaps more likely to engage with preventive health and attend procedures to monitor their health. Another possible explanation is that those with worse health are likely to be more familiar with professional health care services and

thus are more likely to utilise services or have to attend routine appointments anyway and be given these checks as part of monitoring existing conditions (that is assuming health conditions reported age 43-53 were present still at age 68).

In women, worse childhood health was bivariately associated with higher non-attendance. Although this association was slightly attenuated by childhood social class and adolescent self-organisation, a weak association remained following all adjustments, including for adult health. In contrast to the hypothesis, this association was not explained by adult factors and was in fact in the opposite direction to the association between adult health and attendance, suggesting that childhood health and adult health are differently associated with health check attendance. This result was surprising as (although slightly attenuated) it was independent of an inverse association between higher childhood social class and lower non-attendance. Although there are associations previously reported between lower social class and poorer health in childhood (Wadsworth & Kuh, 1997), the present results indicate that both childhood health and childhood social class are independently associated with health check attendance in opposite directions. Whether these results are because poor health and hospital admissions in childhood are associated with another factor in adulthood that might explain this association, or if this is just a chance finding, is not clear; what is evident is that the relationship between health and health care utilisation (specifically preventive health care) changes throughout the life course.

6.6.3 Previous health care utilisation and health check attendance

Previously visiting a GP was associated with lower health check non-attendance in men. These results are in line with previous literature, which has reported that individuals who more frequently accessed health care services were more likely to attend health checks (Waller et al., 1990). These authors reported that individuals who consulted a doctor at least four times a year were more likely to attend cardiovascular health checks in their GP surgery; although these results were cross-sectional. Although one explanation for this association between GP consultation and greater health check attendance could be that individuals who more frequently visit their GP have poorer health and are therefore more likely to attend health checks, the present study adds to the research by presenting independent associations between GP visiting and attendance and worse health and attendance, as both were significant correlates in the final model for men. This result was not found for women however. This may reflect the different contexts in which men and women visit their GP and use primary care (as discussed in section 2.3.3.2). This may be particularly relevant as the measure of GP attendance used in thesis was measured

when study members were in early adulthood; at that life stage, women were likely to visit a GP for matters different to men, for example to consult their GP about reproductive health. Thus, for women, visiting the GP in earlier adulthood is associated with different health experiences and behaviours and may not be associated with either health status or health care utilisation in later life. This does not necessarily explain why an association between GP access and health check attendance was not found for women, but does offer a possible explanation as to why results for men and women differed.

Also in support of the hypothesis were the associations between previous attendance to mammogram and cervical screening and lower health check non-attendance, demonstrating a consistent pattern in engagement with preventive health care. As men are not routinely invited to screening procedures in earlier adulthood it was not possible to test this association in men.

6.6.4 Health behaviours and health check attendance

In support of the hypothesis, being an ex/non-smoker, compared to being a smoker, was associated with lower non-attendance in both men and women after adjusting for all other variables; hence, was independent of socioeconomic factors. This association supported previous literature (Dalton et al., 2011; Labeit et al., 2013; Pill et al., 1988), and furthermore, Waller et al. (1990) also reported that cardiovascular health check attendees were more likely to be non-smokers. One implication of this finding is that, given that health checks include cardiovascular checks that might identify risk factors for or early indicators of cardiovascular disease, smokers may benefit more from these checks than non-smokers, due to inflated risk of these diseases, yet they are less likely to attend checks. Whilst no association was found between physical activity and health check attendance in men, the association between higher levels of physical activity and lower non-attendance in women was attenuated by other adult variables, thus physical activity was not a correlate of health check attendance in the final models for either men or women. These results indicate that, although being a non-smoker and reporting higher levels of physical activity were both used as measures of positive health behaviours, they are associated differently with preventive health care engagement, as associations with physical activity were either not found or explained by other factors, whereas smoking remained associated with attendance in both men and women in the fully adjusted models.

6.6.5 Personality and health check attendance

As was hypothesised, higher self-organisation was associated with lower non-attendance; however, this association was independent of all other explanatory variables

in men, whereas, for women, this was explained by adult health, screening attendance and smoking behaviour. Given that previous literature has described associations between lower self-organisation and poor health behaviours (Moffitt et al., 2011; Nishida et al., 2016), it is not surprising that associations with attendance (for women) were explained by adult health related factors. The association for men would suggest that self-organisation is independently associated with health check attendance.

No support for the hypothesised associations between extraversion and neuroticism and health check attendance was found in these results. Although no previous literature has explored associations between these measures of personality and health check attendance, studies have shown associations between personality, particularly higher neuroticism, and poorer health behaviours (Carver & Connor-Smith, 2010; Cooper et al., 2000; Munafo & Black, 2007). It is therefore of interest that neuroticism is not related to health check attendance in this study.

6.6.6 Marital status and health check attendance

It was hypothesised that being married would be associated with greater attendance. The results showed that being separated/divorced/widowed, compared to being married, was associated with greater non-attendance in men (in line with the hypothesis), but not in women, after adjusting for other adult variables. This is consistent with previous literature, which has suggested a positive association between being married and health check attendance (Thorogood et al., 1993). On the other hand, having never been married was not associated with attendance. These findings highlight differences both between marital histories (ie, between having never been married and being married previously) and between men and women, possibly indicating that transitioning from marriage to an un-married status has a detrimental effect on individuals' management of their health and that this is seen only in men.

Previous research by, Joung, Van Der Meer & Mackenbach (1995) also reported differences in health care utilisation (hospital admissions) between 'never married' people and widowed or divorced individuals after controlling for education and health status, such that divorced people were more likely to be admitted to hospital compared to never-married people. Hospital admissions are a different type of health care utilisation to health check attendance, nevertheless, previous research has shown that lack of engagement with medical care (this could include health check attendance) is associated with an increased risk of hospitalisation in elderly adults (Shapiro & Roos, 1985). The present results add to the existing literature by demonstrating possible differences by marital status in the way that individuals respond to their health needs. Joung, Van Der

Meer & Mackenbach (1995), in their discussion, describe several other potential determinants of health care utilisation which might explain the differences found in marital status, one of which is the value placed on health; the authors suggest that married, divorced and widowed people may value their health more, compared to unmarried people, as they are more likely to have responsibility for children. It is also suggested that being married may be associated with the provision of informal care at home, which might result in lower uptake of professional services, or, on the other hand, with pressure from a spouse to attend health care services.

6.6.7 Strengths and limitations

One of the strengths of this analysis is that, whilst similar research has looked at the predictors of NHS Health Check attendance (which includes only checks for cardiovascular health), or attendance to particular screening procedures, these data included most of the routine health checks recommended for older adults. Moreover, this study benefitted from using a representative sample of adults in the age category (ie, over 65) who are advised to attend each one of these heath checks. As with the other results chapters, one of the benefits of this analysis was the fact that adjustments could be made for childhood and adult factors, demonstrating which of the explanatory variables were independently associated with health check attendance and which were explained by either other childhood or adult exposures.

One of the limitations of this analysis is that results were adjusted only for health conditions at age 43-53, not for current health conditions at age 68 (this is due to the most recent health data not being available at the time of the analysis), thus does not account for any ongoing treatment study members might be receiving, which is likely to affect how frequently individuals attend health care services and influence engagement with preventive health care. Furthermore, it was not possible to identify which reasons for not attending health checks were associated with not attending which health checks, so for some individuals it may not be appropriate to label lower attendance with a lack of engagement with preventive health care.

One of the findings from this chapter is that health check non-attendance was low in this sample; attendance was higher than anticipated in this sample, thus it could be argued that these findings are not representative of the wider UK population. Recent studies have reported NHS Health Check uptake rates of between 20 and 48% (Artac et al., 2013; Dalton et al., 2011), however these statistics apply to those individuals invited to attend the NHS Health Checks, which includes adults over the age of 40, and is not directly comparable with the NSHD sample.

Lastly, these results may be limited as several potential covariates were omitted from analysis, particularly those regarding locality, as previous literature has shown that NHS Health Check coverage differs by location and between different primary care practices (Chang et al., 2015) and factors that might hinder access to services, such as car ownership.

6.6.8 Conclusions

This chapter identified some of the factors associated with health check attendance in later life and highlighted the differences between men and women.

Among men and women, socioeconomic advantage was associated with lower non-attendance. The associations between adult socioeconomic factors and attendance were all attenuated by adult health, health care utilisation (although this was screening attendance, rather than GP visits, in women) and smoking behaviour.

Health status, previous health care utilisation (although, in men, the association was with GP visits, whereas in women, it was with screening attendance) and smoking were correlates of health check attendance, in support of the hypotheses. In men, marital status and self-organisation were associated with attendance. Overall, there is more support for associations between health-related factors and attendance than socioeconomic circumstances and attendance.

The next and final results chapter will explore the associations between the outcome health management measures used in Chapters, 4, 5 and 6, to identify any consistent patterns, or otherwise, in study members' approach to managing different health challenges at different stages in the life course.

7 Health management across the life course

The aim of this chapter is to investigate whether the ways in which individuals respond to different health challenges at different time points across adulthood are consistent or not. It was hypothesised that proactive management of health (including both consultation and self-management) would be consistent across adult life (see hypothesis 9, Chapter 3, page 79).

All measures of health management considered in this thesis will be used in this chapter: consultation for any conditions, psychological symptoms and musculoskeletal symptoms at age 43; women's consultation for symptoms in midlife; women's self-management of symptoms and general health in midlife; and health check attendance in later life.

7.1 Analytical strategy

As the measures of men's health management included consultation at age 43 and health check attendance, whereas women also had measures of management of symptoms and general health in midlife, analysis of men and women was separated. For this chapter, complete case analysis was used (ie, men and women who had health management data at ages 43 and 68, and for women, 54 also).

For men and women, associations were tested between binary measures of consultation at age 43 for any conditions, psychological symptoms and musculoskeletal symptoms and health check non-attendance at 68 using Poisson regression models. In women, for continuous outcomes (propensity to consult and propensity to self-manage measured using latent variables), linear regression was used. For binary outcomes (consultation for HFNS, self-management of HFNS, self-management of general health), logistic regression was used.

7.2 Men's management of health

7.2.1 Descriptive results

In total, N=1635 men completed the questionnaire at age 43 and N=1176 men completed the questionnaire at age 68. Of these, N=1062 completed at both ages and make up the analytical sample here. Table 7.1 shows frequencies for the measures of consultation at age 43 for any condition, psychological symptoms and musculoskeletal symptoms. The percentage of men who did not report any symptoms at age 43 in the present analytical sample (25.4%) is fairly similar to sample who completed the questionnaire at age 43 and were analysed in Chapter 4 (20.7%; although, this includes female study members;

see Table 4.2). Similarly, the percentage of study members who reported any health conditions and did consult is comparable in the present analytical sample (45.5%) and the sample used in Chapter 4 (52.7%; see Table 4.2). These figures suggest that rates of health conditions and consultation for any conditions are reasonably similar between the study members who completed the questionnaire age 43 and male study members who completed the questionnaire both at 43 and 68 (the analytical sample used in this chapter).

Table 7.1 Frequencies of consultation for any conditions, psychological symptoms and musculoskeletal symptoms at age 43 in men who completed the questionnaires at age 43 and 68

Health conditions and symptoms and consultation at age 43 N=1062		N (%)
Consultation for any conditions	Did not report any conditions	270 (25.4)
	Reported conditions and did not consult	432 (40.7)
	Reported conditions and did consult	360 (33.9)
Consultation for psychological symptoms	Did not report symptoms	903 (85.0)
	Reported conditions and did not consult	117 (11.0)
	Reported conditions and did consult	42 (4.0)
Consultation for musculoskeletal symptoms	Did not report symptoms	756 (71.2)
	Reported conditions and did not consult	190 (17.9)
	Reported conditions and did consult	116 (10.9)

Table 7.2 shows the number of health checks not attended within the recommended time frame in later life in the analytical sample (N=1062). Nearly half of these study members (47.5%) attended all health checks within the recommended time frame. The distribution of these data is comparable to that reported in Chapter 6 (see Figure 6.1), in that data are positively skewed, as the majority of (male) study members attended most health checks.

Table 7.2 Frequencies of the number of health checks not attended in later life by men who completed the questionnaires at age 43 and 68

Number of health checks not attended in later life (N=1062)	N (%)
0	503 (47.4)
1	286 (26.9)
2	146 (13.8)
3	80 (7.5)
4	29 (2.7)
5	12 (1.1)
6	6 (0.6)

7.2.2 Associations between consultation at age 43 and health check non-attendance in later life in men

Table 7.3 shows the associations between men's consultation at age 43 (for any conditions, psychological symptoms and musculoskeletal symptoms) and health check non-attendance in later life in the analytical sample (N=1062). Reporting having any conditions, psychological symptoms or musculoskeletal symptoms and not consulting was used as the reference category in the respective models.

With the exception of musculoskeletal symptoms, having conditions/symptoms at age 43 and consulting a professional was generally associated with lower health check non-attendance at age 68, compared to having conditions/symptoms and not consulting. The estimate for consulting for psychological symptoms was greater (than for any conditions) although the power to detect differences was lower. Consulting for musculoskeletal symptoms at age 43 was not associated with lower health check attendance.

Table 7.3 Associations between consultation at age 43 (reporting condition(s)/symptoms and not consulting used as reference category) and the number of health checks not attended in later life in men who completed the questionnaires at age 43 and 68

Consultation for conditions and symptoms at age 43 N=1062		Men's health check non-attendance at age 68 IRR (95% CI)
Consultation for any symptoms/conditions	Reported conditions and did not consult (*reference category*)	1.00
	Reported conditions and did consult	0.85 (0.74-0.98)**
	Reported no conditions	1.04 (0.89-1.20)
Consultation for psychological symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	0.72 (0.47-1.09)
	Reported no symptoms	1.11 (0.91-1.36)
Consultation for musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	0.99 (0.78-1.26)
	Reported no symptoms	1.05 (0.89-1.24)

**p<0.05

7.3 Women's management of health

7.3.1 Descriptive results

A total of N=1627 women completed the questionnaire at age 43, N=1308 completed at age 54 and N=1276 completed at age 68. Of these, N=1034 completed at ages 43, 54 and 68 and form the analytical sample used in this section. The descriptive statistics for each measure of health management (consultation at age 43, consultation for symptoms and self-management of symptoms and general health at age 54 and health check attendance in midlife) are presented below in order of age (associations between these measures are presented also in order of age in the following section). Table 7.4 shows frequencies for the measures of consultation at age 43 for any condition, psychological symptoms and musculoskeletal symptoms. The percentage of study members who reported no symptoms at age 43 (16.6%, in the present analytical sample: women who completed the questionnaire at ages 43, 54 and 68) is similar to that reported in Chapter 4 (of study members who completed the questionnaire at age 43; 20.7%; see Table 4.2), as are the percentages of study members who reported experiencing symptoms and consulting (52.7% of study members who completed the questionnaire at age 43; 54.9% of women study members who completed the questionnaire at ages 43, 54 and 68).

Table 7.4 Frequencies of consultation for any conditions, psychological symptoms and musculoskeletal symptoms at age 43 in women who completed the questionnaires at age 43 and 68

Management of conditions/symptoms at age 43 N=1034		N (%)
Consultation for any symptoms/conditions	Did not report any conditions	172 (16.6)
	Reported conditions and did not consult	389 (37.6)
	Reported conditions and did consult	473 (45.7)
Consultation for psychological symptoms	Did not report symptoms	828 (80.1)
	Reported conditions and did not consult	128 (12.4)
	Reported conditions and did consult	78 (7.5)
Consultation for musculoskeletal symptoms	Did not report symptoms	679 (65.7)
	Reported conditions and did not consult	230 (22.2)
	Reported conditions and did consult	125 (12.1)

Table 7.5 shows the frequencies of not having symptoms and, in women who did report symptoms, management types for hot flushes and night sweats (HFNS), trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms between ages 47-54 in the analytical sample used in this chapter (N=1034). These frequencies are comparable to those reported in Chapter 5, where the analytical sample comprised of women who completed each of the Women's Health questionnaires between ages 47-54 (N=1005) (see Tables 5.4 and 5.6).

Table 7.5 Frequencies for measures symptom management in midlife in women who completed the questionnaire at ages 43, 54 and 68

Experience and symptom of management in midlife (N=1034)		N (%)
HFNS	Did not have symptom	90 (8.7)
	Consulted and self-managed	83 (8.0)
	Consulted only	278 (26.9)
	Self-managed only	61 (5.9)
	Neither consulted or self-managed	522 (50.5)
Trouble sleeping	Did not have symptom	74 (7.2)
	Consulted and self-managed	49 (4.7)
	Consulted only	95 (9.2)
	Self-managed only	70 (6.8)
	Neither consulted or self-managed	746 (72.2)
Vaginal dryness	Did not have symptom	380 (36.8)
	Consulted and self-managed	27 (2.6)
	Consulted only	72 (7.0)
	Self-managed only	56 (5.4)
	Neither consulted or self-managed	499 (48.3)
Nervous/emotional symptoms	Did not have symptom	92 (8.9)
	Consulted and self-managed	62(6.0)
	Consulted only	147 (14.2)
	Self-managed only	48 (4.6)
	Neither consulted or self-managed	685 (66.3)
Urinary symptoms	Did not have symptom	143 (13.8)
	Consulted and self-managed	56 (5.4)
	Consulted only	185 (17.9)
	Self-managed only	14 (1.4)
	Neither consulted or self-managed	636 (61.5)

Table 7.6 shows the number of women (of those who completed the questionnaire at age 43, 54 and 68) who reported self-managing their general health in midlife. The proportion of women who did self-manage in the present analytical sample (60.3%) is similar to the proportion of women analysed in Chapter 5 (61.5%; see Table 5.13).

Table 7.6 Frequencies of self-management in midlife in women who completed the questionnaire at ages 43, 54 and 68

Binary measure of self-management in midlife (N=1034)	N (%)
Did not report self-managing	623 (60.3%)
Reported self-managing	411 (39.8%)

Table 7.7 shows the number of health checks not attended in later life in the analytical sample. Again, the distribution of this variable is very similar to that used in Chapter 6 (see Figure 6.1).

Table 7.7 Frequencies (%) number of health checks not attended in later by women who completed the questionnaire at ages 43, 54 and 68

Number of health checks not attended in later life (N=1034)	N (%)
0	419 (48.1)
1	316 (30.6)
2	123 (11.9)
3	63 (6.1)
4	23 (2.2)
5	8 (0.8)
6	4 (0.4)

7.3.2 Associations between consultation at age 43 and later health management approaches

7.3.2.1 Associations between consultation at age 43 and women's management of symptoms in midlife

Tables 7.8 and 7.9 show the associations between consultation at age 43 and women's response to symptoms in midlife. The factor of consultation for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms (previously described in section 5.2.8) was used as the outcome measure in Table 7.8 and the binary measure of consultation for HFNS was used in Table 7.9. Reporting conditions/symptoms and not consulting at age 43 was used as the reference category throughout. All tables include women who completed the questionnaire at age 43, 54 and 68 (N=1034).

