CARDIFF UNIVERSITY

Delaying parenthood: Choice or circumstance?

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I dedicate this thesis to the memories of

Arthur, Muriel and Gary Fitzpatrick

DECLARATION

This work has not previously been accepted in substance for any degree and is not concurrently submitted in candidature for any degree.

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Thesis Summary

People, especially women, are delaying having children until later ages. The average age of first birth in the UK is now 29.5, an increase of six years over the past four decades. This may be problematic not only due to the fact that fertility declines with age (with a marked decrease after age 35) but also due to the fact that older age is associated with more complications during pregnancy and delivery to both mother and baby. Previous research has shown that although people have awareness of fertility risks and issues in general they often underestimate the risks and may not apply them to themselves. The aim of the present thesis is to examine reasons why people may be delaying childbearing, whether they know about the risks associated with reduced fertility and how we can better educate people about these risks.

The present thesis demonstrates that there are a variety of reasons associated with why people delay childbearing with individuals wanting certain preconditions (e.g., having financial security, being in a stable relationship) in place before they begin trying to start a family which may result in them not achieving their childbearing goals by their ideal time. While overall knowledge of risks associated with reduced fertility is quite high in some populations, it is apparent that some individuals may not associate these risks with their own fertility and therefore not engage in fertility optimising behaviours such as seeking timely help or advice.

Results from the present thesis reveal that educating people about the risks associated with reduced fertility may be subject to discovering the optimal time to do so with regards to individual's age. Education too early may not have an effect due to the individual not being at a stage where they are thinking about their own fertility and so may not pay sufficient attention. Conversely, education at a later age may not have the desired effect as the individual may feel that it is too late to make the changes necessary. Overall, the present thesis underlines the need for increased education regarding risks associated with reduced fertility so that people can make informed choices about the decision to start childbearing and realise their childbearing goals.

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Chapter 1: General Introduction and thesis overview

Making informed choices about health and healthcare is now becoming commonplace with individuals increasingly bridging the knowledge gap between themselves and information regarding aspects of their health by way of public health campaigns and behaviour change interventions. These campaigns have shown success in such areas as skin cancer and HIV/AIDS (Health Development Agency, NHS, 2006) by increasing knowledge and raising awareness of risk. Due to these campaigns, individuals are now well-informed of health risks associated with certain behaviours. For example, that smoking is associated with increased risk of cancer (Health Development Agency, 2000).

While health campaigns have informed about risks associated with certain behaviours such as smoking when pregnant (e.g., Murin, Rafii & Bilello, 2011) or about reducing risky sexual behaviours (e.g., condom use; e.g., Wakefield, Loken & Hornik, 2010) there appears to be a lack of information informing and educating people about their future fertility. That is, there is a lack of readily available information informing people that certain behaviours may have an impact on their future ability to conceive and that it is important to take into consideration health behaviours in this context so that individual's may realise their future childbearing goals. Additionally, and perhaps most importantly with the rising age of first birth, individuals need to be well informed that fertility declines with age so that they may factor this into their plans.

In light of this, this thesis aimed to examine the reasons behind why people delay childbearing, whether people are aware of the risks associated with reduced fertility and if so, whether having knowledge of these risks will lead them to engage in fertility

optimising behaviours. Furthermore, it attempted to establish how we can better educate people about these risks in a way that they apply this information to themselves and whether there is an optimal window of opportunity in which to educate people about their fertility by endeavouring to understand the importance individuals place on other life goals in relation to their childbearing plans and the factors that underlie individuals not meeting their childbearing goals within their ideal timeframe.

Review of the delay literature (Chapter 2)

As with many population trends (e.g., increased life-span), reproductive trends have changed over the decades. People are starting childbearing later than ever (Office for National Statistics (ONS), 2010) which may be a reason that additionally, family sizes are decreasing due to people waiting until such a time that they are unable to realise their family size intentions (e.g., Goldstein, Lutz & Testa, 2003). The age of first marriage is also rising while the rate of marriages is falling (ONS, 2010).

There is much research that discusses the reasons behind the decision to have or not have children. With numerous studies across a variety of disciplines research in this area is complex in terms of the factors and outcomes examined. For example, demographic approaches to the study of childbearing focus mainly on background and socio-economic factors such as the impact of employment on starting families (e.g., Hank & Kreyenfeld, 2003). On the other hand, in sociological approaches the focus is given to the wider influences of the social context such as friends and family (e.g., Barber, 2001). Very few psychological studies appear to have investigated the factors associated with childbearing. Where there are studies, these tend to take a more individualised approach

and examine such influences as personal motivations or desire to have children (e.g., Miller, 1994).