Table 7.8 Associations between consultation for conditions/symptoms at 43 (reporting condition(s) and not consulting was used as the reference category) and latent measure of propensity to consult for symptoms in midlife in women who completed the questionnaire at age 43, 54 and 68

Management of conditions/symptoms at age 43 N=1034		Propensity to consult for midlife symptoms Coefficient (p value)
Consultation for any symptoms/conditions	Reported conditions and did not consult (*reference category*)	0.00
	Reported conditions and did consult	0.04 (0.038)
	Reported no conditions	-0.08 (0.002)
Consultation for psychological symptoms	Reported symptoms and did not consult (*reference category*)	0.00
	Reported symptoms and did consult	0.11 (<0.001)
	Reported no symptoms	-0.08 (0.007)
Consultation for musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	0.00
	Reported symptoms and did consult	0.09 (0.002)
	Reported no symptoms	-0.01 (0.526)

Table 7.9 Associations between consultation for conditions/symptoms at 43 (reporting condition(s) and not consulting was used as the reference category) and a binary measure of consultation for HFNS in midlife in women who completed the questionnaire at age 43, 54 and 68

Management of conditions/symptoms at age 43 (N=1034)		Binary measure of HFNS consultation OR (95% CI)
Consultation for any symptoms/conditions	Reported conditions and did not consult (*reference category*)	1.00
	Reported conditions and did consult	1.05 (0.80-1.38)
	Reported no conditions	0.73 (0.50-1.08)
Consultation for psychological symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	0.86 (0.49-1.51)
	Reported no symptoms	0.64 (0.44-0.93)
Consultation for musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	1.31 (0.84-2.05)
	Reported no symptoms	1.08 (0.79-1.47)

Compared to reporting conditions/symptoms at age 43 and not consulting, reporting any conditions, psychological symptoms or musculoskeletal symptoms and consulting a professional was associated with an increased likelihood of *consulting* for trouble sleeping, vaginal dryness, nervous/emotional symptoms or urinary symptoms in midlife (see Table 7.8). The strongest of these associations was between consultation for psychological symptoms at age 43 and consultation for symptoms in midlife. Also noteworthy are the associations seen between not reporting conditions/symptoms at 43 and a lower likelihood of consulting for midlife symptoms, although this may be explained by experiencing fewer symptoms in midlife. There was no evidence of an association between consultation for conditions/symptoms at 43 and consultation for HFNS (Table 7.9).

The associations between consultation at age 43 and women's *self-management* of symptoms in midlife, using the latent measure of self-management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms (also described previously in section 5.2.8) (Table 7.10) and the binary measure of self-management of HFNS (Table 7.11), show that consultation at age 43 was not associated with self-management of any symptoms in midlife.

Table 7.10 Associations between consultation for any conditions at 43 (reporting condition(s) and not consulting was used as the reference category) and latent measures of propensity to self-manage symptoms in midlife in women who completed the questionnaire at age 43, 54 and 68

Management of conditions/symptoms at age 43 N=1034		Propensity to self-manage mid-life symptoms Coefficient (p value)
Consultation for any symptoms/conditions	Reported conditions and did not consult (*reference category*)	0.00
	Reported conditions and did consult	0.002 (0.899)
	Reported no conditions	-0.05 (0.057)
Consultation for psychological symptoms	Reported symptoms and did not consult (*reference category*)	0.00
	Reported symptoms and did consult	-0.024 (0.354)
	Reported no symptoms	-0.09 (0.001)
Consultation for musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	0.00
	Reported symptoms and did consult	0.007 (0.725)
	Reported no symptoms	-0.002 (0.917)

Table 7.11 Associations between consultation for any conditions at 43 (reporting condition(s) and not consulting was used as the reference category) and a binary measure of self-management of HFNS in midlife in women who completed the questionnaire at age 43, 54 and 68

Management of conditions/symptoms at age 43 N=1034		Binary measure of self-management of HFNS OR (95% CI)
Consultation for any symptoms/conditions	Reported conditions and did not consult (*reference category*)	1.00
	Reported conditions and did consult	0.90 (0.62-1.32)
	Reported no conditions	0.85 (0.50-1.42)
Consultation for psychological symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	0.40 (0.16-1.04)
	Reported no symptoms	0.83 (0.51-1.37)
Consultation for musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	1.38 (0.72-2.64)
	Reported no symptoms	1.53 (0.72-2.64)

7.3.2.2 Associations between consultation at age 43 and self-management of general health in midlife

Table 7.12 shows associations between consultation at age 43 and the binary measure of self-management of general health in midlife in women who completed the questionnaire at age 43, 54 and 68 (N=1034). Consultation for conditions/symptoms at age 43 was not associated with women's general health self-management in midlife (see Table 7.12).

Table 7.12 Associations between consultation for any conditions, psychological symptoms and musculoskeletal symptoms at age 43 (reporting condition(s)/symptoms and not consulting used as reference category) and general health self-management in midlife in women who completed the questionnaire at age 43, 54 and 68

Consultation for conditions and symptoms at age 43 N=1034		Women's self-management of general health in midlife OR (95% CI)
Any condition	Reported conditions and did not consult (*reference category*)	1.00
	Had condition(s) and did consult	1.10 (0.84-1.44)
	Did not have symptom	0.80 (0.55-1.16)
Psychological symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Had symptom and did consult	0.80 (0.45-1.41)
	Did not have symptom	0.77 (0.53-1.12)
Musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Had symptom and did consult	1.18 (0.76-1.83)
	Did not have symptom	0.95 (0.70-1.30)

7.3.2.3 Associations between consultation at age 43 and health check non-attendance in later life

Table 7.13 shows the associations between consultation for conditions/symptoms at age 43 and health check non-attendance in later life; reporting conditions/symptoms and not consulting was used as the reference category. In women, consulting a health professional at age 43 was not associated with health check non-attendance in later life.

Table 7.13 Associations between consultation at age 43 (reporting condition(s)/symptoms and not consulting used as reference category) and the number of health checks not attended in later life in women who completed the questionnaires at age 43 and 68

Consultation for conditions and symptoms at age 43 N=1034		Women's health check non-attendance at age 68 IRR (95% CI)
Consultation for any symptoms/conditions	Reported conditions and did not consult (*reference category*)	1.00
	Reported conditions and did consult	0.94 (0.82-1.09)
	Reported no conditions	0.95 (0.78-1.15)
Consultation for psychological symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	1.18 (0.90-1.55)
	Reported no symptoms	0.86 (0.71-1.04)
Consultation for musculoskeletal symptoms	Reported symptoms and did not consult (*reference category*)	1.00
	Reported symptoms and did consult	0.98 (0.78-1.23)
	Reported no symptoms	0.98 (0.84-1.15)

7.3.3 Associations between symptom management in midlife and later health management approaches

7.3.3.1 Associations between management of symptoms and general health self-management in midlife

Tables 7.14 and 7.15 show the associations between management of symptoms in midlife and self-management of general health in midlife. (Although these measures are from the same age (54), they represent management of different health challenges; symptoms compared to general health.) The latent measures of consultation for and self-management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms were used as explanatory variables in Table 7.14 and the binary measures of HFNS consultation and self-management were used in Table 7.15. The binary measure of general health self-management in midlife was used in both tables. Given that these questionnaire responses were given at age 54, these results are essentially cross-sectional.

Table 7.14 Associations between latent measures of symptom management and general health self-management in midlife in women who completed the questionnaire at age 43, 54 and 68

Latent management variable	Self-management of general health OR (95% CI)
Propensity to consult a professional	1.49 (1.15-1.93)**
Propensity to self-manage	2.83 (1.71-4.70)**

**p<0.05

Table 7.15 Associations between binary measures of symptom management and general health self-management in midlife in women who completed the questionnaire at age 43, 54 and 68

Binary management variable	Self-management of general health OR (95% CI)
Consultation for HFNS	1.04 (0.81-1.35)
Self-management of HFNS	3.95 (2.73-5.72)**

**p<0.05

Higher consultation for and self-management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms was associated with an increased likelihood of self-managing general health in midlife (see Table 7.14), suggesting that women who proactively managed their symptoms by any means were also more likely to self-manage their general health. However, whilst self-management of HFNS was strongly associated with general health self-management (see Table 7.15), no association was found between consultation for HFNS and general health self-management, illustrating a difference between consultation for HFNS and for other symptoms. Results from both tables suggest a stronger association between self-management behaviours than between consultation and self-management.

7.3.3.2 Associations between management of symptoms in midlife and health check non-attendance in later life

Tables 7.16 and 7.17 show the associations between management of symptoms in midlife and health check non-attendance in later life, using factor measures of consultation and self-management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms in Table 7.16 and binary measures of consultation and self-management of HFNS in Table 7.17. The count measure of health check non-attendance was used as the outcome measure in both tables.

Table 7.16 Associations between factors of management of symptoms in midlife and the number of health checks not attended in later life in women who completed the questionnaire at age 43, 54 and 68

Latent management variable	Number of health checks not attended IRR (95% CI)
Propensity to consult a professional	0.01[1]
Propensity to self-manage	0.39 (0.21-0.73)**

**p<0.05

[1] Lower 95% confidence interval did not converge, upper confidence interval=100.54

Table 7.17 Associations between binary measures of management of HFNS in midlife and the number of health checks not attended in later life in women who completed the questionnaire at age 43, 54 and 68

Binary management variable	Number of health checks not attended IRR (95% CI)
HFNS consult	0.88 (0.77-1.01)
HFNS self-manage	0.86 (0.70-1.04)

Self-managing trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms was associated with a lower likelihood of health check non-attendance; no association was found between consultation for these symptoms and health check non-attendance (see Table 7.16). Consultation for HFNS was weakly associated with a lower likelihood of health check non-attendance and an even weaker association was found between self-management of HFNS and attendance (see Table 7.17).

7.3.4 Associations between general health self-management in midlife and health check non-attendance in later life

Reporting self-managing general health in midlife, compared to not self-managing, was associated with lower health check non-attendance (IRR=0.83, 95% CI 0.72-0.95), using a count measure of the number of health checks not attended in later life, in women who completed the questionnaire at ages 43, 54 and 68.

7.4 Summary of results and discussion

7.4.1 Health management in men

Although the results are limited for men, utilising measures of health management from just two time points in adulthood, age 43 and 68, results do seem to suggest a positive association between consultation at age 43 and engagement with preventive health care

at age 68 (Table 7.3). Even though both are measures of health care utilisation, they represent different forms of health care; at 43 individuals consulted professionals in response to particular health conditions and adverse symptoms, whereas in later life, attendance to health checks is generally not a response to a symptom but is a measure taken against potential health challenges, without the individual necessarily having had any indication that their health needs attending to (although it could be argued that some of the health checks measured may have been part of care for chronic conditions). These results support the hypothesis (hypothesis 9, see Chapter 3, page 69) that proactive health management (in terms of access to health care services), irrespective of the motivation to seek professional help, is consistent across adult life, at least in men. It should be noted, however, that no association was found between consultation for musculoskeletal symptoms at 43 and health check attendance, which suggests that there may be differences depending on symptom type.

7.4.2 Health management in women

It was possible to examine the links between health management using health care services and self-management at different life stages in women. The results presented in section 7.3 will be discussed in the following section: firstly, associations between consultation at age 43 and health check attendance in later (as was discussed in the above section for men), then associations between health professional consultation for different health challenges (at ages 43 and 54) and lastly associations between health care utilisation and self-management.

7.4.2.1 Associations between consultation at age 43 and health check non-attendance in later life

In contrast to the findings for men, no associations were found between consultation at age 43 and health check non-attendance at age 68 in women. These results demonstrated differences between men and women, although it should be noted that sex differences were not tested formally. If there are sex differences then this could be because men and women show different patterns of health care utilisation (Mustard et al., 1998). This is possibly due to consultation for conditions/symptoms and attendance to preventive health care checks being different types of health care utilisation (responsive versus preventive) and not being related; it could be argued that utilisation of one particular health care service does not necessarily predict another. Differences may be due to women requiring medical attention or support for health issues specific to women, such as reproductive health challenges. However, this thesis aimed to avoid this potential confounder by, in the measures of consultation at age 43, including health

challenges relevant to both men and women. Further reasons for differences observed between men and women are the influence sex has on illness behaviours (Mechanic, 1976). As discussed in section 1.3, women have different experiences of health and health care utilisation (Hannay, 1980), which may result in differences as to how men and women manage their health over the life course.

It is also possible that, as the measures of health management measured at the two most distant ages in this thesis, there are certain exposures and experiences between the ages of 43 and 68 that influence an individual's propensity to engage with health care services, therefore individuals who access health care services at one age may not necessarily continue to do so into later life. It is not clear why this might be the case for women and not for men, although a point could be made about the different health challenges men and women face between these two points in adulthood, one being the menopause. Although this does not explain why patterns of health care utilisation appear to be different for men and women, it further illustrates the point that men and women are have different experiences of health throughout adulthood.

7.4.2.2 Associations between health care utilisation across adulthood

Associations were found between all measures of consultation at age 43 (for any conditions, psychological symptoms and musculoskeletal symptoms) and consultation for most symptoms in midlife (trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms), which indicated that consultation at age 43 was associated with a greater propensity to consult for symptoms in midlife (see Table 7.8). However, no associations were found between consultation at age 43 and consultation for HFNS in midlife (Table 7.9). These results present some support for the hypothesis that proactive management of health (particularly health professional consultation) would be consistent throughout adulthood and for different health challenges (eg, in this example, consultation for conditions/symptoms at age 43 and for women's symptoms in midlife). However, given that no association was found for consultation of HFNS, results indicate that continuity (or otherwise) of consultation varies depending on symptom type.

7.4.2.3 Associations between self-management of symptoms and general health

The two measures of self-management used in this thesis/chapter were measured at the same age, therefore it was not possible to assess associations between self-management at different ages, but this analysis demonstrates associations between self-management of different health challenges (ie, women's symptoms in midlife and

women's general health in midlife). As seen in Tables 7.14 and 7.15, self-management of all symptoms in midlife was associated with more self-management of general health in midlife, more so than consultation for symptoms was associated with general health self-management. These findings would suggest that, at least at the same time point, women who utilise self-management as a response to a particular health challenge are likely to do so for an additional health challenge. However, as these measures were recorded in the same questionnaire, it is possible that the self-management behaviours reported for managing symptoms were the same behaviours reported for managing general health. Although this would suggest that these results be interpreted with caution, the questions women were asked were explicit about the motivations for self-managing health (to relieve bothersome symptoms compared to maintaining general health and preventing effects of ageing), thus, this supports the use of both measures of self-management of different health challenges.

7.4.2.4 Associations between health care utilisation and self-management

Although it was hypothesised that consultation at age 43 (as a means of proactively managing health) would be associated with more self-management of health in midlife, no evidence was found to support this, as consulting for conditions and symptoms at age 43 was not associated with self-management of symptoms (see Tables 7.10 and 7.11) or general health in midlife (see Table 7.12). These results suggest that individuals who consult a professional as a means of managing their health are not necessarily more likely to also self-manage their health, however it could be argued that the conditions/symptoms investigated at age 43 are a different type of health challenge to symptoms/general health in midlife, therefore management is not comparable. This issue around measurement of proactive health management, including both consultation and self-management, will be returned to in Chapter 8.

As was hypothesised, consultation for symptoms in midlife was (cross-sectionally) associated with an increased likelihood of self-managing general health (Table 7.14). However, consultation for HFNS was not associated with general health self-management (Table 7.15). These results would suggest that symptom type is associated with how women manage their health, at least in midlife.

Finally, in line with the hypothesis, self-management of most symptoms in midlife was associated with lower health check non-attendance at age 68 (see Table 7.16), although this association was considerably weaker than that between consultation for symptoms and health check non-attendance. No association was found between self-management

of HFNS and health check attendance (Table 7.17), again suggesting differences between management of different symptoms, particularly for management of HFNS. Self-managing general health was associated with lower non-attendance for health checks (see section 7.3.4). Note that these two health management measures both represent preventive health management, hence, although the mode of health care is different (self-management compared to attending professional health care services), the motivation to engage with these approaches to managing health is likely to be similar (ie, to preserve health and prevent illness).

7.4.3 Strengths and limitations

One of the strengths of this chapter is its inclusion of measures of management of different types of health challenges (common conditions and symptoms in adulthood, women's symptoms in midlife, women's maintenance of general health in midlife and health challenges associated with ageing) and different proactive approaches to managing health at different stages in life course. This is a novel approach to health management research and has addressed a gap in the literature.

Use of longitudinal data allowed for the prospective study of health management across adulthood. The benefits of this include avoiding the limitations of retrospective studies, such as recall bias, particularly in an area of study, such as management of health, where there might be perceived social pressures to conform to an ideal regarding health care utilisation and health self-management behaviours.

One of the obvious limitations is the lack of health management measures for men, as only two measures were utilised for men in the present analysis, compared to four measures for women. As complete case analysis was used (imputation methods were not used for measures of health management), the sample sizes were restricted to study members who completed all questionnaires used in this thesis. These smaller sample sizes may have implications for limited statistical power.

Further limitations include not having both measures of health care utilisation and self-management at the same age, this would have been able to demonstrate how individuals use different approaches to manage health at a particular age and then compare across ages. It could also be argued that age and health management approaches are confounded, for instance, attendance to health checks included in this thesis are mostly only applicable to older adults, therefore this measure of health management is not comparable to other measures of health management.

Lastly, the interpretation of these results is potentially limited as the measures of health management, particularly health care utilisation, are inconsistent, as they measure

access to different health care services in order to manage different health challenges. However, as it was hypothesised that proactive management of health, using a variety of approaches for a variety of health challenges, would be consistent across adulthood, this approach was a way of testing this hypothesis.

7.4.4 Conclusions

Analysis of men's management of health in mid-adulthood and later life appears to support the idea that proactive management of health is maintained from earlier in adulthood to later in life (in support of hypothesis 9), although this is not seen consistently across the measures of consultation for different types of health challenges faced at age 43. This association was not seen in women, demonstrating differences in health management patterns between men and women.

In women, consulting at age 43 was associated with a greater propensity to consult for most symptoms in midlife. As associations were not seen in consultation for HFNS, this further supports the idea that management of health may depend on the symptom or health challenge and may not always be consistent taking this (symptom type/health challenge) into consideration. Associations between consultation at 43 and women's self-management of symptoms and of general health in midlife were not found, indicating that, whilst likelihood of consultation may be consistent between these two life stages, different approaches to health management did not track consistently.

Associations between women's self-management of symptoms and general health in midlife and health check attendance in later life were supportive of the hypothesis, indicating that proactive management of symptoms in midlife is associated with (i) proactive management of general health in midlife and (ii) proactive management of health in later life among women.

The mixed findings of this final results chapter possibly reflect the very different measures of health management that are used in this thesis. First, they measure responses to different health challenges, eg, conditions, symptoms, potential health challenges, and second, they measure different types of responses to said health challenges.

These results partially support the hypothesis that proactive health management would be consistent across adulthood, however this appears to be for consultation only. Given that no associations were found between consultation at age 43 and self-management of symptoms in midlife, in contrast to the hypothesis that proactive management, whether that be by health care utilisation or self-management, would be consistent across adult life, these results suggest that women aren't necessarily more likely to proactively

manage their health by whatever means; health care utilisation does not predict health self-management. Furthermore, as no association was found for consultation for HFNS, this also suggests that health management may not be consistent between different types of symptoms and, thus, across different health challenges.

In the following chapter, these results will be discussed in the context of previous chapters, in addition to assessing the factors associated with proactive health management across adult life.

8 Discussion

The aim of this thesis was to investigate how study members from the MRC National Survey of Health and Development (NSHD) managed their health at various stages in adulthood and to identify the health and social factors from across life associated with different health management approaches. It achieved this aim by exploring health management (by health professional consultation, self-management and attending preventive health checks) at ages 43, 54 (in women) and 68 and assessing the hypothesised correlates of health management (to be discussed below in section 8.1), and also by investigating patterns of health management, using these measures, across adulthood. This chapter will summarise the findings of this thesis and address each of the hypotheses described in Chapter 3 in turn.

The first hypothesis described in Chapter 3 stated that rates of consultation would differ according to symptom type. This was investigated in Chapters 4 and 5. The data from study members at age 43 showed that, for a wide range of health conditions (reported in Table 4.2), 53% of study members who reported conditions consulted a professional. These data indicate that nearly half of study members who reported health conditions did not consult a professional, demonstrating the 'illness iceberg' phenomenon (Hannay, 1980) (described in Chapter 1, section 1.3), which proposed that individuals do not seek professional health care for every symptom or episode of ill health they experience. Chapter 4 also identified rates of consultation specifically for psychological symptoms (including nervous/emotional problems and trouble sleeping) and musculoskeletal symptoms (including sciatica, lumbago or severe back pain and arthritis or rheumatism). Of the individuals who reported psychological or musculoskeletal symptoms, rates of consultation were slightly lower than for any conditions (34 and 38% respectively). It is not clear why consultation was lower for these types of symptoms; possibly because the list of health conditions included potentially more severe health conditions, such as cancer. However, these results suggest that rates of health professional consultation, as a means of managing health conditions or symptoms, differ depending on the type of health condition or symptom.

Furthermore, the analysis in Chapter 5 (Table 5.6) showed that rates of consultation differed by women's symptom types in midlife, as consultation was highest for hot flushes and night sweats (HFNS) and lowest for trouble sleeping and vaginal dryness. Data from the Women's Health sub-study further supported the illness iceberg phenomenon as, for each type of symptom, over half of women with symptoms reported no response to symptoms. This further supports the hypothesis that consultation rates differ between symptom types. There are many reasons why this may be. Some symptoms may be

more tolerable than others (although this is likely to vary between individuals), and some symptoms may be perceived as more in need of medical attention than others. There may also be cultural or social perceptions of the appropriateness of medical attention for certain symptoms; this might be particularly relevant to women's health symptoms. It may also be that, for particular health conditions or symptoms, there are more well-recognised medical treatment options or, conversely, there are more well-known self-management options for particular health challenges.

One of the main conclusions from this thesis was that, on the whole, the health and social experiences and exposures tested in this thesis were not consistently associated with management of various health challenges across adult life (although this may partly be explained by making the assumption that a set of behaviours all represented 'proactive health management', this will be discussed further in section 8.4). The results suggested that associations between health and social factors from childhood (namely serious illness resulting in hospital admissions, social class and self-organisation) and health management in adulthood were generally explained by adult health and social factors, demonstrating one of the benefits of taking a life course approach. As both health and social factors were able to be adjusted for in the analysis, the results also demonstrated that, in the multiply adjusted models, associations between socioeconomic factors (namely social class and educational attainment) and health management were, more often than not, attenuated by health related factors, particularly number of health conditions, previous health care utilisation and health behaviours.

The following section of this chapter will address hypotheses 2-8, by considering the health and social domains investigated in this thesis and their associations with health management.

8.1 The life course correlates of health management

8.1.1 Socioeconomic circumstances

Hypothesis 2 (see Chapter 3) stated that socioeconomic advantage would be associated with more proactive management of health (including higher rates of consultation in those that reported health conditions/symptoms, more self-management and higher health check attendance). This thesis presented mixed support for this hypothesis as the direction of associations between socioeconomic position (SEP) and health management varied between different health challenges and health management approaches.

In contrast to what was hypothesised, more socioeconomic advantage (as indicated by higher childhood SEP, higher adulthood SEP and higher educational attainment) was generally associated with lower health professional consultation at age 43 for any conditions, psychological symptoms and musculoskeletal symptoms. Associations between socioeconomic measures and consultation, both from childhood and adulthood, were attenuated by measures of childhood and adult health, previous health care utilisation and health-related behaviours. These results suggest that whilst socioeconomic circumstances are an important factor in the likelihood of consultation in mid-adulthood, the pathways by which they operate are generally explained by health exposures and experiences at various points across the life course.

These results, although not in line with the hypothesis, did support some previous studies that showed associations between lower SEP and higher health care utilisation, both from childhood and adulthood (Adamson et al., 2003; Lindsay, 2009; Palència et al., 2013). However, the hypothesis tested in this thesis was based on the idea that consultation for particular health conditions/symptoms is a proactive approach to managing health (thus, was hypothesised to be associated with socioeconomic advantage), whereas previous literature generally considered health care utilisation to be an indicator of passive health management (by deferring responsibility to professionals) and a marker of consumption of resources. The results suggest that a distinction between healthcare professional consultation and self-management needs to be made. These results add to the existing body of research, as it considered only reported consultations in study members who reported health conditions/symptoms (whereas existing literature generally reports rates of consultation irrespective of health care need) and demonstrated some of the pathways that might explain associations between SEP and health management via health-related factors.

Exploring the role of socioeconomic factors in women's management of health in midlife found some unexpected results that had not been described in previous literature nor had been hypothesised in this thesis. Whilst indicators of socioeconomic advantage from across the life course were generally associated with more proactive management (both consultation and self-management) of most of the symptoms measured in Chapter 5 (trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms), in line with hypothesis 3, they were associated with a lower likelihood of managing HFNS, particularly consulting a professional. These results appeared to show a difference according to symptom type in how socioeconomic circumstances were related to women's management of symptoms in midlife. This thesis expanded on previous literature by assessing management of different symptom types; something not reported in previous research.

The chapter on women's health management in midlife benefitted from having measures of women's experience of bothersome symptoms and the use of latent measures of symptom experience and management for structural equation modelling. This allowed for tests of mediation by symptom experience. Very few previous studies considered both women's experience and management of symptoms when exploring the health and/or social correlates of symptom management; this thesis was able to address this research gap. This analysis showed that associations between socioeconomic advantage and proactive management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms were not mediated by symptom experience (in contrast with hypothesis 8). However, associations between socioeconomic advantage and lower consultation for HFNS were at least partly mediated by symptom experience (in line with hypothesis 8); in that, women from more socioeconomically advantaged positions were less likely to report bothersome HFNS and subsequently were less likely to consult a professional. The association between higher childhood SEP and lower likelihood of consultation for HFNS was only partly mediated by symptom experience; further exploration showed that this association was also partly mediated by adult socioeconomic factors (where the associations with symptom management were largely mediated by symptom experience). These results indicate that, with regard to management of HFNS, the association with socioeconomic factors largely operated through symptom experience. Taking this into account, the analysis, on the whole, supported the hypothesis that socioeconomic advantage was associated with higher consultation for most symptoms in midlife, and where support for this hypothesis was not found – in inverse associations between measures of higher socioeconomic advantage and lower consultation for HFNS – this was due to mediation by symptom experience (in support of hypothesis 8), which was inversely associated with socioeconomic advantage.

Higher SEP was also generally associated with higher levels of women's self-management of symptoms and general health in midlife, after adjusting for other childhood and adult health and social factors and symptoms (in contrast to hypothesis 8, the associations between SEP and self-management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms were not mediated by symptom experience). Higher childhood and adulthood SEP were both independently associated with general health self-management, whereas the association between educational attainment and self-management was attenuated by other factors, particularly SEP and health related behaviours. These results suggest SEP (from both childhood and adulthood) was a stronger correlate of self-management and explained, at least in part, the association between higher educational attainment and self-

management. One possible explanation behind this is, with higher SEP there is likely to be greater access to resources which may facilitate self-management. Many of the techniques and behaviours included in the definition of self-management used in this thesis, such as dietary modifications, physical activities and complementary and alternative medicine, are costly and require spare time. With more expendable income and available time, likely to be associated more with higher SEP, women might be more likely to explore alternative means to managing their health.

Also in line with the hypothesis, higher SEP was associated with lower health check non-attendance at age 68, however, only childhood SEP remained a significant correlate of health check attendance and only in women after adjusting for other health and social factors (predominantly health and health behaviours), suggesting the importance of childhood socioeconomic circumstances, as well as sex differences. These bivariate associations were similar to those reported by previous literature (Labeit et al., 2013; Missinne et al., 2014; Pill et al., 1988; Waller et al., 2009). The results from this thesis add to the existing literature, as most studies did not include childhood SEP. Of these studies, only Missinne, Neels, & Bracke (2014) included measures of childhood socioeconomic circumstances; no association between childhood social class and screening attendance was found and the association between a higher number of books in house throughout childhood (used as an indicator of cultural capital and socioeconomic advantage) and higher attendance was attenuated by adult SEP. Two of these studies address only attendance to health checks specific to women (Missinne et al., 2014; Waller et al., 2009) and the remaining two (Labeit et al., 2013; Pill et al., 1988) did not test for sex interactions or adjust for sex. Given that the present results demonstrated how different the correlates of health check attendance are between men and women, this highlights a gap in the previous literature. This thesis has added to the body of literature by considering a wide range of health and social factors through which these pathways operated, showing that, with the exception of women's childhood SEP, associations between socioeconomic factors and health check attendance were generally explained by adult health and health behaviours and previous health care utilisation.

In conclusion, the results from women's health management in midlife (Chapters 5) and health check attendance in later life (Chapter 6) are broadly supportive of the hypothesised association between socioeconomic advantage and more proactive management whereas in earlier adult life (Chapter 4) higher SEP was associated with lower consultation for common health conditions for men and women. The results from this thesis suggest that the role of socioeconomic circumstances in health management depends largely on: i) the health challenge being managed, including symptom type and

experience of symptoms, ii) the type of health management (particularly the type of health care service, eg, consultation for symptoms compared to attendance to preventive health care services), iii) life stage, iv) sex and v) the extent to which symptom severity and duration is accounted for.

8.1.2 Health

It was hypothesised that study members with poorer health in childhood and adulthood would be more likely to proactively manage their health in adulthood (Chapter 1, Hypothesis 3).

For childhood health (which was measured using hospitalisations for serious illness before the age of 25), associations with health management types were mixed. Worse childhood health was associated with a greater likelihood of consultation for any conditions at age 43, and was attenuated by adult health, in line with the hypothesis. However, worse childhood health was the single remaining correlate of consultation for musculoskeletal symptoms after adjustments for childhood and adult factors, indicating differences between symptom types and the correlates of consultation. In contrast to the hypothesis, worse childhood health was found to be weakly associated with higher health check non-attendance in later life. Given that no association was found between childhood health and women's health management in midlife, and where associations were found between childhood health and health management at ages 43 and 68, the direction of associations differed, the results suggest that childhood health is not consistently associated with health management. Associations vary between health challenges and management types, thus there is limited support for the hypothesised association between worse health in childhood and proactive management of health across adulthood. This has implications for a life course approach to the study of health management, in that, as childhood health was associated differently with health management at different stages in adulthood, the associations between health in childhood and health management in adulthood vary according to the type of health management and the point in the life course individuals are faced with the particular health challenge.

The measure of adult health used in this thesis was a summary measure of the number of health conditions reported in the ten years prior to the point at which the measure of health management was taken (with the exception of Chapter 6, where the number of health conditions reported in midlife (age 43-53) was used as the most consistent (with previous chapters) available measure). These measures of reported health conditions, also considered as an indicator of health burden, were generally associated with

proactive health management at each stage across the life course explored in this thesis, in support of Hypothesis 3 and in line with previous studies (Glynn et al., 2011; Labeit et al., 2013). These results suggest that, the worse an individual's health is (as measured by an increasing number of comorbid health conditions), the more likely they are to proactively manage their health. This is a particularly important finding, given that, as described section 1.1, older adults are more likely to be in poor health and with more comorbidities, thus a greater health burden. These results, which are in contrast to the direction of associations between childhood health and health check attendance, suggest that childhood and adult health have different relationships with preventive health.

The differences observed between childhood and adult health and their associations with adult health management could reflect differences between how exposures from different stages in the life course are associated with health management. They may also be due to the different types of measures used, as the measure of health in childhood indicated lengthy hospital stays due to serious illness, whereas the adult measure was a sum of the number of health conditions reported by the study member; it could be argued that these two different measures were not comparable and the associations were likely to differ.

Under the broad heading of health, it is worth mentioning that, where symptom experience (severity and duration) was possible to measure (in Chapter 5), symptom experience was i) strongly associated with likelihood of proactive management and ii) a mediator in most of the associations between the health and social factors from childhood and adulthood and the measures of health management included in this thesis, providing support for hypothesis 8.

In summary, the majority of associations reported in this thesis between health and health management indicated that individuals with worse health were more likely to proactively manage their health by various means, including consulting a professional, self-management and engagement with preventive health care. However, one anomalous association (between worse childhood health and higher health check non-attendance) suggests that there may be other factors not measured in this thesis that may feature on this pathway.

8.1.3 Health care utilisation

Visiting a GP in early adulthood was used as a measure of previous health care utilisation in each chapter and, for women, previous use of the pill and attendance to mammogram

and cervical screening were measured in midlife and used as explanatory variables in Chapters 5 and 6.

It was hypothesised that study members who reported previously utilising health care would be more likely to proactively manage their health and – in line with this hypothesis - visiting a GP in earlier adulthood was associated with more proactive management of health across adult life. Moreover, previously attending screening procedures in earlier and mid-adulthood was associated with lower non-attendance of health checks in later life in women.

Health care utilisation was associated consistently and in the same direction with health management at each life stage tested in this thesis, in line with previous studies (Labeit et al., 2013; Pill et al., 1988; Thorogood et al., 1993). However, associations between previous GP visits and self-management of women's symptoms and general health in midlife were largely attenuated by symptom experience and other health and social factors, suggesting that GP visits were more strongly associated with measures of health care utilisation than self-management (although this was tested in and applied only to women). Also, sex differences were found for health check attendance, in that visiting the GP was associated with lower non-attendance only in men. This sex difference may reflect the differences in how men and women access health care services (discussed in Chapter 2), although no effects of sex were found for consultations in earlier adulthood (Chapter 4).

These results indicate that individuals who access professional health care services are likely to continue to do so for different health challenges later in life, both in response to symptoms and for preventive care, in support of the hypothesis, although there may be sex differences.

8.1.4 Health behaviours

The association between positive health behaviours (higher levels of physical activity and being a non-smoker) differed across types of health management. Positive health behaviours were associated with a decreased likelihood of consultation at age 43 (for psychological symptoms only) but with more proactive management of women's health in midlife and lower health check non-attendance at age 68. Furthermore, measures of health behaviours were often the strongest correlates of health management, though the directions of associations were not consistent. For example, positive health behaviours were associated with lower consultation at age 43 but with higher consultation for women's symptoms in midlife and with attending more health checks in later life. These

results suggest that health behaviours are associated strongly, but not consistently, with health management.

As mentioned in section 1.1, poor health behaviours, namely sedentary behaviour and smoking, result in adverse health and are a burden on health care services (Health Survey for England, 2013; ONS, 2013a; Proper et al., 2011). The fact that positive health behaviours are often cited as ways individuals can protect and maintain their health but have also been found to be associated with higher health professional consultation comes back to the debate as to whether consultation is a means of proactively managing health or deferring to health professionals and greater consumption of health care resources. Moreover, improving health behaviours often features as a component of self-management interventions (discussed in section 1.2.2.2), many of which aim to reduce access to health care services. Taking this into consideration, these results illustrate a more complex picture of the association between positive health behaviours and proactive health management, which might explain the mixed results reported in this thesis.

Although it was hypothesised that reporting more positive health behaviours would be associated with generally taking a proactive approach to managing health across adult life, this could not be concluded from these results, at least in the way that life course proactive health management was measured and defined in this thesis. The results suggest that the association between health behaviours and health management were dependent upon the type of health challenge and approach to health management (ie, different types of health care utilisation and self-management).

8.1.5 Personality

Three measures of personality were used in this thesis, self-organisation (measured in adolescence) and neuroticism and extraversion (measured at age 26). Higher scores for each of these measures were hypothesised to be associated with more proactive health management.

Self-organisation (a measure of personality from childhood) was not consistently associated proactive health management. Higher self-organisation was associated with lower consultation at age 43, an increased likelihood of self-managing women's general health in midlife and lower health check non-attendance at age 68. However, in line with the hypothesis, these associations were each attenuated by adult factors, particularly socioeconomic measures, which were associated with health management in different ways. Self-organisation has also been shown to be associated with health behaviours in

NSHD (Nishida et al., 2016), which may also contribute to the pathways between self-organisation and health management.

Personality in adulthood was not a strong correlate of health management. Extraversion was not associated with any measure of health management. Neuroticism, on the other hand, was found only to be associated with the management of psychological symptoms; at age 43, higher neuroticism was associated (albeit weakly) with an increased likelihood of consultation for psychological symptoms and, in midlife, with consultation for and self-management of women's nervous/emotional symptoms. The results from this thesis suggest that neuroticism appears to be a correlate of management of psychological symptoms but not with management of other health challenges. This adds to the literature by exploring the role of neuroticism in the management of psychological symptoms in the context of a wider variety of different health challenges.

Although health beliefs were not well measured in this thesis, women's attitudes towards the menopause were not associated with management. This result was not in line with the large body of evidence that has previously reported associations between negative attitudes towards the menopause and women's experience and management of symptoms. However, this could be due to low numbers, as few women in this sample reported negative feelings (specifically feelings of regret), or it could be that for this sample of women at this point in time (given the role of culture and social context) and at the relatively early age of 47, management approach did not depend on women's attitudes towards the menopause. Although not presented in this thesis, the role of attitudes at age 54 was investigated also and again no associations were found; attitudes at age 47 were selected to be included in the thesis as it was hypothesised that attitudes earlier in the menopausal transition would influence management of symptoms throughout midlife. In a systematic review of women's attitudes towards the menopause and the association with symptom experience (Ayers et al., 2010), which found consistent evidence for the association between negative attitudes and more severe symptoms, the ages of women included in studies ranged, most often, from 40-45 to 60. Although most of the studies included in the review were cross-sectional, the variety of ages at which attitudes were measured would suggest that age does not influence the association between attitudes and symptom experience (and possibly subsequent management approach). Thus, although the present results did not corroborate previous research, this is not likely to be a result of the particular measure of attitudes used in this study.

8.1.6 Family circumstances and support

It was hypothesised that married status and lower family related stress (both considered indicators of supportive family circumstances) would be associated with more proactive health management. Marital status will be considered first in this section as it was measured for both men and women at ages 43, 53 and 68, followed by family-related stress, which was measured at age 54 in women.