With regards to the outcomes that the literature focuses on, many different outcomes are examined. For example, while some focus on the intention to have a child (e.g., Berrington, 2004) or the timing of childbearing (e.g., Hank & Kreyenfeld, 2003) others examine the motivation to have a child (e.g., Miller, 1994) or the intention of childlessness (e.g., Heaton, 1999). While the delay or postponement of childbearing appears as a theme in many studies there has not thus far appeared to be a definitive explanation of this as an actual childbearing outcome.

In light of this chapter 2 aimed to, by way of a systematic review of the childbearing literature, examine studies that actually employ delay or postponement as an outcome in order to investigate the factors or drivers behind the decision to delay childbearing. As previously mentioned there have been changes over the decades in reproductive trends. Therefore, chapter 2 also aimed to examine the impact the factors that influence delay may also have, in turn, on contemporary reproductive trends.

The impact of fertility knowledge on help-seeking (chapter 3)

While it is fully established that there are risks associated with older age at first birth (e.g., Dunson, Baird & Columbo, 2004) along with consensus that fertility declines with age in females from around the age of 30 with a steep decline after the age of 35 (Broekmans, Knauff, te Velde, Macklon & Fauser, 2007), it has not been fully established that all women are completely aware of the problems associated with older age. Studies thus far have informed us that while some are aware that age is a factor when considering

fertility, many people, in general, underestimate the average time it may take to get pregnant and the fact that this time increases with age (Bretherick, Fairbrother, Avila, Harbord & Robinson, 2010). Furthermore people may overestimate their chances of conceiving at an older age (Friese, Becker & Nachtigall, 2006) or have limited knowledge about the risks associated with older maternal age in reference to increased risks such as stillbirth and preterm births (Benzies, Tough, Tofflemire, Frick, Faber & Newburn-cook, 2006).

Along with older age, there are other lifestyle factors that impact on fertility (e.g., smoking more than 10 cigarettes per day, drinking more than 14 units of alcohol per week, being overweight) and while it has been shown that people do have awareness of these risks (Bunting & Boivin, 2008), results from studies investigating these factors suggest that while people may be aware they lack precision about the critical thresholds at which point negative impacts occur. Due to the fact that it may be that people do not attribute their lifestyle factors to any possible fertility problems, it is also necessary to examine whether people actually feel susceptible to fertility problems. The Health Belief Model (Rosenstock, 1990) states that perceived susceptibility is an important consideration when thinking about changing health-related behaviours and people may, therefore, not take action in changing lifestyle habits (e.g., smoking) if they do not feel this has an impact on their future fertility.

Therefore, the aim of chapter 3 was to firstly examine whether having higher fertility knowledge (regarding risks associated with reduced fertility) would be associated with a higher likelihood to engage in fertility optimising behaviours (i.e., seek medical or non medical help or advice or change lifestyle). The second aim of chapter 3 was to investigate whether those people who were deemed at risk of reduced fertility (e.g., being over the age of 34, smoking more than 10 cigarettes per day) would be more likely to

engage in fertility optimising behaviours when they also had high knowledge along with those who believed they were susceptible to fertility problems. By establishing the factors encouraging individuals to engage in these help-seeking behaviours it may be possible to identify whether having fertility knowledge aids in help-seeking regarding fertility and so, in turn, enable us to have a better understanding of the level of education needed to encourage fertility optimising behaviours.

Raising awareness of risks associated with fertility (Chapter 4)

Low numbers of people seeking medical care for infertility may suggest that people may have a lack of education regarding their own fertility (Boivin, Bunting, Collins & Nygren, 2007). While public health campaigns focus on addressing public knowledge of certain areas of health, such as giving up smoking or healthy eating (e.g., Wakefield, Loen & Hornik, 2010) there appears to be a distinct lack of campaigns targeting the issues that surround infertility with one of the only campaigns being produced by the American Society for Reproductive Medicine (ASRM) in 2010 when they endeavoured to raise awareness of risks associated with reduced fertility (e.g., obesity, older age).

While we already know that some people are aware that fertility declines with age (Tough, Tofflemire, Benzies, Fraser-Lee & Newburn-Cook, 2007) studies have shown that many young people intend to have a child after the age of 35 when fertility may be compromised (e.g., Lampic, Svanberg, Karlström & Tydén, 2006) suggesting that although people may be aware of the risk factors, they do not always apply them to themselves. In addition to older age there are other risk factors associated with reduced fertility such as lifestyle factors (e.g., smoking, drinking) that may be reduced or modified

suggesting that better education about these factors may lead to people deliberating more about their own fertility.

Research has revealed that the way information is presented to people may have an impact on how that information is received. For example, personalising health information so that it applies to specific individuals or groups has been shown to be an effective way of communicating risk information (Kreuter, Bull, Clark & Oswal, 1999) while it has been suggested that an individual will only change certain behaviours if they have appropriate knowledge of the health risks and benefits (Bandura, 2004). Therefore, a lack of knowledge or awareness of the risks associated with reduced fertility will provide no incentive for an individual to change their behaviours in relation to having the best chance of conceiving later on.