Of all the health management approaches explored in this thesis, marital status was associated only with health check attendance and only in men at age 68. The results showed that being separated/divorced/widowed was associated with lower health check attendance, after adjusting for all other explanatory variables. Although this same association was found in women, it was attenuated by other adult variables, namely health in midlife, previous screening attendance (although not GP attendance) and health related behaviours, indicating sex differences in how marital status is associated with engagement with preventive care. However, given that an association, attenuated or not, was found for both men and women, this would suggest that marital status was associated with health check attendance in a way that it was not with consultation at age 43 and women's health management in midlife. This could be due to the type of health challenge (ie, preventive care rather than a response to symptoms or health conditions) or to the life stage, ie, later life, compared to a stage earlier in life.

Whilst the results presented in this thesis support previously reported associations between being married and attending more health checks (Thorogood et al., 1993), the rest of the results presented in this thesis are not in line with the previous literature that describes associations between married status and proactive health management (Dunlop et al., 2000; Waller et al., 2009). However, Joung et al. (1995) reported that the associations between marital status and health care utilisation differ between types of health service, which may explain the different results in this thesis.

Although family related stress was only measured in women in midlife and used only in Chapter 5, higher levels of stress in midlife were associated with women's higher proactive management of health. This was in contrast to the hypothesis but in line with previous research. Morse et al. (1994) reported that higher levels of stress (although not specifically family-related) were associated with more health care utilisation in midlife and more so with 'problem-related' care (including using medication and access treatment for health conditions) than preventive health care. Consultation regarding symptoms could be labelled as problem-related health care utilisation, thus the present results supported this study.

Higher family related stress was associated with an increased likelihood of self-management of general health after adjusting for all other health and social factors. Greater stress was associated with more proactive management of symptoms in midlife, yet these associations were largely mediated by symptom experience in that higher stress was associated with the experience of more bothersome symptoms (similar to previous research (Hardy & Kuh, 2002; Mishra & Kuh, 2006)) which was associated with an increased likelihood of proactively managing symptoms. This may be because experiencing stress in midlife might heighten women's awareness of symptoms or lower their tolerance of symptoms. This may also explain the association between family related stress and general health self-management, as, although the number of health conditions reported in midlife was controlled for as the best available measure of health burden, there are likely to have been other challenges that women faced in midlife, which may have been aggravated, or at least their attention drawn to, due to greater stress levels in midlife, which in turn results in more proactive management of health. This theory may explain why the results differed to the hypothesis.

Overall, limited support was found for hypothesis 7 with regard to marital status and health management and the opposite association was found between family-related stress and proactive management of health, though – for management of women's symptoms - this was explained by symptom experience.

8.2 Health management over the life course

Chapter 7 provided somewhat mixed results regarding the 'consistency' of proactive management of health across adult life (hypothesis 9). In men, consultation at age 43 was associated with lower health check non-attendance in later life, in support of the hypothesis. However, in women, consultation at age 43 was associated only with consultation for symptoms in midlife (for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms only; not for HFNS - this might reflect different rates of consultation for HFNS compared to other symptoms, as discussed earlier) and not with self-management in midlife or, as it had been in men, with health check attendance. In contrast to the hypothesis, these results would suggest that women who reported consulting a health professional at age 43 were not necessarily more likely to proactively manage their health later in life using different approaches to health management, but were more likely to consult a professional in midlife.

The results in women suggest that, as no associations were found between consultation at age 43 and health check attendance at 68, experiences of health challenges in the intervening years may weaken associations between these forms of health

management. Women and men face different health challenges in this life stage and this may explain sex differences in the association between age 43 consultation and health check attendance at age 68.

On the whole, there is stronger support for consistent proactive management of health in men than in women, although this may be more pronounced given that there are fewer measures of health management for men in this thesis.

Alternatively, these mixed results may indicate that the measures of health management used in this thesis perhaps should not have been treated as equal, or comparable, measures of 'proactive health management'. It could be argued that these results, rather than indicating that proactive health management is not necessarily consistent across adult life, suggest that consultation, self-management and health check attendance are not comparable behaviours and should not be collectively labelled proactive health management. This will be discussed further in the following section.

The conceptual framework used in this thesis summarised the different health management approaches tested in this thesis using one overall outcome measure of proactive health management. The following section of this chapter will discuss this framework in light of the results and assess the appropriateness and the advantages and disadvantages of using a summary measure of proactive health management.

8.3 A life course model of health management

This thesis set out to test a conceptual life course model of health management. The conceptual model shown in figure 2.1 was developed as there were no existing models of health management thought to encompass the key factors associated with how individuals manage their health; the nearest available frameworks were the models of health self-management described in section 1.2.2.1. The conceptual model used in this thesis aimed to build on these models by both widening the concept of health management to include proactive behaviours used to manage health and by identifying the factors associated with proactive health management.

This thesis sought to identify the factors associated with 'proactive' management of health, by any means, and was able to test this in three approaches to health management: health professional consultation, health self-management and attendance to preventive health checks. The conceptual framework used in this thesis was thought to have several benefits over the existing models of health self-management (although, by definition, they represent and aim to measure different behaviours). Firstly, by including exposures and experiences from childhood and adulthood hypothesised and

found to be associated with health management, it represents the various pathways by which certain explanatory variables may be associated with health management. Moreover, including factors from both childhood and adulthood facilitates a life course approach, necessary to consider the experiences and exposures from across the life course that are associated with how individuals manage their health. A life course approach, or at least a temporal component, was something missing from the majority of existing models.

Whereas the existing models of self-management highlight the factors thought to be associated with health self-management only, using a conceptual model of health management in this thesis indicated which factors were associated with different forms of proactive health management (eg, socioeconomic factors, measures of health, health care utilisation and health behaviours) and which were associated with only a particular approach to health management (eg, marital status and its association with health check attendance). However, given that few health and social factors were associated with multiple health management approaches *in the same direction*, it could be argued that one life course model is not appropriate for a variety of different health management approaches as there were differences in the correlates of each measure of health management. Models illustrating the associations found between health and social factors and different types of health management (health professional consultation for conditions/symptoms at age 43, women's management of symptoms in midlife, women's self-management of general health in midlife and health check attendance in later life) are shown below in section 8.3.1.

8.3.1 Models of individual health management approaches

As the correlates of health management varied by the approach to health management, it was concluded that a 'one size fits all' model of health management was not appropriate. Models for each health management approach are shown below; the health and social factors included in each model are those with which associations were found with an approach to health management in this thesis. Variables that were not associated bivariately with the outcome are not depicted in the models shown below. Variables shown in the dashed-line boxes are those that were attenuated by adult health and social factors in the adjusted model. Directions of associations have also been shown by indicating how the explanatory variables were associated with the outcome (eg, worse adult health was associated with consultation).

Figure 8.1 shows the associations found between health and social factors from childhood and adulthood and consultations at age 43. As shown in Figure 8.1 and discussed in more detail in section 4.7, childhood associations were all attenuated by associations with factors from adulthood and only worse adult health and previous GP visits were associated with a higher likelihood of consulting in the fully adjusted model; associations between socioeconomic factors and neuroticism and consultation were attenuated by health related factors.
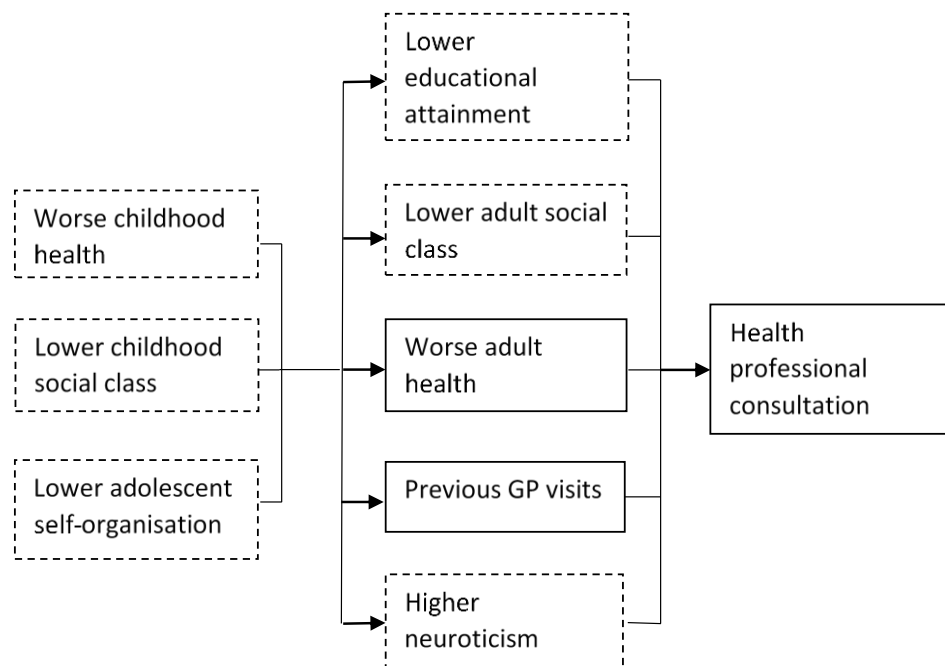

Figure 8.1 Associations between health and social factors from childhood and adulthood and health professional consultation for any symptoms/conditions at age 43[1]

[1]Dashed line boxes indicate associations were attenuated for by adult health and social factors

Figure 8.2 shows the correlates of women's management of symptoms in midlife. Unlike with the other health management approaches included in this thesis, the correlates of both consultation and self-management of women's midlife symptoms were mostly the same (see Table 5.10), this may have been because the health challenge was the same or because these data were collected at the same age. Thus, perhaps because women were managing one set of health challenges at one point in their lives, the two behaviours (consultation and self-management) were comparable in terms of developing a life course model of the health and social factors associated with health management, as the correlates were similar. Therefore, in figure 8.2, the outcome, proactive management of symptoms, covers both these behaviours. However, as the experience and management of hot flushes and night sweats (HFNS) was associated differently with socioeconomic factors, figure 8.2 presents only associations between explanatory variables and experience and management of trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms.

As structural equation modelling (SEM) was used for this section of analysis (reported in section 5.2.8), rather than multiply adjusted models, figure 8.2 demonstrates the direct associations that were observed between higher educational attainment, social class and physical activity levels and a higher likelihood of proactive management of symptoms, the association between higher childhood social class and proactive management that was mediated by adulthood socioeconomic advantage and the associations between worse adult health, previous PMT, previous GP visits and higher family related stress and proactive management, which were all mediated by symptom experience. This model of women's health management benefitted from inclusion of the role of symptom experience. Symptom experience was found to be an important factor in women's management of symptoms, both in terms of how symptom experience mediated some of the associations between explanatory variables and health management and in how symptom type was associated differently with certain explanatory variables and subsequent management (eg, the socioeconomic patterning of experience and management of HFNS).
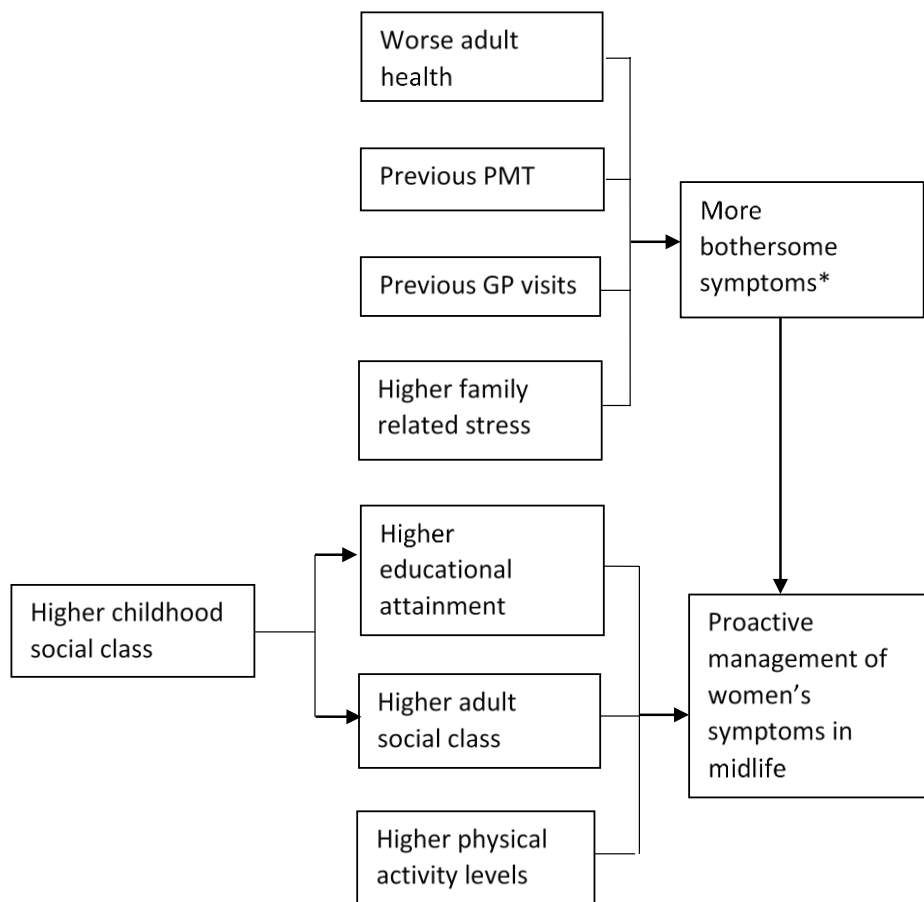
Figure 8.2 Factors associated with consultation for and self-management of women's symptoms in midlife

Figure 8.3 illustrates the associations found between health and social factors from childhood and adulthood and women's general health self-management in midlife. In comparing this model with figure 8.2, the differences between self-management of symptoms and general health are apparent, although it is not possible to make direct comparisons given that the model of symptom management included symptoms as a mediator. However, as shown in figure 8.3, unlike the other health management approaches investigated in this thesis, associations between health related explanatory variables and women's general health self-management were attenuated by socioeconomic factors (both in childhood and adulthood; highlighting the life course perspective). These results would suggest that this approach to health management is fundamentally different to other approaches (in terms of the health and social correlates), possibly due to the behaviour (self-management, in contrast to consultation) or to the health challenge (general health, in contrast to symptoms).
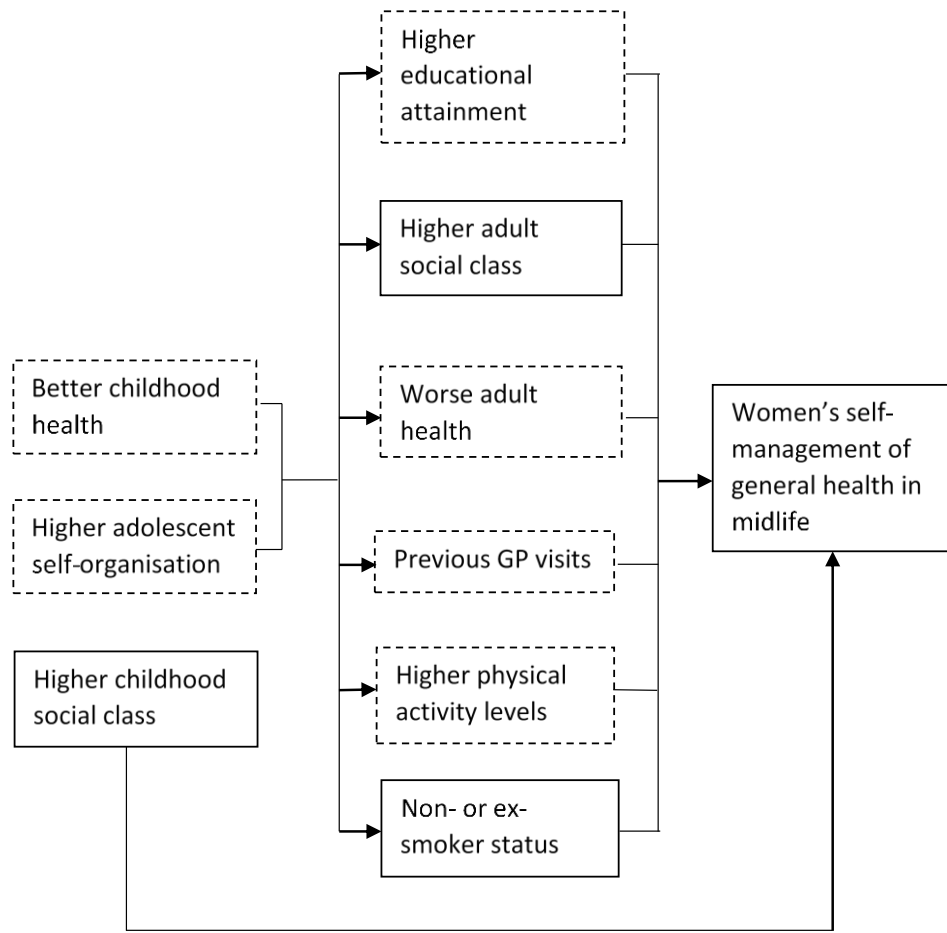
Figure 8.3 Factors associated with women's general health self-management in midlife[1]

[1]Dashed lines indicate associations were attenuated for by adult health and social factors

Figure 8.4 demonstrates associations found between health and social factors from childhood and adulthood and health check attendance. Similarities and differences can be observed with figures 8.1 and 8.4, demonstrating the different correlates for different types of health care utilisation. For health check attendance (figure 8.4), more associations with childhood variables remain following adjustments for adulthood exposures and experiences, although there are differences between men and women. Similar to consultation at age 43, associations with socioeconomic factors were attenuated by health and health care utilisation measures, which remained following all adjustments.
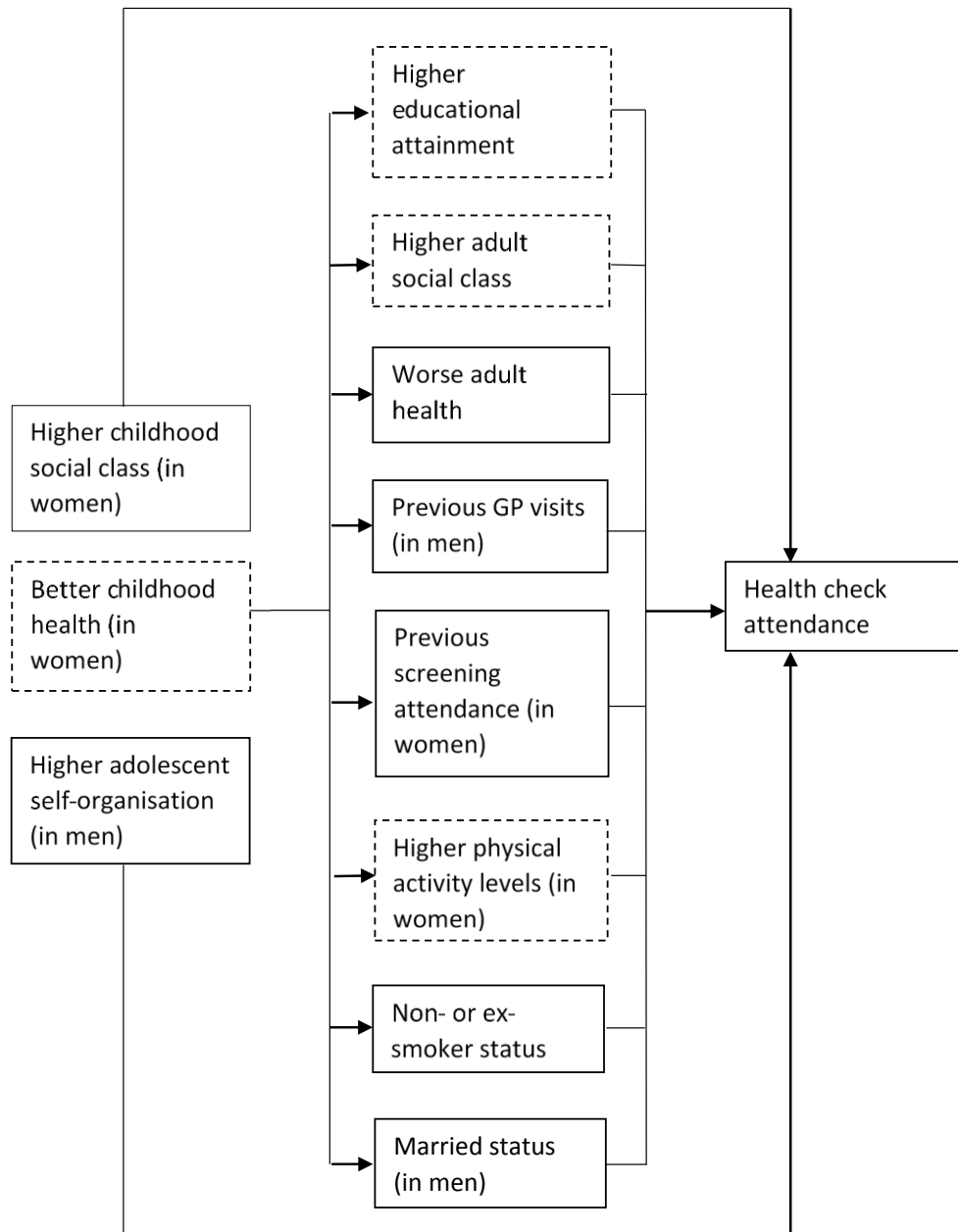
Figure 8.4 Factors associated with health check attendance at age 68[1]

[1]Dashed lines indicate associations were attenuated for by adult health and social factors

Although this thesis set out to test a single model of health management (figure 2.1), figures 8.1-8.4 demonstrate that although there were similarities in the correlates of the different health management approaches tested in this thesis, there were several differences, including the variables associated with the different outcomes and the direction of those associations. The results of this thesis suggest that, on the whole, it is not possible to have just one model to illustrate the many health and social factors from childhood and adulthood associated with different health management approaches.