The aim of chapter 4, therefore, was to examine how best to present fertility risk information to raise awareness of these risks. By presenting information in different ways (i.e., personalised information regarding risks associated with reduced fertility versus non-personalised, general information) it may be possible to establish whether the way the information is presented has an effect on future behaviour by examining whether the information encourages any change in risky behaviours immediately following the study.

Delayed parenthood: Understanding age and preconditions (Chapter 5)

Although there is an array of information informing us that people are delaying childbearing until an age that their fertility may be compromised, there does not appear to be a consensus on how delay is actually defined. While some studies have discussed delay in more general terms of waiting until other preconditions have been met e.g., being

in a stable relationship (Bretherick, Fairbrother, Avila, Harbord & Robinson, 2010) or feeling financially prepared (Lampic et al., 2006) other discuss it in terms of specific ages, for example aged 30-39 (Berrington, 2004).

One main reason that people delay childbearing is that they wish to achieve other life goals first and there are different stages in an individual's life when these goals are more prominent. For example, finishing education or getting married. So, while an individual may have an ideal age at which to begin childbearing, achieving other life goals first may lead to a later than intended age of actually beginning childbearing.

For this reason it is imperative to attempt to gain a clearer understanding of when different preconditions are important to individuals and how they may impact on the decision to delay childbearing. This will help us understand the best way, and the best age at which, to educate individuals about their fertility so that along with their other life goals their childbearing goals may also be realised. Therefore, the aim of chapter 5 was to achieve a better understanding of delay by examining the importance of different preconditions to different age groups and how these preconditions may influence the decision on timing of childbearing and whether individuals had passed their ideal age to have their first child.

General discussion (Chapter 6)

The final chapter of this thesis will examine the overall findings of the studies along with implications.

Chapter 2: Systematic review of delay literature

Introduction

In contemporary society the decision whether or not to have children has become more of a personal choice rather than an instinctual compulsion or biological given. Over the years much has changed in reproductive trends and these transformations can be seen clearly when comparing contemporary society with society 30 or 40 years ago. In the past it would have been the norm to find a partner whilst in your early 20s, get married, have a first child within a couple of years, possibly followed by more children while today things can be seen to be being done differently. Age at first marriage along with age at first birth is rising (Office for National Statistics (ONS), 2010). Many people are choosing to forego marriage and instead cohabit (Reinhold, 2010), whilst the number of children people are having has declined during the past few decades (Goldstein, Lutz & Testa, 2003). In addition to this, readily available contraception means that people now have almost full control over whether and when to conceive (Abma & Martinez, 2006), while there are increasing numbers of people who are completely rejecting the choice to have children and instead choosing childlessness (Heaton, Jacobson & Holland, 1999).

In this chapter a systematic review of the literature concerning reproductive decision making, in particular why people choose to delay childbearing and have children later in life, will be carried out together with an examination of current reproductive trends (control of reproduction, whether people want children, the timing of childbirth and how many children people desire). This will help us to understand which factors are important in influencing an individual's decision to begin parenthood and further, to

investigate the impact of these factors on current reproductive trends. Along with this, the changes over the years in previously mentioned reproductive trends will be considered.

Reproductive trends (control of reproduction)

Effective contraception has made it possible for people to have far more control over their reproduction that ever before and this has implications for the changes in reproductive trends in many countries. According to the Office of National Statistics (ONS, 2006) approximately 75% of women aged between 16 and 49 use some form of contraception, while in 1960 this figure was less than 10% (Belfield, 2009). There is now a vast array of contraception available including barrier contraceptives (e.g., condoms), hormonal contraceptives (e.g., the pill) and contraceptive devices such as intrauterine devices that are placed in the womb. With the introduction of over-the-counter emergency contraception now widely available there is now considerable choice available to women (and couples) wishing to control their reproduction.

When examining control of reproduction, one must also consider abortion mainly due to the fact that this may also be considered a way in which individuals may choose to control their reproduction. Since the introduction of The Abortion Act in 1967 the number of abortions in England and Wales has risen dramatically (Table 2.1) with 23% of women under the age of 25 who had an abortion in 2007 having had one or more abortions in previous years (ONS, 2008).

Table 2.1

Abortion rates in England and Wales

	Abortion rates per 1000 females	
Age group	1970s	2000s
16-19	16.41	26.34
20-24	14.64	31.31
25-34	10.45	18.17
Over 35	5.86	6.65

Along with these widely recognised areas of contraception and family planning there are more recent developments in this area that will give people further options in controlling their fertility and reproductive decision making. In particular, the highly controversial use of oocyte cryopreservation is making it increasingly possible for women to choose to have their children at a later age. This particular technology has, up until now, been mainly used for women who due to illnesses such as cancer that may leave them infertile may wish to try and preserve their fertility. However, it is now thought that more women are freezing oocytes at an earlier age to be used at such time as they are ready to begin their reproductive career (Molloy, Hall, Ilbery, Irving & Harrison, 2009). In this process a patient will engage in an In vitro fertilization (IVF) cycle comprising of ovarian stimulation and oocyte retrieval. These oocytes are then cryopreserved without being fertilized and will be inseminated using intracytoplasmic sperm injection after thawing (Molloy et al., 2009). In addition to this, there is now growing evidence that testosterone-based contraceptives (male contraceptives) could soon be widely available (Matthiesson & McLachlon, 2006), with clinical trials underway and results suggesting that male contraceptives could be available within the next decade (kuehn, 2006).

Reproductive trends (Do people want children?)

The majority of people consider having children to be imperative. According to Lampic, Svanberg, Karlström, & Tydén (2006), parenthood is considered a life priority among 95% of individuals, demonstrating that having children is still considered to be an extremely important part of life by most people. This was illustrated by Lampic et al.(2006) who discovered that in a study of postgraduate students consisting of 141 women (mean age = 24.4) and 116 men (mean age = 23.8), 91% and 90% respectively expressed a wish to have children at some point in the future. In a study on intentions to have children in childless men and women (Berrington, 2004) it was discovered that in the age group 18-24, less than 7% stated that they intended to remain childless rising to 17% in the 25-29 age group. Even though this figure rises quite considerably in the 30-34 age group and the 35-39 age group (37.5 & and 81.3% respectively) it is still seen that one in five women in their late 30s intend to have a child, while one in ten intend to have two or more (Berrington, 2004). This finding is mirrored by other studies which observe similar findings (e.g., Miettinen & Paajanen, 2005; Tough, Tofflemire, Benzies, Fraser-Lee & Cook, 2007).

However, an ever-increasing body of literature is informing us that more and more people are choosing to remain childfree (also known as voluntary childlessness). According to the Office of National Statistics (ONS, 2006) this trend of remaining childless by choice has doubled over the past few decades with the figures standing at 1 in 10 women in their 40s being childless in the mid 1940s whereas in 2005 this number had risen to 1 in 5.

Although the evidence concerning voluntary childlessness contradicts the earlier evidence that the majority of people desire children at some point, it could be explained by the fact that in the studies investigating whether people want children the population questioned are aged, on average, between 22 and 25. This could mean that although at this younger age they may have a desire for children, these desires may not actually be realised later on. It has been shown that childless individuals tend to be more highly educated, are employed in more professional roles and have higher incomes than parents (Koropeckyj-Cox & Call, 2007). These factors may all influence why people who previously desired children at an earlier age later decide not to proceed with their reproductive intentions due to other life events becoming more of a priority. It may also be that by waiting until later in life, until such a time that career and financial careers are realised, women find that they are no longer able to have children due to their age.

Reproductive trends (The timing of children)

Data from the ONS (ONS, 2011) reveals that the average age of first time mothers in the United Kingdom has risen from 23.6 in 1971 to 29.5 in 2010, the highest age on record. This trend is not just limited to the United Kingdom, in many countries in Europe the average has also risen to between 29 and 30 years of age (Eurostat yearbook, 2009).

Increasing age at first birth is a concern as it may result in health implications during pregnancy, delivery and to the neonate. Female fertility declines with age (Homan, Davies & Norman, 2007), with the decline starting when a woman is in her late 20s and rapidly declining after 35 (Dunson, Colombo & Baird, 2002). More women are delaying having children until their late 20s and early 30s (Baird, Collins, Egozcue et al., 2005)

while according to Bewley, Davies and Braude (2005) there is an ever-increasing trend of women over the age of 35 attempting to conceive. Examples of the increase in the age at first pregnancy can be seen in studies by Sobotka (2006) who found that in Sweden the average age of motherhood rose from 24 in the early 1970s to an average age of 29 in 2005 and Shaw & Giles (2007) who reported that in the U.K. in 2004 the average age of first birth rose to over 27 years, while in Canada during 2003 it was reported that nearly 50% of women giving birth were aged 30 or over (Benzies, Tough, Tofflemire, Frick, Faber & Newburn-Cook, 2006). This is problematic due to the fact that, as mentioned previously, fertility declines with age. This decline is due, in part, to the decrease of ovarian follicle numbers and a decrease in quality of oocyte, which leads to the decrease in fecundity (a measure of the ability to produce offspring) and the eventual onset of menopause (Broekmans, Knauff, te Velde, Macklon & Fauser, 2006).

Figure 2.1 shows a sharp decline in fecundity after the age of 30 (Broekmans, Knauff, te Velde, Macklon & Fauser, 2007) and from this it is possible to see that postponing childbirth can severely affect chances of conception and may eventually lead to higher incidences of involuntary childlessness. It has been shown that when trying to conceive a woman of 35 will take, on average, twice as long as a woman of 25 (Breart, 1997) while according to Baird et al. (2005) when attempting to conceive naturally the percentage of women obtaining a live birth within a year goes down from 75% at age 30 to 66% at age 35 and to 44% at age 40. These percentages highlight the importance of female age and its effect on reproductive ability.