8.3.2 Health and social factors associated with health management

The domains included in the conceptual model (figure 2.1) used in this thesis were predominantly those identified in the literature as correlates of health care utilisation and/or health self-management. Although some variables explored in this thesis were found not to be associated with health management in this sample, eg, extraversion, no domains identified in the model were found to be completely unrelated to health management. For instance, although extraversion was not associated with health management, other aspects of personality were, such as self-organisation and neuroticism. Similarly, although marital status was associated only with health check attendance in this thesis, this highlights the differences in the correlates of different health management approaches, as a strong correlate of engagement with preventive health care (in men) yet unrelated to other forms of health management.

Through assessing the common correlates of different management approaches, it was apparent that certain health and social factors from childhood and adulthood were associated very differently with management of different health challenges. Examples of this include higher physical activity being associated with lower consultation at age 43 and higher consultation for women's symptoms in midlife; furthermore, socioeconomic advantage was associated with lower consultation at age 43, but more proactive management at ages 54 (in women) and 68. One interpretation of these results could suggest that different proactive approaches to managing different aspects of health do not all equate to an overall proactive health management behaviour (to be discussed further in section 8.4). This idea could also be supported by the lack of consistency shown between the different health management types across adulthood (Chapter 7). Although it was assumed that the correlates of all forms of proactive management explored in this thesis would be the same, or at least the directions of associations would be comparable, using common correlates across each chapter meant that the results were able to show whether or not the factors associated with different management types were similar or not. As this thesis has shown mixed results for the common correlates of management approaches, it cannot be concluded that certain health and social factors consistently predict proactive health management. This would explain why some of the hypotheses (particularly between socioeconomic factors and health behaviours and proactive management) were unsupported. Although it might have been expected that more differences (in terms of the health and social correlates and the directions of the associations) were found between health care utilisation and self-management, as many differences were seen between different types of health care utilisation (ie, consultation regarding symptoms and health check attendance).

It is also worth bearing in mind that this thesis only explored the correlates of three approaches to health management at particular life stages. Therefore, it cannot be concluded that an explanatory variable is not associated with health management on the basis of null findings presented here. It is also possible that there are factors that are associated with health management that are not included in the conceptual model and were not tested in this thesis.

This conceptual model and the results presented in this thesis illustrate some of the benefits of a life course approach in considering health management at different stages across the life course. Childhood health and social factors were associated with each of the health management approaches explored in this thesis, though most of these associations were attenuated by adult factors, indicating that the pathways between childhood explanatory variables and health management operate through adult exposures and experiences. These results showed that health and social factors from childhood do have a role in how individuals manage their health later in life and should be included in a conceptual model of health management. By considering only adult factors in the study of health management, the various pathways by which factors from across the life course are associated with health management may be missed.

8.4 Proactive health management

This thesis tested the assumption that different approaches to managing health (consultation, self-management and engagement with preventive health care) could be collectively considered as 'proactive health management'. It aimed to widen the concept of health management as most previous literature focused on one approach, generally either health care utilisation, self-management or health check/screening attendance. This led to the development of one single conceptual framework for the general outcome of 'proactive health management'. The benefit of taking this approach (ie, treating consultation, self-management and preventive health care collectively) was that it addressed several conflicting areas in the literature, as some literature treated health care utilisation and self-management as opposing approaches to managing health (discussed in section 1.4) whilst many policy documents recommended collaborative health care utilising both approaches to achieve the best health care outcomes (Leyden Academy, 2013; Naylor et al., 2013; Oliver et al., 2014; PWC, 2013). Furthermore, the use of a single conceptual framework informed the analytical approach for each chapter in this thesis with the aim of comparing results across different health management approaches (ie, comparing associations with a similar set of potential explanatory variables).

Although this thesis aimed to fill a gap in the literature by testing a life course model of proactive health management, it could be argued that it was inappropriate to combine different approaches to managing health as one over-arching concept (ie, 'proactive health management'), hence, this is why previous research has found different associations between health and social factors and, for instance, utilisation of different types of health care services (eg, primary and secondary care and health checks). Although there were similarities between the health management approaches included in this thesis (i. there were some common correlates and ii. utilising one approach was sometimes associated with utilising another approach later in adulthood/for a different health challenge (reported in Chapter 7)), the many different correlates of each approach and the direction of associations and the overall lack of consistency in adopting a health management approach at different point across adulthood would suggest that the health management approaches measured in this thesis should not be grouped collectively as 'proactive health management'. The implications of these results for further development of health management theory will be discussed in section 8.7.

8.5 Strengths

One of the key strengths of this thesis is its use of a representative sample of British adults from the MRC National Survey of Health and Development (NSHD) which provided longitudinal prospective data on a number of health and social exposures relevant to health management. Moreover, as study members were aged 68 at the most recent data collection when this thesis was written, it has used a representative sample of individuals often blamed for the strain on British health services, the so-called 'baby-boomers'.

This thesis has filled a gap in the literature that has previously considered health care utilisation and health self-management as compartmentalised approaches to managing health. In this thesis, health care utilisation and self-management were considered both as means of proactive health management. This was felt to be beneficial to the study of this area as both approaches are recommended to lead to collaborative, integrated care and in order to understand how this might be implemented, the similarities and differences between the two approaches should be explored.

The existing literature on health self-management has largely focused on the self-management of chronic conditions. As stated in Chapter 1, this is at odds with the reality of self-management for most individuals, which largely involves managing general health (Self Care Forum, 2014). This thesis has addressed this gap in the literature by including

self-management of general health and common symptoms, rather than chronic conditions.

Where possible, this thesis has been able to consider individuals whose approach to managing their health was to do nothing (not consult a professional, not self-manage or not attend health checks). Although in this thesis this group was used as a comparator for those who did proactively manage their health, as this was the outcome of interest, this group are often overlooked in literature. Given that this thesis found support for the 'illness iceberg' (Hannay, 1980), there is evidence that, for some, doing nothing is a management approach of choice.

8.6 Limitations

One of the inherent limitations of using secondary data is that there are inevitably variables potentially relevant to the study that have not been measured in the sample and are not available. Ideally, this study would have benefitted from including measures of health literacy, self-efficacy and health beliefs. (These are variables often cited in the literature reporting predictors of health management and also included in the conceptual models of health behaviours.)

Another limitation is the lack of symptom experience related data. Only in Chapter 5 was symptom experience (severity and duration) accounted for; and this was found to be an important mediator for many of the pathways between the explanatory variables and the outcome measures. Unfortunately, it was not possible to measure the role of symptom severity at age 43.

There was also a lack of information about health professional consultation as a means of managing health. The term 'health professional' itself may be open to interpretation and could include a wide range of professionals, some study members may also have included non-clinical professionals under this heading. Ideally, additional information would have included how long after the onset of symptoms study members sought professional help (as discussed in Chapter 1, 'timely' access to health care services is considered an integral part of integrated health care; the 'timeliness' of health care utilisation was not able to be quantified in this thesis), the type of health professional and the outcome of the consultation (this was available at age 54, to an extent, but not at 43).

Whilst this thesis has tried to address several gaps in the literature with regard to an integrated approach to managing health, it has not explored the ongoing management of long-term conditions. This would have added an additional layer of exploration of

health management, however, this thesis took the alternative approach to look at other, more generic health challenges, that a larger proportion of individuals are likely to experience at some point throughout the life course.

Using data from a birth cohort study (specifically, NSHD) has the advantage of providing rich longitudinal data from a representative sample, however, one of the possible drawbacks of using a sample who have been involved in a health-related study for their entire lives is that are likely to be more health aware and engaged with health services and health self-management than the general population. This was evident in how health check attendance in this sample was higher than in the general population (discussed in section 6.6.7). In a study investigating health management, this has the potential to bias results and limit the generalisation of findings to the wider population.

Another limitation is the level of missing data. Missing data in any study presents a challenge as it can lead to biased estimates and limited statistical power. However, NSHD has relatively high participation rates (Kuh et al., 2016; Stafford et al., 2013; Wadsworth et al., 2006). In NSHD, data are assumed to be missing at random and, in the present study, an appropriate means of dealing with data missing at random – multiple imputation – was employed. Although measures were taken to try to ensure using imputed data did not distort results compared to complete case analysis (sensitivity analyses are presented in the Appendix, Tables A.3-A.5), handling missing data and using imputed data is not ideal.

8.7 Implications of the findings of this thesis for health management research, policy and practice

As discussed in Chapter 1, it is necessary to understand how individuals manage their health and the factors associated with the utilisation of different health management approaches, in light of the changing demographic and limitations of available health resources in the UK. This thesis has shown that some individuals who proactively manage a particular health challenge are likely to do so again at a later life stage, however, this varies depending on the type of health challenge, or symptom being managed. One of the key findings of this is thesis was support for the illness iceberg, which suggests that most individuals do not seek professional help for most symptoms (Hannay, 1980). Although this phenomenon was first described in the 1980s, it would appear that this is still case, as evidence was found both at age 43 and, in women, age 53. However, as discussed in Chapter 1, the majority of grey literature describes the 'overuse' of health care services (Naylor et al., 2013; Oliver et al., 2014; PWC, 2013), demonstrating tension between policy makers' and health care providers' perception of

individuals' health care utilisation and actual access to health care services in response to symptoms/conditions. Thus, the results from this thesis suggest that both health care professionals and policy makers consider that most individuals do not rely heavily on health services. This has implications for campaigns that aim to reduce 'unnecessary' access to health services (eg, the 'Treat Yourself Better' campaign, described in section 1.2.2.2) as it is likely to be a relatively small group of individuals (given that most people do not consult) that should be targeted.

As this thesis found that health status and symptom experience was associated with health management, there are implications for the ageing population, who are more likely to acquire health conditions and report comorbidities (ONS, 2011). Older adults may be more likely to experience new and bothersome symptoms and health conditions, which may be a barrier to proactive health management as they are required to manage more symptoms and conditions than they were earlier in adulthood, when there may be declining capacity. This is relevant to health care providers who aim to encourage and facilitate health self-management, in that older adults with greater health burden may require more support in managing their health. This idea of increasing comorbidities as a barrier to managing health is a theme that frequently appears in the existing health self-management literature and with regard to access to health care services (Bayliss et al., 2003; Glynn et al., 2011; Kenning et al., 2015); this thesis expands on this literature by suggesting that, even in those who have previously proactively managed their health in earlier adulthood, the onset of particular symptoms or conditions may alter their propensity or approach to managing their health as they get older.

There is often a belief that individuals who utilise health care resources are less likely to self-manage (and possibly vice versa), however this thesis found some evidence to suggest that women who consult for one health challenge (ie, symptoms in midlife) are also likely to self-manage their general health. These results support the idea of collaborative care, described earlier in Chapter 1. Accessing health care services when necessary and self-managing one's health is reported to produce the best health outcomes (Bodenheimer et al., 2002) and relieve pressure on health services (Barlow et al., 2002). This thesis, particularly Chapter 5, would suggest that for many women, this is a reality of managing health; those with bothersome symptoms in midlife consulted a professional and were more likely to self-manage their general health. Moreover, men who consult a professional are also more likely to engage in preventive health care, suggesting that those who consult are not necessarily 'passive consumers' of health care, as they are also likely to voluntarily attend health checks aimed at maintaining health and identifying health risks. An implication of these results is that campaigns promoting health self-management and interventions aimed at individuals who utilise

health resources should possibly target those who do not utilise health care services, as they are possibly even less likely to be effectively self-managing their health. Furthermore, the results from the thesis suggest that improving or encouraging one particular approach to health management (eg, self-management) may not necessarily increase or decrease the propensity to use another (eg, health care utilisation), as the results from Chapter 7 indicate that different health management approaches are not associated with one another in any consistent pattern. This has implications both for policy makers, who should be aware that aiming to improve or change one behaviour will not necessarily have a direct impact on another behaviour, and for health self-management interventions, which often aim to reduce health care utilisation (previously discussed in section 1.2.2.2).

Considering how to best further develop health management theory, this thesis aimed to challenge the portrayal in the literature that different approaches to health management (particularly health care utilisation and self-management) were conflicting behaviours by treating consultation, self-management and health check attendance all as 'proactive health management'. Whilst it was concluded from the results that it was not appropriate to include these three approaches in one over-arching concept of proactive health management, the results did not support the idea that engaging with one health management approach meant that individuals were less likely to adopt another. Thus, the present results would suggest that researchers further investigating health management should not treat different behaviours as indicators of a common proactive health management, as this thesis did, but neither should they assume that one approach or behaviour is a substitute for another. Future research (and health care providers/policy makers) would be encouraged to consider different health management approaches as (a) dependent on the health challenge (b) having different health and social correlates both from childhood and adulthood and (c) not dependent on previous or predictive of future behaviours.

How best to promote integrated health care is beyond the scope of this thesis, however it does demonstrate the role of many social and individual differences in individuals' approaches to managing health. This thesis identified some of the correlates of different health management approaches and demonstrated that the factors associated with different approaches are generally not consistent across adult life, suggesting that individuals with different socioeconomic backgrounds and with different health related experiences are likely to respond to health challenges in different ways. These results may have implications for policy makers. For instance, although the results showed that the majority of people with symptoms did not consult, of those who did (for any symptoms/conditions at age 43 or for women's symptoms in midlife), those who have

previously visited a GP in earlier adulthood were more likely to do so for these symptoms. These results would suggest that campaigns or interventions that aim to encourage people to seek professional health care when needed should target individuals who aren't already or haven't been engaged with health services. This would involve targeting these individuals through other channels outside of health care (ie, not through information provided at a GP clinic), possibly through social media and other non-health care environments. Furthermore, this thesis indicates that the type of health challenge and symptom experience are important factors related to how individuals manage health and they need to be considered when advising the public or particular populations how to respond to a given health challenge.

Finally, this thesis identified some potentially modifiable factors that were associated with health management. Adolescent self-organisation was generally associated with more proactive health management, it could be argued that this could be targeted through campaigns aimed at young people (Public Health England, 2015). Health behaviours were a strong correlate of health management, in that not smoking and more physical activity, were often associated with more proactive health management, independent of health and socioeconomic factors. These behaviours are both potentially modifiable and therefore interventions could influence health management by targeting these behaviours. Whilst this may not directly affect health management behaviour it may be that improving an individual's health behaviours influences various health beliefs, sense of mastery or self-efficacy, which might subsequently affect how they respond to a health challenge.

8.8 Future research

As this thesis has identified some of the ways in which individuals manage their health, the next steps could include assessing the health related outcomes of different health management approaches. An important research question to explore in the future is, what are the health related outcomes associated with proactively managing health over the life course? Future research could consider proactive health management approaches collectively or individually (eg, health care utilisation compared to self-management). There are many different measures of health that could be investigated as outcomes of proactive health management, including mortality, self-rated health and clinically objective measures of health.

Given that this thesis promotes a life course approach and exploration of the pathways by which exposures and experiences from childhood and adulthood are associated with health management, future research into health self-management (particularly chronic

illness self-management) is likely to benefit from a life course approach, which could then inform interventions and target population groups that may need more input and advice than others.

The results from this thesis were demonstrated in a relatively homogenous population, in terms of generation, ethnicity and culture. Future research could explore the health management in populations of different ages, from different cultures and from different countries, particularly ones where health care systems are different to the UK. One way of assessing whether or not the results of this thesis are generalisable to another population would be to replicate this study in other cohort studies, such as younger British birth cohorts (eg, the National Child Development Study or the 1970 British Cohort Study). Although the same variables would not be available in these datasets to derive the same outcome measures of health management, comparable explanatory variables would be available to assess associations with other measures of study members' responses to various health challenges. Furthermore, other cohort studies from across the world, particularly other studies of women's experience of symptoms in midlife, eg, the Massachusetts Women's Health Study (Avis & McKinlay, 1995) or the Melbourne Women's Midlife Health Study (Morse et al., 1994) could be used to make cultural comparisons of women's management of midlife health. This could enable researchers to compare health management across different age groups, explore cultural differences and investigate how health management in practiced in different populations.

8.9 Conclusions

This thesis has identified some of the health and social factors across life that are associated with proactive management of health at different stages of adulthood in a representative British birth cohort study, the MRC NSHD. Socioeconomic circumstances, health related exposures and experiences and, to a lesser degree, aspects of personality and family circumstances and support were associated with health management, although some of the associations differed between different types of health management, demonstrating mixed support for a general proactive health management approach across different health challenges and stages in adulthood. The likelihood of proactively managing health often depended on the type of health challenge or symptom, suggesting using an over-arching label of proactive health management to describe the management of different health challenges was an over-simplification. Moreover, there was mixed support for the hypothesis that proactive health management for one health challenge, at one stage in adulthood, would be associated with proactive management of another as results varied between sex, health challenges and health management approaches.