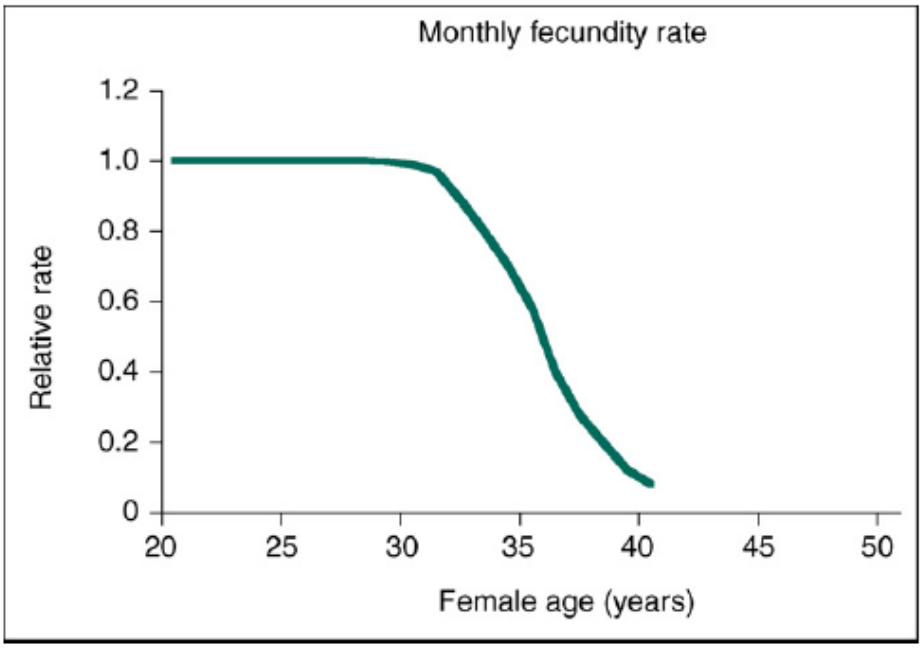

Figure 2.1. Decrease in monthly fecundity rate according to age in females (Broekmans, Knauff, te Velde, Macklon & Fauser, 2007).

However, when determining the ability to conceive it is not only female age that is of importance; male age can also affect fertility. In a review of the literature, Kidd, Eskenazi and Wyrobek (2001) discovered that after 50 years of age there can be some risks of diminished semen quality and fertility. According to Sloter, Schmid, Marchetti, Eskenazi, Nath and Wyrobek (2006) the decline in male fertility is partly explained by the fact that men produce fewer motile sperm as they age. Although it may seem obvious that male fertility would start to decline after age 50, Dunson et al. (2002) found that a decrease in male fertility may actually begin in late 30s. This is especially important considering, as stated previously, many women are now delaying parenting (Liefbroer, 2005; Benzies et al., 2006). Evidence for the delay in male fertility can be seen in a study conducted by Hassan and Killick (2003) in which the effect of male age on time to pregnancy (TTP) was investigated. By examining TTP, contraceptive use, planning of

pregnancy and previous pregnancies, age and life-style, Hassan and Killick discovered that, as would be expected for women's age, increasing male age was linked to a significant rise in TTP (Hassan & Killick, 2003) with men over 45 years old 12.5 times more likely to have TTP of more than two years compared to men of under 25 years old. Recently, in a prospective study of over 30,000 children in the U.S. at ages eight months, four years and seven years, advanced paternal age was found in some cases to be significantly linked to poorer scores on neurocognitive function tests such as Bayley Scales for Infant Development, Stanford Binet Intelligence Scale and Wechsler Intelligence Scale for Performance (Saha, Barnett, Foldi, Burne, Eyles, Buka & McGrath, 2009).

In addition to a rising age at first birth the age at first marriage has also increased over time. The age of first marriage in England and Wales has risen from 27.5 years old in men and 25.5 in women in 1991 to 30.7 and 28.5 respectively in 2008 (Office for National Statistics, Social Trends, 2008). Meanwhile, according to the European Commission, the mean age of people in the EU getting married for the first time rose, on average, by 2 years from 1991 to 2002 (Eurostat yearbook, 2004). Not only has the age at first marriage risen but in addition to this the rate of marriages is falling which may also be contributing to a change in decision making concerning childbearing. In the United Kingdom marriage rates have dropped at a steady rate since the 1970s with nearly 197,000 fewer marriages in 2005 than in 1972. Rates in the EU have dropped from 8 marriages per one thousand inhabitants in 1970 to only 5 per thousand in 2002. In addition to this, rates of cohabiting are on the rise with 24% of unmarried men and 25 % of unmarried women cohabiting in the U.K. in 2006. This figure is double to that in 1986 (11% and 13% respectively), which is the first year that this sort of data was available

consistently (Office for National Statistics, Social trends 38, 2008). Due to the ever-increasing trend of cohabiting, births outside marriages have increased from 10% in the 1970s to over 40% in the 2000s (ONS, 2008).

Reproductive trends (family size)

In addition to an older age of parents at first birth, there is also a recent trend of smaller family sizes. Total Fertility Rate (TFR) has dropped in England and Wales from 2.4 in 1971 (ONS, 2008) to 1.96 in 2008 (ONS, 2008). The TFR is the average number of births a woman would achieve in her lifetime if she were to live through her reproductive years of 14 to 49 (Bongaarts & Feeney, 1998). This trend is mirrored throughout Europe where the average total fertility rate is 1.7 (Eurostat yearbook, 2004).

The replacement level of fertility (i.e., the fertility rate necessary to sustain world population at current level) in developed countries is thought to be, at present, just above 2 births per female which is commonly taken as 2.1 (Morgan & Taylor, 2006). However, in many countries this has dropped below replacement level with the rate in many European countries (Figure 2.2) estimated to have fallen below 1.5 (World Health Organisation, 2006). The U.K. alone has dropped from 2.4 in 1971 (ONS, 2008) to 1.96 in 2008. This trend may be accounted for if people are delaying childbearing until a later age, as their childbearing desires for a larger family size may not be realised.

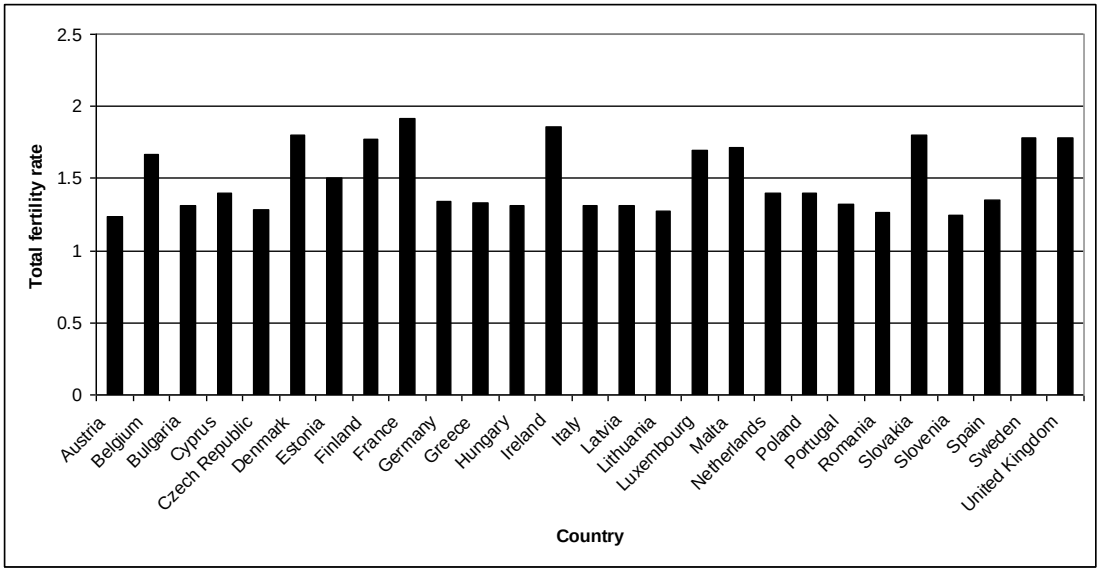

Figure 2.2. Total fertility rates in EU countries (2007).

Fertility Theories

Traditionally, childbearing has thus far been mainly investigated from a demographic view and not from a psychological viewpoint. However, there are several theories examining decision-making, motivations and intentions that may account for why people delay childbearing.

Diffusion of innovations theory explains how and why a new idea or concept (innovation) may spread through populations or cultures. The theory states that if a new idea is adopted by a few people, then this will spread through other people over time who may also wish to adopt the new practice until nearly all of the people who may wish to adopt the new practice have done so (diffusion) (Rogers, 2004). How individuals make decisions according to this model is explained by Rogers (2004) as consisting of five stages; Knowledge (exposure to the new innovation), persuasion (forming either a favourable or unfavourable attitude towards the innovation), decision (engage in activities

that will lead to a choice of adopting or rejecting the innovation), implementation (putting the innovation to use) and confirmation (seeking reinforcement) (Rogers, 2004). This theory may help explain the rising rate in delaying childbearing that is being seen today. Berwick (2003) suggests that there are three things that influence the rate at which an innovation spreads. The first influence is perception of the innovation, for example delay. If the innovation that is delaying childbearing is perceived as more beneficial to an individual than having children may be (e.g., more freedom, more time for career prospects and so forth) the individual will be more likely to adopt it. Secondly, the characteristics of the individual will influence the rate. For example, individuals who wish to pursue demanding careers or those who wish to continue their education may choose to delay childbearing as this will enable them to concentrate fully on their ambitions as they may regard having children as a barrier to these goals. The final influence is thought to be contextual factors. Individuals may regard themselves as not being in a supportive social network or not having family close-by which, in turn, may lead some to consider that waiting until a later time to have children may be a better option for them.