Appendices
Appendix 1

Questionnaires

The questions detailed below were asked study members during a nurse visit at age 43.

Bronchitis

Have you had this problem? *No / Yes, once / Recurring*

How old were you when you had this problem?

First time: __ *yrs old* Last time: __ *yrs old*

How often have you consulted a doctor or other heath professional about this in the last year? Doctor: __ Other: __

The same questions were asked for:

Sciatica, lumbago or severe backache (specify site)

Arthritis/rheumatism (specify complaint and joints involved)

Trouble with the liver (specify)

Skin trouble such as eczema or psoriasis (specify)

Asthma

Bronchitis

Hay fever

Allergies (specify)

Stomach trouble such as ulcers, gastritis or acid indigestion (specify)

Gall bladder trouble

Hernia

Severe headaches or migraine (specify)

High blood pressure

Heart trouble

Varicose veins

Cancer (specify site)

Nervous/emotional trouble or depression (specify)

Diabetes

Trouble with gums or mouth

Trouble with sleeping

Epilepsy

Kidney or bladder infections (specify)

Dizziness and unsteadiness

Piles or haemorrhoids

Anaemia or any other blood disorder (specify)

Persistent constipation

Cataracts or glaucoma or other serious eye trouble (specify)

Women were asked the following questions at age 47 in a postal questionnaire as part of the Women's Health sub-study

---

In the last 12 months have you experienced hot flushes?   *No / Yes*

How much have hot flushes bothered you in the last 12 months?

- *Not at all*
- *Bothered a little*
- *Bothered a lot*

In the last 12 months have you experienced cold sweats or night sweats? *No / Yes*

How much have cold sweats or night sweats bothered you in the last 12 months?

- *Not at all*
- *Bothered a little*
- *Bothered a lot*

The questions below were asked to women at age 47 in the postal questionnaire as part of the Women's Health sub-study

---

Trouble sleeping

- Have not had this symptom in last 12 months

Have had this symptom in the last 12 months

- It didn't bother me
- Bothered me a little
- Bothered me a lot

The same questions were asked for:

Vaginal dryness

Anxiety or depression

Tearfulness

Feelings of panic

Frequency of passing urine

Women were asked the questions below annually between ages 48 and 54.

Hot flushes

- Have not had this symptom in last 12 months

Have had this symptom in the last 12 months

- It didn't bother me
- Bothered me a little
- Bothered me a lot

The same questions were asked for:

Cold sweats/night sweats

Trouble sleeping

Vaginal dryness

Anxiety or depression

Tearfulness

Feelings of panic

Frequency of passing urine

Lost urine when you didn't mean to

Pain when passing urine

Women were asked the questions below at age 54.

In the last 10 years have you consulted a doctor or other health professional about hot flushes or night sweats? *No / Yes*

In the last 10 years have you regularly taken any non prescribed medicines or treatments (including alternative therapies) or changed your behaviour in any way to try to relieve hot flushes or cold sweats? *No / Yes*

The same questions were asked for:
Trouble sleeping

Vaginal dryness

Nervous or emotional symptoms

Urinary symptoms

Do you regularly take non prescribed medicines, use alternative treatments or therapies or follow a special diet or exercise regime to maintain or restore your health, reduce your risk of chronic health problems (such as osteoporosis and heart disease) or to slow down the effects of ageing on your body or your brain?

No / Yes

Please specify name(s) of non prescribed medicine, alternative therapy or treatment, special diet or exercise regime…

Study members were asked the following questions at age 68

The following statements are about health checks that you may have had recently. Please circle one number in each row to indicate whether or not you have had each of the following.

- Blood pressure measurement within the past 5 years
  No / Yes / Don't know
- Cholesterol measurement within the past 5 years   *No / Yes / Don't know*
- Eyesight check-up within the past 2 years   *No / Yes / Don't know*
- Dental check-up within the past year *No / Yes / Don't know*
- Immunisation against influenza ("flu jab") within the past year
  No / Yes / Don't know
- Colon cancer screen *No / Yes / Don't know*

For those health checks listed above that you have not had during the period specified, which of the following kept you from having them?

- My GP never recommended it
- I have no need to, I have no relevant health problems
- Financial reasons/cost
- I don't have the time/didn't get around to it
- I don't think it is important
- I've never thought about it
- I had already had these checks earlier (ie, before the period specified)
- Other (please specify)

Appendix 2

Tables and Figures

Table A.1 Table of outcome measures and explanatory variables, the age at which they were measured and in which section of analysis they were used in this thesis

		Age measured at	Notes	Relevant results section
Outcome measures				
Health professional consultation at age 43	Any conditions	43	Binary measure of consultation for any conditions (see table 4.2) in last 12 measures (see section 3.3.1; descriptives described in section 4.3.1)	4.4
	Psychological symptoms	43	Binary measure of consultation for psychological symptoms (nervous/emotional symptoms or trouble sleeping) in last 12 months (see section 3.3.1; descriptives presented in table 4.3)	4.5
	Musculoskeletal symptoms	43	Binary measure of consultation for musculoskeletal symptoms (arthritis or back pain) in last 12 months (see section 3.3.1; descriptives presented in table 4.3)	4.6
Management of women's symptoms in midlife		54	Categorical measures of symptom management for each symptom (HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms, urinary symptoms) (coded: consulted professional, self-managed, both consulted and self-managed, neither) (see section 3.3.2; descriptives presented in table 5.6)	5.2.5, 5.2.6, 5.2.7
			Binary measure of consultation for HFNS (see section 3.3.2; descriptives presented in table 5.6)	5.2.8
			Binary measure of self-management for HFNS (see section 3.3.2; descriptives presented in table 5.6)	5.2.8
			Latent measure of consultation for trouble sleeping, vaginal dryness, nervous/emotional symptoms or urinary symptoms was	5.2.8

			derived using binary measures of consultation for each symptom and measured propensity to consult (see section 5.2.8.1)	
			Latent measure of self-management for trouble sleeping, vaginal dryness, nervous/emotional symptoms or urinary symptoms was derived using binary measures of self-management for each symptom and measured propensity to consult (see section 5.2.8.1)	5.2.8
Women's general health self-management		54	Binary measure of women's general health self-management (see section 3.3.3; descriptives presented in table 5.13)	5.3
Health check attendance		68	Count measure of health checks not attended by men and women (see section 3.3.4; descriptives presented in figure 6.2)	Chapter 6
Explanatory variables/mediators				
From childhood	Health	0-25	Binary measure of hospitalisations of lasting longer than 28 days between ages 0-25 (see section 3.4.1.1; descriptives presented in table 3.3)	Chapters 4, 5 and 6
	Social class	11, 15 or 4	Categorical measure of father's occupational classification, coded from 0 (low social class) to 5 (high social class) (see section 3.4.1.2; descriptives presented in table 3.3)	Chapters 4, 5 and 6
	Adolescent self-organisation	13 and/or 15	Mean factor score of study members' self-organisation, ranging from 1 (low) to 5.05 (high) (see section 3.4.1.3; descriptives presented in table 3.3)	Chapters 4, 5 and 6
From adulthood	Educational attainment	26	Ordered categorical measure of educational attainment, ranging from 0 (low) to 3 (high) (see section 3.4.2.1; descriptives presented in table 3.3)	Chapters 4, 5 and 6
	Social class	43	Ordered categorical measure of social class, ranging from 0 (low) to 5 (high) (see section 3.4.2.2; descriptives presented in table 4.1)	Chapter 4
		53	Ordered categorical measure of social class, ranging from 0 (low) to 5 (high) (see section 3.4.2.2; descriptives presented in table 5.1)	Chapters 5 and 6
	Number health conditions	43	Count measure of number of symptoms/conditions experienced in last 10 years (see section 3.4.2.3; descriptives presented in table 4.1)	Chapter 4

	53	Count measure of number of conditions experienced in last 10 years (see section 3.4.2.3; descriptives presented in table 5.1)	Chapters 5 and 6
Previous PMT	51	Binary measure of ever experiencing PMT (see section 3.4.2.3; descriptives presented in table 5.2)	Chapter 5
Previous GP visits	31, 20 or 22	Binary measure of GP attendance in earlier adulthood (see section 3.4.2.4; descriptives presented in table 3.3)	Chapters 4, 5 and 6
Contraceptive pill use	47	Binary measure of ever using contraceptive pill (see section 3.4.2.4; descriptives presented in table 5.2)	Chapter 5
Cervical screening attendance	43	Binary measure of ever attending cervical screening (see section 3.4.2.4; descriptives presented in table 6.1)	Chapter 6
Mammogram attendance	53	Binary measure of ever attending mammogram (see section 3.4.2.4; descriptives presented in table 6.1)	Chapter 6
Smoking behaviour	43	Categorical measure of smoking (never smoked, ex-smoker, current smoker) (see section 3.4.2.5; descriptives presented in table 4.1)	Chapter 4
	53	Categorical measure of smoking (never smoked, ex-smoker, current smoker) (see section 3.4.2.5; descriptives presented in table 5.1)	Chapter 5
	68	Categorical measure of smoking (never smoked, ex-smoker, current smoker) (see section 3.4.2.5; descriptives presented in table 6.1)	Chapter 6
Physical activity	43 or 36	Ordered categorical measure of physical activity, ranging from 0 (low) to 2 (high) (see section 3.4.2.5; descriptives presented in table 3.3)	Chapters 4, 5 and 6
Neuroticism	26	Mean score on neuroticism scale, ranging from 0-12 (see section 3.4.2.6; descriptives presented in table 3.3)	Chapters 4, 5 and 6
Extraversion	26	Mean score on extraversion scale, ranging from 0-12 (see section 3.4.2.6; descriptives presented in table 3.3)	Chapters 4, 5 and 6
Attitudes towards the menopause	47	Categorical measure of attitudes towards the menopause (regret, relief, mixed feelings, no feelings) (see section 3.4.2.6; descriptives presented in table 5.2)	5.2

	Marital status	43	Categorical measure of marital status (single, married, separated/divorced/widowed) (see section 3.4.2.7.1; descriptives presented in table 4.1)	Chapter 4
		53	Categorical measure of marital status (single, married, separated/divorced/widowed) (see section 3.4.2.7.1; descriptives presented in table 5.1)	Chapter 5
		68	Categorical measure of marital status (single, married, separated/divorced/widowed) (see section 3.4.2.7.1; descriptives presented in table 6.1)	Chapter 6
	Family related stress	47-54	Summary measure of family-related stress in midlife, ranging from 0-49 (see section 3.4.2.7.2; descriptives presented in table 5.1)	Chapter 5
Women's symptoms in midlife	Binary measures of symptom experience	47-54	For each symptom (HFNS, trouble sleeping, vaginal dryness, nervous/emotional symptoms, urinary symptoms), binary measures indicated if women reported the symptom and were not bothered by it (coded 0) or if they had ever been bothered a little or a lot by a particular symptom (coded 1) (see section 3.4.2.8; descriptives presented in table 5.4)	5.2.5.2
	Symptom duration	47-54	For each symptom, a count measure of the number of years study members reported by bothered a little or a lot by the symptom was generated, ranging from 0-8 (see section 3.4.2.8; descriptives presented in table 5.5)	5.2.6
	Latent measure of symptom experience	47-54	Using the count measures of years bothered a little/lot by symptoms for trouble sleeping, vaginal dryness, nervous/emotional symptoms and urinary symptoms, a latent measure of symptom experience was generated, where a lower score indicated lower symptom burden and a higher score higher symptom burden (see section 5.2.8.1)	5.2.8

Table A.2 Bivariate associations between explanatory variables and binary measures of all self-management behaviours, diet and exercise self-management behaviours and complementary and alternative medicine (CAM) and non-prescribed medication use

Potential explanatory variable N=1308		Binary measure self-management OR (95% CI)	Binary measure of diet or exercise OR (95% CI)	Binary measure of CAM/ non-prescribed medication use OR (95% CI)
From childhood				
Childhood serious illness resulting in hospital admissions (age 0-25) (compared to none)		0.71 (0.55-0.91)**	0.68 (0.50-0.92)**	0.76 (0.58-1.01)*
Childhood social class (per one class increase; unskilled → professional)		1.30 (1.19-1.42)**	1.25 (1.13-1.38)**	1.26 (1.15-1.39)**
Adolescent self-organisation (per one unit increase in the self-organisation factor score)		1.28 (1.08-1.52)**	1.17 (0.95-1.43)	1.33 (1.10-1.61)**
From adulthood				
Educational attainment at age 26 (per one level increase; no qualifications → degree level)		1.52 (1.33-1.74)**	1.49 (1.29-1.73)**	1.42 (1.24-1.63)**
Adult SEP (per one class increase; unskilled → professional)		1.43 (1.28-1.59)**	1.41 (1.24-1.60)**	1.40 (1.25-1.57)**
Total number of health conditions between ages 43-53 (per one condition increase)		1.13 (1.05-1.22)**	1.14 (1.04-1.24)**	1.13 (1.04-1.22)**
Any GP visits in earlier adulthood (compared to none)		1.47 (1.15-1.88)**	1.27 (0.95-1.70)	1.46 (1.11-1.91)**
Summary measure of physical activity in adulthood (per one level increase in activity)		1.52 (1.32-1.74)**	1.80 (1.54-2.12)**	1.31 (1.13-1.52)**
Lifetime smoking trajectory to age 53 (current smoker used as reference group)	Never smoked	2.03 (1.37-3.00)**	1.85 (1.11-3.07)**	2.09 (1.33-3.27)**
	Ex-smoker	2.11 (1.46-3.06)**	2.15 (1.33-3.47)**	2.07 (1.34-3.20)**
Personality	Extraversion	1.00 (0.96-1.03)	1.02 (0.98-1.06)	1.00 (0.96-1.03)
	Neuroticism	1.00 (0.97-1.04)	0.99 (0.95-1.02)	1.01 (0.97-1.04)
Marital status age 53 (married used as reference group)	Single	0.68 (0.38-1.22)	0.81 (0.41-1.61)	0.79 (0.42-1.51)
	Separated/ Divorced/Widowed	1.01 (0.74-1.38)	0.98 (0.68-1.40)	1.01 (0.73-1.40)
Family stress between and 48 and 54 (per one unit increase)		1.05 (1.03-1.07)**	1.04 (1.02-1.07)**	1.04 (1.02-1.06)**

Table A.3 Complete case frequencies and imputed percentages for data used in Chapter 4

Potential explanatory variable		Complete case, N (%)	Imputed % N=3262
From childhood			
Childhood serious illness resulting in hospital admissions (age 0-25) (N=3261)	No hospital admissions for +28 days 0-25 yrs	2226 (68.3)	68.3
	At least one hospital admission +28 day 0-25 yrs	1035 (31.7)	31.7
Childhood social class (N=3096)	Unskilled	193 (6.2)	6.3
	Partly skilled	585 (18.9)	18.7
	Skilled (manual)	1004 (32.4)	32.4
	Skilled (non-manual)	507 (16.4)	16.5
	Intermediate	610 (19.7)	19.7
	Professional	197 (6.4)	6.4
		Complete case, Mean (95% CI)	**Imputed Mean (95% CI)**
Self-organisation score 13-15 (N=2908)		3.4 (3.3-3.4)	3.4 (3.3-3.4)
From adulthood			
		Complete case, N (%)	**Imputed %**
Educational attainment at age 26 (N=3075)	No qualifications	1141 (37.1)	37.2
	Lower secondary	859 (27.9)	27.8
	Advanced secondary	775 (25.2)	25.3
	Degree level	300 (9.8)	9.8
Adult social class at age 43 (N=3232)	Unskilled	122 (3.8)	3.8
	Partly skilled	381 (11.8)	11.8
	Skilled (manual)	578 (17.9)	17.9
	Skilled (non-manual)	752 (23.3)	23.3
	Intermediate	1192 (36.9)	36.8
	Professional	207 (6.4)	6.4
GP visits in earlier adulthood (N=3159)	No previously reported GP visits	1295 (40.0)	40.9
	Previously reported GP visits	1864 (59.0)	59.1
Smoking status at age 43 (N=3252)	Never	948 (29.2)	29.2
	Ex	1330 (40.9)	40.9
	Current	974 (30.0)	30.0
		Complete case, Mean (95% CI)	**Imputed Mean (95% CI)**
Extraversion at 26 (N=2903)		7.9 (7.8-8.0)	7.9 (7.8-8.0)
Neuroticism at 26 (N=2902)		6.3 (6.2-6.5)	6.3 (6.2-6.4)
		Complete case, N (%)	**Imputed %**
Marital status at age 43 (N=3257)	Single	221 (6.8)	6.8
	Married	2595 (79.7)	79.7
	Separated/divorced/widowed	441 (13.5)	13.6

Table A.4 Complete case frequencies and imputed percentages for data used in Chapter 5

Potential explanatory variable		Complete case, N (%)	Imputed % N=1308
From childhood			
Childhood social class (N=1232)	Unskilled	58 (4.7)	4.7%
	Partly skilled	235 (19.1)	19.0%
	Skilled (manual)	378 (30.7)	30.7%
	Skilled (non-manual)	212 (17.2)	17.3%
	Intermediate	263 (21.4)	21.3%
	Professional	86 (7.0)	7.0%
		Complete case, Mean (95% CI)	**Imputed Mean (95% CI)**
Self-organisation (N=1164)		3.5 (3.5-3.6)	3.5 (3.5-3.5)
From adulthood			
		Complete case, N (%)	**Imputed %**
Educational attainment (N=1238)	No qualifications	397 (32.1)	32.3%
	Lower secondary	453 (36.6)	36.2%
	Advanced secondary	312 (25.2)	25.3%
	Degree level	76 (6.1)	6.3%
Adult social class (N=1282)	Unskilled	56 (4.4)	4.3%
	Partly skilled	178 (13.9)	13.7%
	Skilled (manual)	84 (6.6)	6.8%
	Skilled (non-manual)	494 (38.5)	38.3%
	Intermediate	447 (34.9)	34.9%
	Professional	23 (1.8)	1.9%
		Complete case, Mean (95% CI)	**Imputed Mean (95% CI)**
Total number health conditions (N=1205)		1.8 (1.7-1.9)	1.8 (1.7-1.9)
		Complete case, N (%)	**Imputed %**
GP visits (N=1272)	No previously reported GP visits	402 (31.6)	31.9%
	Previously reported GP visits	870 (68.4)	68.1%
Physical activity (N=1216)	Inactive	662 (54.4)	54.1%
	Less active	283 (23.3)	23.5%
	Most active	271 (22.3)	22.5%
Smoking status (N=1216)	Never	419 (34.5)	34.3%
	Ex	630 (51.8)	51.9%
	Current	167 (13.7)	13.8%
		Complete case, Mean (95% CI)	**Imputed Mean (95% CI)**
Extraversion (N=1181)		7.5 (7.3-7.6)	7.5 (7.3-7.7)
Neuroticism (N=920)		7.1 (6.9-7.3)	7.0 (6.8-7.2)
		Complete case, N (%)	**Imputed %**
Marital status (N=1218)	Single	58 (4.8)	4.8%
	Married	948 (77.8)	77.6%
	Separated/divorced/widowed	212 (17.4)	17.6%

	Complete case, Mean (95% CI)	Imputed Mean (95% CI)
Family related stress (N=1005)	6.12 (5.8, 6.5)	6.11 (5.7, 6.5)

Table A.5 Complete case frequencies and imputed percentages for data used in Chapter 6

Potential explanatory variable		Complete case, N (%)	Imputed % N=2452
From childhood			
Childhood serious illness resulting in hospital admissions (age 0-25) (N=2451)	No hospital admissions	1736 (70.8)	70.8
	At least one hospital admission	715 (29.2)	29.2
Childhood social class (N=2326)	Unskilled	122 (5.3)	5.3%
	Partly skilled	402 (17.3)	17.2%
	Skilled (manual)	708 (30.4)	30.5%
	Skilled (non-manual)	405 (17.4)	17.4%
	Intermediate	513 (22.1)	22.0%
	Professional	176 (7.6)	7.6%
		Complete case Mean (95% CI)	**Imputed Mean (95% CI)**
Self-organisation (N=2187)		3.4 (3.4-3.5)	3.4 (3.4-3.5)
From adulthood			
		Complete case, N (%)	**Imputed %**
Educational attainment (N=2319)	No qualifications	752 (32.4)	32.5%
	Lower secondary	653 (28.2)	28.1%
	Advanced secondary	641 (27.6)	27.8%
	Degree level	273 (11.8)	11.7%
Adult social class (N=2412)	Unskilled	87 (3.6)	3.6%
	Partly skilled	246 (10.2)	10.3%
	Skilled (manual)	381 (15.8)	15.9%
	Skilled (non-manual)	573 (23.8)	23.7%
	Intermediate	940 (39.0)	38.9%
	Professional	185 (7.7)	7.7%
		Complete case, Mean (95% CI)	**Imputed Mean (95% CI)**
Total number health conditions (N=2172)		1.6 (1.5-1.6)	1.6 (1.5-1.6)
		Complete case, N (%)	**Imputed %**
GP visits (N=2378)	No previously reported GP visits	926 (38.9)	39.1%
	Previously reported GP visits	1452 (61.1)	60.9%
Ever attended mammogram age 53 (N=1168)	Never	60 (5.1)	5.3%
	Yes	1108 (94.9)	94.7%

Smear attendance age 43 (N=1163)	Attended +5 years ago/never	131 (11.3)	11.3%
	Attended within last 5 years	1032 (88.7)	88.7%
Physical activity (N=2237)	Inactive	1083 (48.4)	48.9%
	Less active	547 (24.5)	24.3%
	Most active	607 (27.1)	26.8%
Smoking status (N=2239)	Never	670 (29.9)	29.5%
	Ex	1432 (64.0)	64.5%
	Current	137 (6.1)	6.0%
		Complete case Mean (95% CI)	**Imputed Mean (95% CI)**
Extraversion (N=2194)		7.8 (7.7-7.9)	7.8 (7.7-8.0)
Neuroticism (N=2192)		6.2 (6.0-6.4)	6.2 (6.0-6.3)
		Complete case, N (%)	**Imputed %**
Marital status (N=2336)	Single	91 (3.9)	4.0%
	Married	1755 (75.1)	75.0%
	Separated/divorced/widowed	490 (21.0)	21.0%

Table A.6 N (%) women reported each symptom each year of women who completed the questionnaire every year (N=1005)

	HFNS	Trouble sleeping	Vaginal dryness	Nervous/ Emotional symptoms	Urinary symptoms
1993	439 (44%)	578 (58%)	317 (32%)	609 (61%)	402 (40%)
1994	529 (53%)	609 (61%)	305 (30%)	685 (68%)	568 (57%)
1995	552 (55%)	642 (64%)	313 (31%)	686 (68%)	600 (60%)
1996	546 (54%)	655 (65%)	308 (31%)	651 (65%)	603 (60%)
1997	583 (58%)	696 (69%)	326 (32%)	660 (66%)	637 (63%)
1998	581 (58%)	720 (72%)	345 (34%)	650 (65%)	637 (63%)
1999	600 (60%)	729 (73%)	366 (36%)	618 (61%)	623 (62%)
2000	579 (58%)	707 (70%)	384 (38%)	623 (62%)	627 (63%)
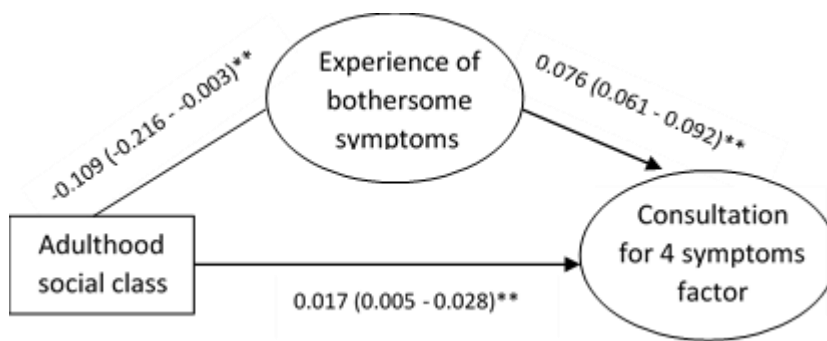
Figure A.1 Path diagram of direct and indirect associations between adulthood social class and factor of consultation
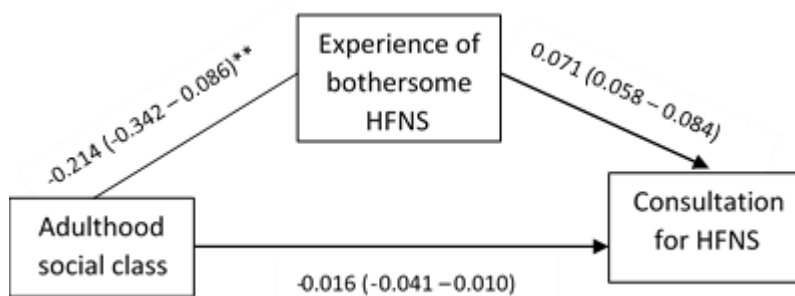
Figure A.2 Path diagram of direct and indirect associations between adulthood social class and consultation for HFNS
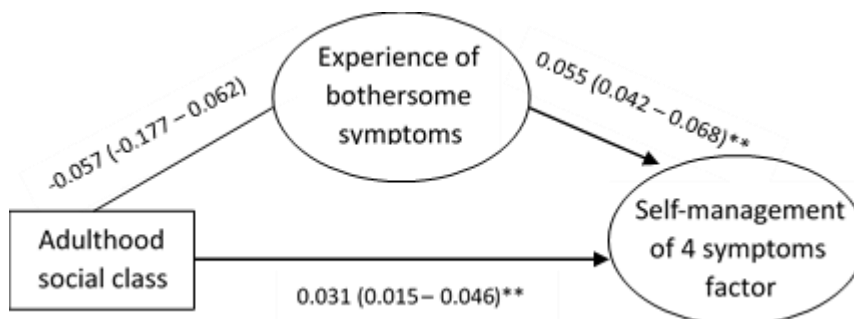
Figure A.3 Path diagram of direct and indirect associations between adulthood social class and factor of self-management
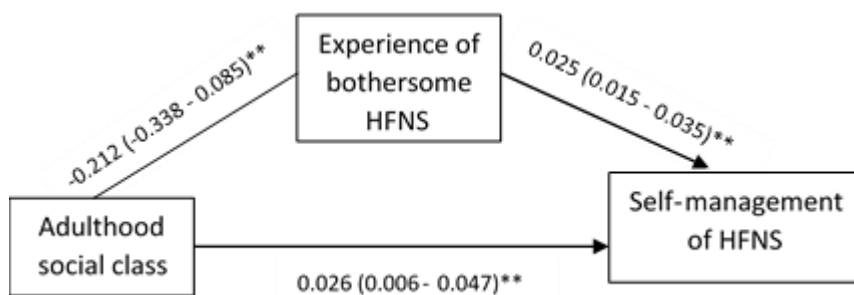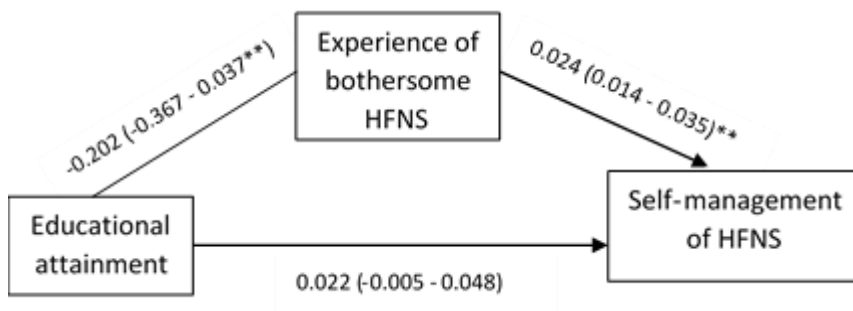

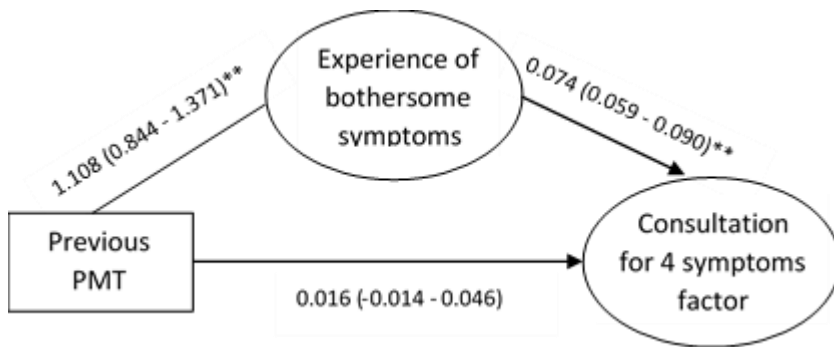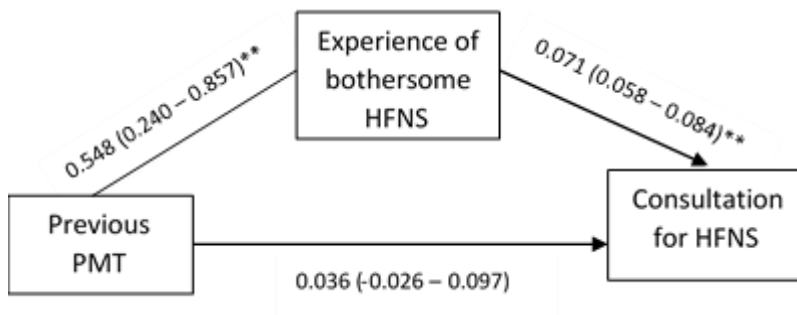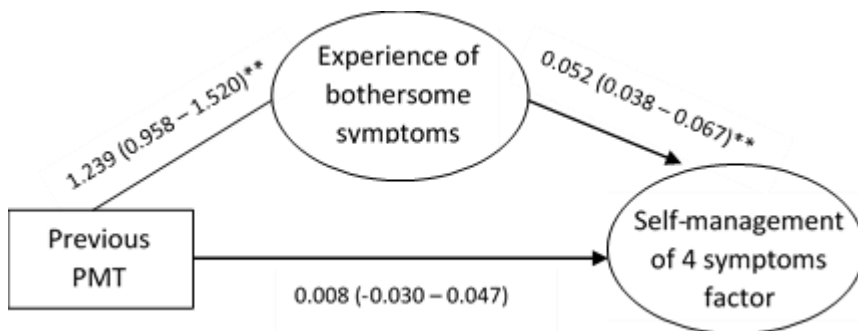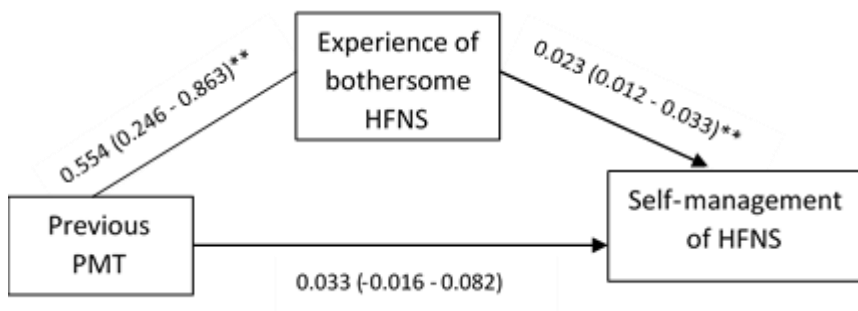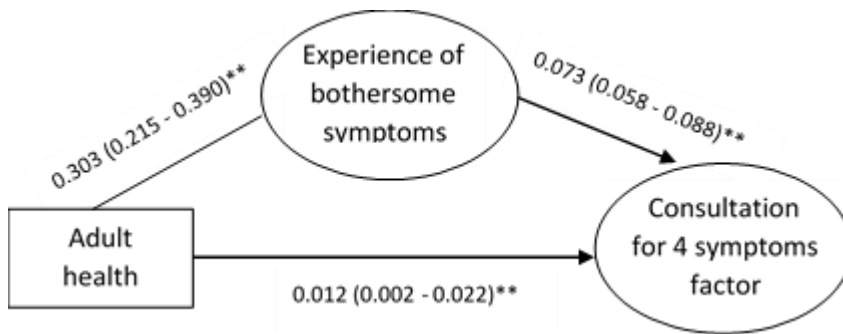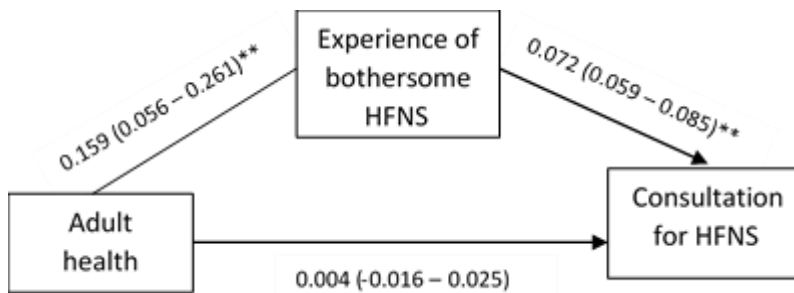*Figure A.4 Path diagram of direct and indirect associations between adulthood social class and self-management of HFNS*

Figure A.5 Path diagram of direct and indirect associations between educational attainment and factor of consultation
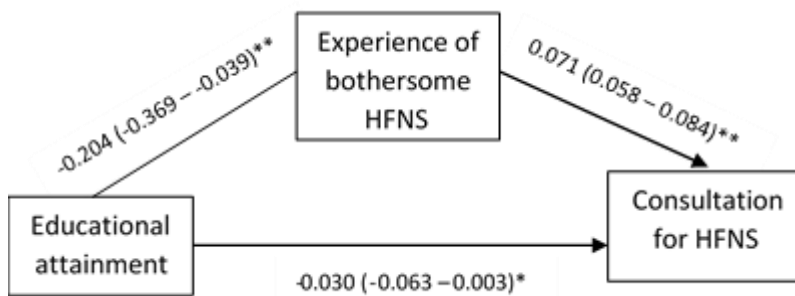
Figure A.6 Path diagram of direct and indirect associations between educational attainment and consultation for HFNS
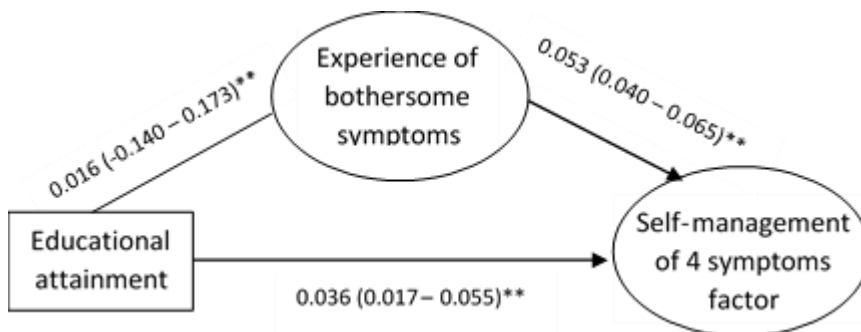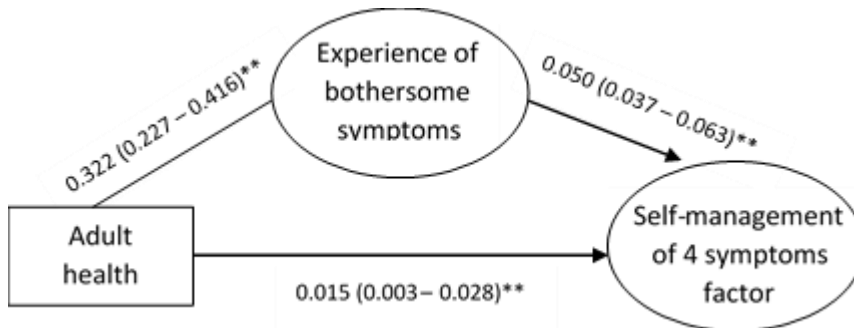

Figure A.7 Path diagram of direct and indirect associations between educational attainment and factor of self-management
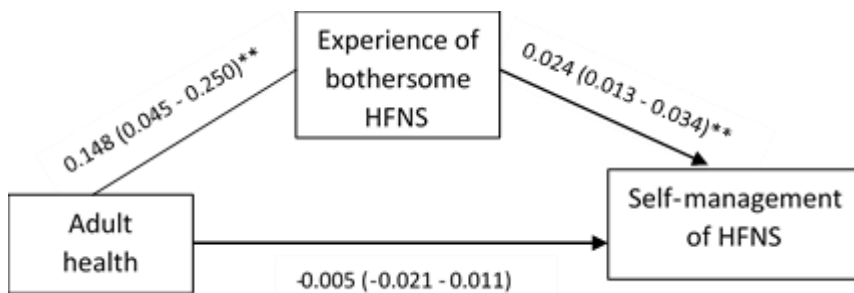

Figure A.8 Path diagram of direct and indirect associations between educational attainment and self-management of HFNS
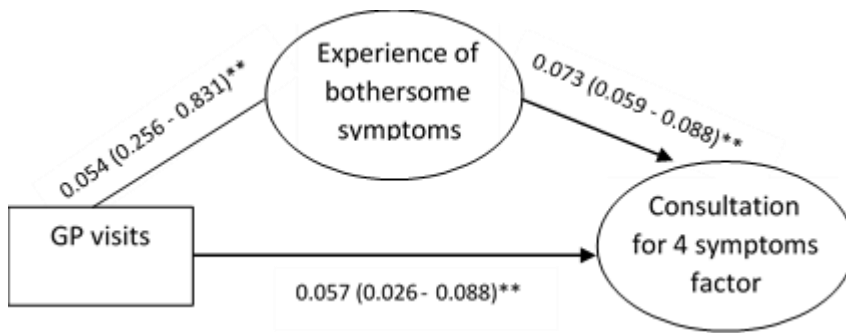
Figure A.9 Path diagram of direct and indirect associations between previous PMT and factor of consultation