The theory of planned behaviour (TPB) (Ajzen, 1991) argues that a person's intention to perform a certain act is determined mainly by their attitude towards the act along with subjective norms and behavioural control. Subjective norms refer to a person's beliefs of whether other people believe that the individual should engage in the behaviour, while behavioural control relates to the individual's perceived ability to perform the behaviour. Therefore if a person has a positive attitude towards starting a family sooner, has people around them that would support and encourage them to start a family and they believe that they are in a position to be able to cope with starting a family, they are more

likely to start trying for a family. However, if a person has a more negative attitude towards childbearing, is surrounded by people who do not believe they should start trying for a family yet or are not in a position, e.g., financially, where they feel they could cope with starting a family then they may be more likely to delay or even decide against childbearing altogether.

In an extension of TPB, Barber (2001) considered the connection between childbearing and the individual's attitude towards competing behaviours, proposing that childbearing behaviour is affected by attitudes towards childbearing and the competing behaviours of career, education and consumer spending (Barber, 2001). Thus explaining that positive attitudes towards childbearing increase the likelihood of childbearing behaviour while positive attitudes towards career, education and spending (i.e., competing behaviours) are likely to reduce childbearing behaviour. This is explained by the fact that the choices people make are limited by the restricted nature of time and resources people have to achieve all they want to achieve. According to Barber (2001) the influence of role conflict plays a big part in explaining how childbearing behaviour is influenced not just by actually participating in behaviours such as education or career but even just having positive attitudes to these activities. For example, having a career would mean spending a large part of every day in work while having a child would require spending time at home with your child resulting in a conflict of roles. In addition cognitive dissonance can occur when an individual has positive attitudes to both childbearing and, for example, a career. When this occurs the individual may start to take on a less positive attitude towards childbearing thus becoming more focused on career i.e., working towards cognitive consistency (Barber, 2001). This may explain why people may delay or even forego

childbearing in favour of other pathways in life such as further education and a demanding career.

A further explanation of why women may choose to delay childbearing (or even forego it all together) has been suggested by Hakim (2003). Preference theory predicts and explains how women make reproductive choices by proposing that women can be categorised into three key groups. These groups comprise of those who favour a family life, often with many children and less emphasis on paid employment (home-centered), those whose main priority is employment and who may voluntarily remain childless (work-centered) and finally women who combine children along with paid employment (adaptive). Whilst both home-centered and work-centered women are both predicted to account for approximately 20% of women, adaptive women are thought to make up the remaining 60%. Preference theory suggests that these choices of different lifestyles have been brought about mainly due to historic changes in society which include widely available contraception, equal opportunities in the workplace, the growth of white-collar occupations, more opportunities for secondary earners and the fact that individual choices are now more driven by personal preferences and values (Hakim, 2003). Preference theory was tested using survey-based data and face-to-face interviews with randomly chosen men and women (n = 2900) aged 16 and over in Britain. Questions included those relating to lifestyle preferences, ideal family models and work orientations. Analysis of the data revealed that the figures were in line with preference theory in that among women of working age 14% were characterised into home-centered, 16% into work-centered and 70% into adaptive (Hakim, 2003). This theory may help to explain the rise in delayed childbearing over the years as discussed earlier. As there are more and more opportunities for women to undertake further education and concentrate on careers before

marriage and childbearing, hence falling into the category of work-centered rather than the more traditional home-centered role, the age at first marriage and first birth may continue to rise while birth rates may continue to decline.

As a result of much of the literature on childbearing being from a demographic perspective, the majority of the literature is mainly empirical revealing a need to examine delay from a psychological viewpoint

The present study

The aim of the present study was to determine the drivers that underlie why people may delay childbearing. That is, how individuals are influenced by different drivers to make the decision to start a family later in life. This was achieved by way of a systematic literature review. A systematic review aims to identify, appraise, select and synthesize all research evidence relevant to the research question (Higgins & Green, 2011). Therefore the present study aimed to carry out a full search of relevant databases in order to investigate the most common factors associated with the delay of childbearing by examining studies that specifically investigated the association between drivers and the outcome of delaying or postponing childbearing. From the identified studies relevant to the present study all drivers associated with the outcome of delay of childbearing were examined in order to gain a clearer picture of what makes individuals delay childbearing.