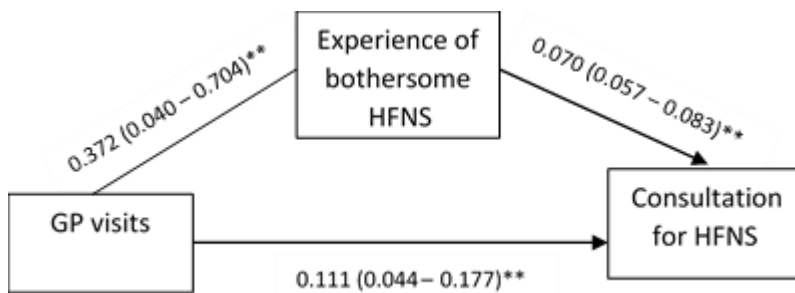*Figure A.10 Path diagram of direct and indirect associations between previous PMT and consultation for HFNS*

Figure A.11 Path diagram of direct and indirect associations between previous PMT and factor of self-management

Figure A.12 Path diagram of direct and indirect associations between previous PMT and self-management of HFNS

Figure A.13 Path diagram of direct and indirect associations between adult health and factor of consultation

Figure A.14 Path diagram of direct and indirect associations between adult health and consultation for HFNS

Figure A.15 Path diagram of direct and indirect associations between adult health and factor of self-management

Figure A.16 Path diagram of direct and indirect associations between adult health and self-management of HFNS

Figure A.17 Path diagram of direct and indirect associations between previous GP visits and factor of consultation

Figure A.18 Path diagram of direct and indirect associations between previous GP visits and consultation for HFNS
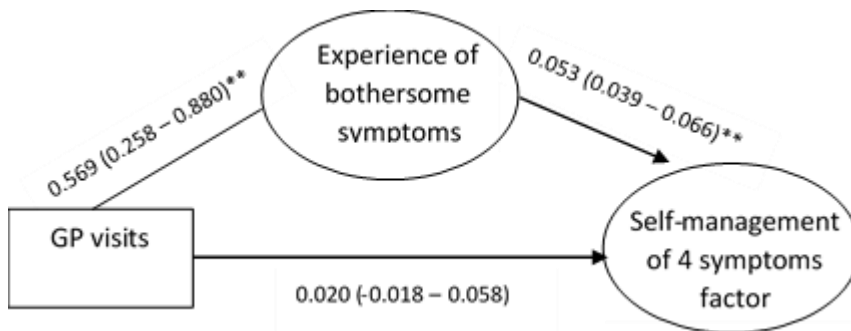

Figure A.19 Path diagram of direct and indirect associations between previous GP visits and factor of self-management
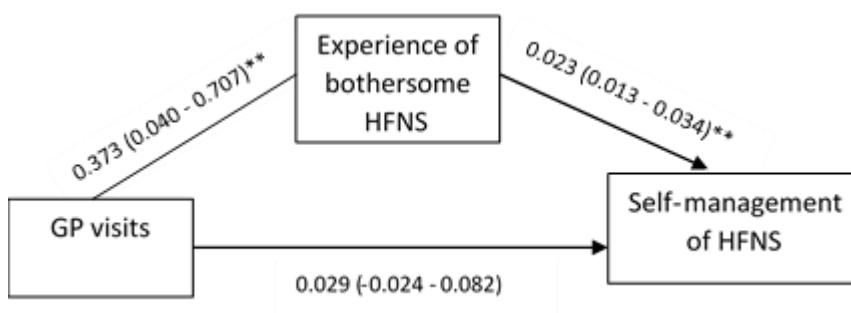

Figure A.20 Path diagram of direct and indirect associations between previous GP visits and self-management of HFNS
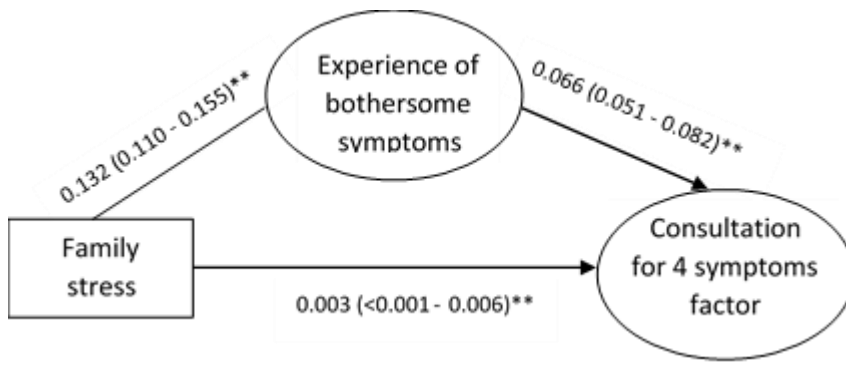
Figure A.21 Path diagram of direct and indirect associations between family related stress and factor of consultation
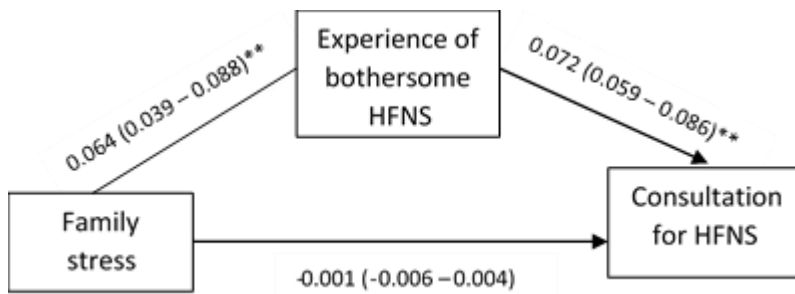

Figure A.22 Path diagram of direct and indirect associations between family related stress and consultation for HFNS
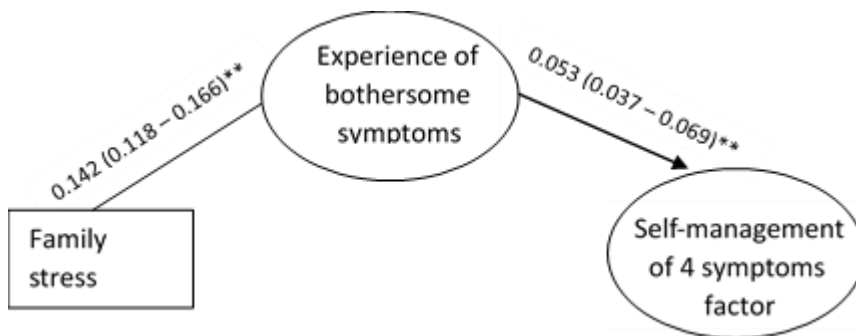

Figure A.23 Path diagram of direct and indirect associations between family related stress and factor of self-management
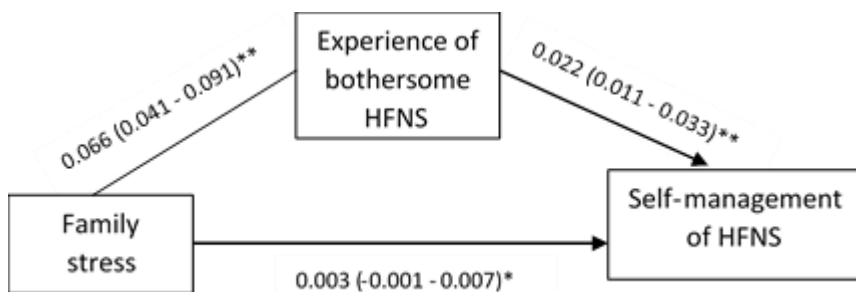

Figure A.24 Path diagram of direct and indirect associations between family related stress and self-management of HFNS
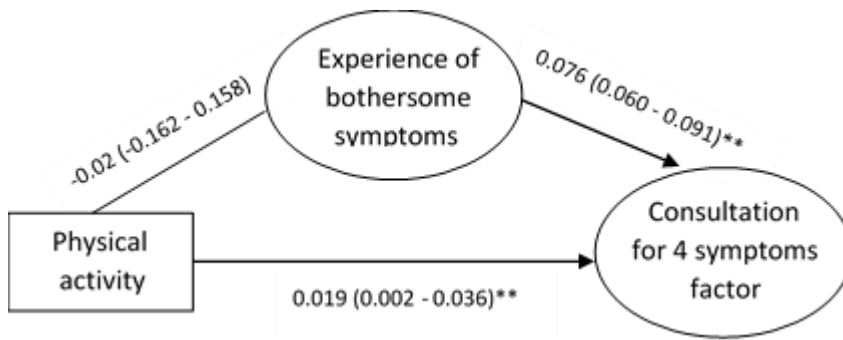
Figure A.25 Path diagram of direct and indirect associations between physical activity and factor of consultation
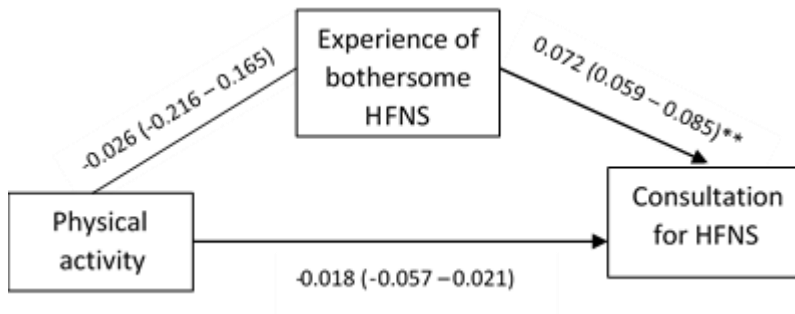

Figure A.26 Path diagram of direct and indirect associations between physical activity and consultation for HFNS
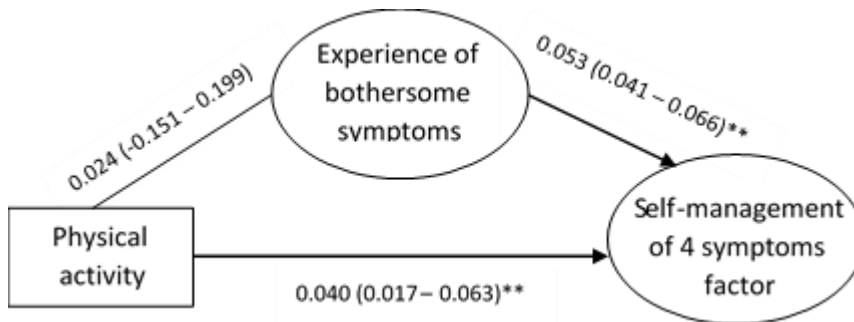

Figure A.27 Path diagram of direct and indirect associations between physical activity and factor of self-management
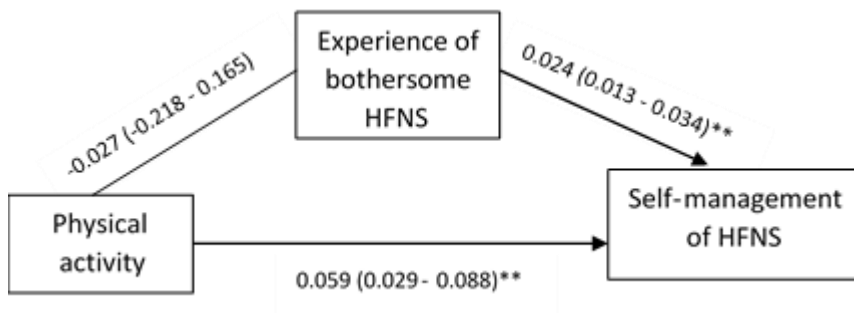
Figure A.28 Path diagram of direct and indirect associations between physical activity and self-management of HFNS

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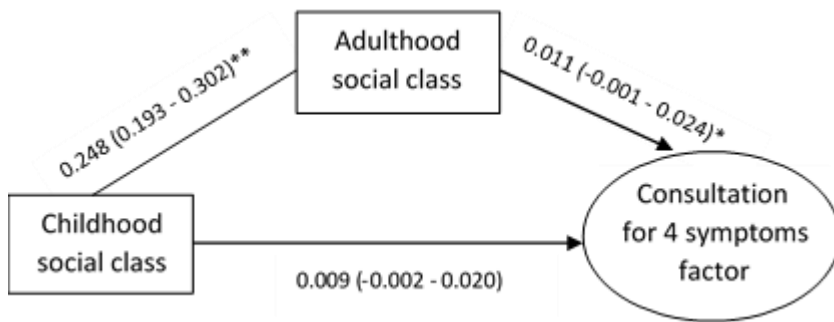
Figure A.29 Path diagram of direct and indirect associations between childhood social class and factor of consultation, via adulthood social class
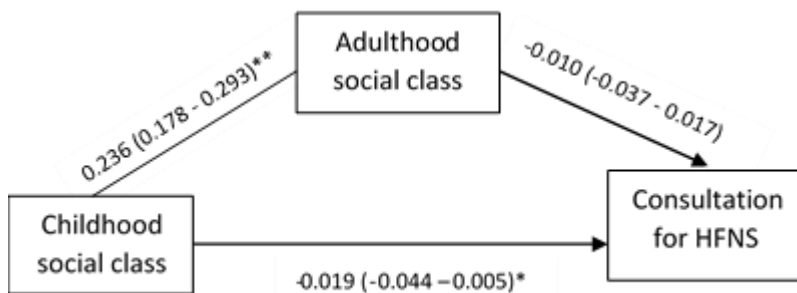
Figure A.30 Path diagram of direct and indirect associations between childhood social class and consultation for HFNS, via adulthood social class
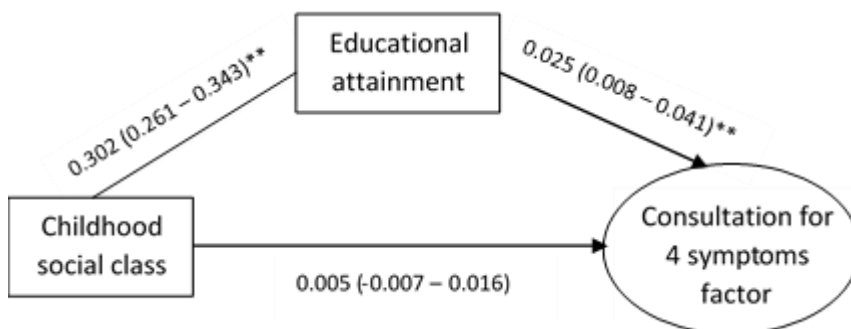
Figure A.31 Path diagram of direct and indirect associations between childhood social class and factor of consultation, via educational attainment
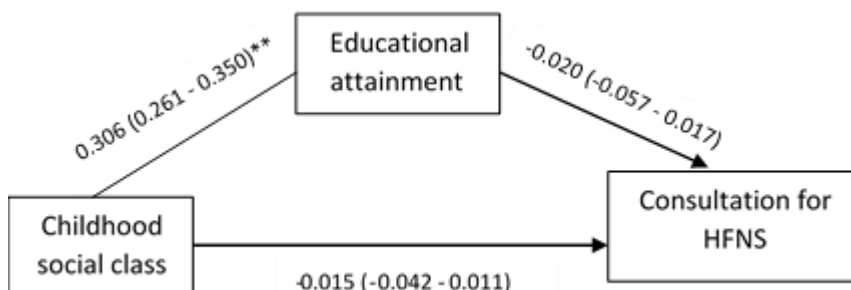
Figure A.32 Path diagram of direct and indirect associations between childhood social class and consultation for HFNS, via educational attainment

Figure A.33 Path diagram of direct and indirect associations between childhood social class and factor of consultation, via adult health
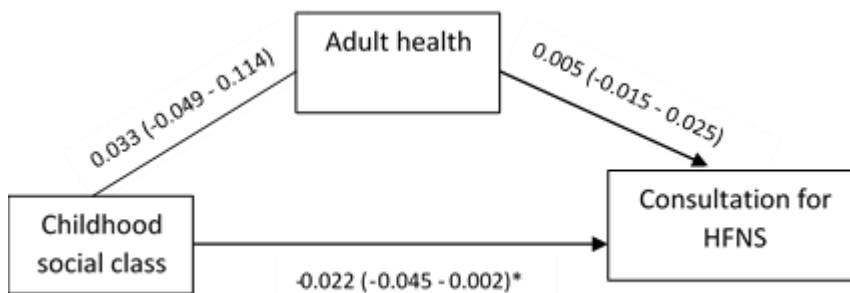
Figure A.34 Path diagram of direct and indirect associations between childhood social class and consultation for HFNS, via adult health

Table A.7 Results from likelihood ratio tests used to show interactions between explanatory variables and sex (complete case) at age 68 (Chapter 6)

Potential explanatory variable	Chi squared	P value
Childhood health	1.95	0.16
Childhood social class	19.27	0.02
Self-organisation	11.93	0.06
Education	11.48	0.04
Adult social class	14.16	0.12
Marital status	9.75	0.02
Adult health	19.83	0.23
GP visits	1.74	0.19
Extraversion	32.72	0.09
Neuroticism	30.35	0.14
Physical activity	3.25	0.35
Smoking	31.82	<0.00

Table A.8 Reasons given for not attending any checks stratified by social class (%s indicate % of study members within that class who gave that reason for not attending)

Reason for not attending	Study members' social class age 68	N (%)
I have no need to, I have no relevant health problems	Total	507 (20.7)
	Unskilled	20 (23.0)
	Partly skilled	57 (23.2)
	Skilled (manual)	94 (24.7)
	Skilled (non-manual)	108 (18.9)
	Intermediate	180 (19.2)
	Professional	36 (19.5)
	Missing	12
My GP never recommended it	Total	311 (12.7)
	Unskilled	9 (15.0)
	Partly skilled	36 (14.6)
	Skilled (manual)	42 (11.0)
	Skilled (non-manual)	75 (13.1)
	Intermediate	116 (12.3)
	Professional	27 (14.6)
	Missing	6
I had already had these checks earlier (before the period specified)	Total	239 (9.8)
	Unskilled	10 (11.5)
	Partly skilled	24 (9.8)
	Skilled (manual)	41 (10.8)
	Skilled (non-manual)	45 (7.9)
	Intermediate	93 (9.9)
	Professional	21 (11.4)
	Missing	5
I do not have time/didn't get around to it	Total	122 (5.0)
	Unskilled	3 (3.5)
	Partly skilled	9 (3.7)
	Skilled (manual)	18 (4.7)
	Skilled (non-manual)	24 (4.2)
	Intermediate	49 (5.2)
	Professional	18 (9.7)
	Missing	1
I've never thought about it	Total	96 (3.9)
	Unskilled	2 (2.3)
	Partly skilled	12 (4.9)
	Skilled (manual)	21 (5.5)
	Skilled (non-manual)	27 (4.7)
	Intermediate	28 (3.0)
	Professional	6 (3.2)
	Missing	0
I don't think it's important	Total	91 (3.7)
	Unskilled	2 (2.3)
	Partly skilled	8 (3.3)
	Skilled (manual)	17 (4.5)
	Skilled (non-manual)	19 (3.3)
	Intermediate	32 (3.4)
	Professional	11 (6.0)

	Missing	2
Financial reasons	Total	47 (1.9)
	Unskilled	5 (5.8)
	Partly skilled	9 (3.7)
	Skilled (manual)	7 (1.8)
	Skilled (non-manual)	5 (0.9)
	Intermediate	20 (2.1)
	Professional	0 (0.0)
	Missing	1

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