Materials and methods

Literature search strategy

A systematic literature search was conducted in order to identify studies investigating reproductive decision making. Twelve electronic databases were searched: Medline, Medline in Process, all Evidence Based Medicine Reviews (EBM) (which included Cochrane Database of Systematic reviews, CENTRAL, Database of Abstracts of Reviews of Effectiveness (DARE), ACP), Psychinfo, Applied Social Sciences Index and Abstracts (ASSIA), British Humanities Index, Sociological abstracts, Social Services Abstracts, Health management Information Centre (HMIC), System for Information on Grey Literature in Europe Archive (OpenSIGLE), Psych Articles and Studies in women and gender abstracts. In all databases, with the exception of HMIC and Open SIGLE, exclusion criteria were applied that limited the searches to articles published since 1990 and those which were human studies but included all languages, all countries and all publication types.

The initial search strategy was developed with assistance from SURE (Search Unit for Research Evidence, Cardiff University), who specialise in Cochrane and NICE systematic reviews. Search terms were selected (Appendix A) and expanded in line with SURE approaches to systematic reviews. This initial strategy was then tested extensively on Medline (Appendix B). The strategy consisted of a variety of search terms, keywords and MeSH vocabulary which were then adapted so they could be applied to each of the other databases (all search strategies along with modifications for each database in appendix B). All results were downloaded to Reference Manager (Version 12, Thomson Reuters, 2008) and duplications eliminated.

Selection criteria

Papers were excluded from the final selection if they investigated or were pertaining to teenage pregnancy, non-human animal studies concerning reproduction, abortion, reproductive decision making after illness or use of specialist fertility treatments (e.g., after receiving cancer treatment, HIV, pre-implantation diagnosis) (see Appendix C for initial exclusion numbers). Papers were included in the present review if they examined an association between drivers (e.g., education, relationship) and the outcome of delay or postponement of childbearing. When examining abstracts and full-texts, the studies to be included had to have specified that delay or postponement of childbearing was one of the outcomes investigated. Those papers examining timing of childbearing without examining effects of drivers on delaying or postponing childbearing were excluded from the present review.

Data Extraction

Data extraction was performed by two reviewers (Harrison & Kalebic) using a standardised protocol. The thirty item critical appraisal and data extraction form was developed in accordance with the Cochrane Handbook for Systematic Reviews (Weightman et al., 2005; Weightman, Urquhartt, Spinkt & Thomas 2008)(see Appendix D for an example of a completed data extraction and critical appraisal form). The data extracted consisted of: (1) characteristics of each study (e.g., aims, outcomes, predictors, population studied, design); (2) results obtained (e.g., type of analysis employed, direction of effect and significance level), and (3) quality of the study (e.g., methods used, bias, and quality of results and generalisability of results). Two reviewers independently

extracted the data from the included studies and cross-referenced their extractions in order to analyse agreement. Agreement for each study was examined according to the three aspects of the data extraction and critical appraisal forms (i.e., study characteristics, results and critical appraisal). Agreement was coded as a yes or a no response to each of the three sections and then the numbers of yes answers were converted into percentages to examine the overall agreement. Cohen's Kappa analysis revealed that agreement levels were high for each of the three categories with study characteristics yielding agreement of 97%, results yielding 98% agreement and critical appraisal yielding 94%.

Results

Overview

Results are presented in four sections. Section I shows the study selection. Section II shows the conceptualisation of delay in each study, section III shows drivers of childbearing delay and section IV presents a synthesis of the results.

Section I: Study selection

Figure 2.3 shows the decision tree for papers captured from the systematic review. A total of 17, 475 papers were extracted from the review, of which 4,495 were duplicates. Of the remaining papers (N=12,980), 5,506 were removed due to investigating unrelated topics (e.g., fertile soil, animal breeding, BT communication networks for families).

The final database of relevant articles contained 6253 hits. Of these, 5409 were excluded because they did not meet the inclusion/exclusion or were deemed relevant but

not high priority (i.e., relevant to certain aspects of reproductive decision making such as decision making after illness but not relevant to the current project examining delay/postponement of childbearing). The remaining 844 papers met search terms, appeared to be high priority for the topic and were used to generate the database of potential papers for inclusion. Each of the 844 abstracts was examined fully to check relevance and those deemed not relevant to the current project were omitted, leaving a final number of 416. These abstracts were then analysed further with additional exclusion criteria that included qualitative data (unless alongside quantitative data), theoretical papers, retrospective studies (that did not include comparison groups), papers that concentrated on family size, birth spacing and desire for more children. Papers were also excluded if they did not examine an actual relationship between drivers and the outcome of delay or postponement producing a total of 142 (see Appendix E for a full list of inclusion and exclusion criteria). All articles that were available (n = 113)were then read in full in order to examine them for information on drivers or factors that may influence delay or postponement of childbearing and exclude any further papers that did not fully meet the inclusion criteria. A total of 105 papers were excluded through examination of the full texts, leaving a total of five papers.

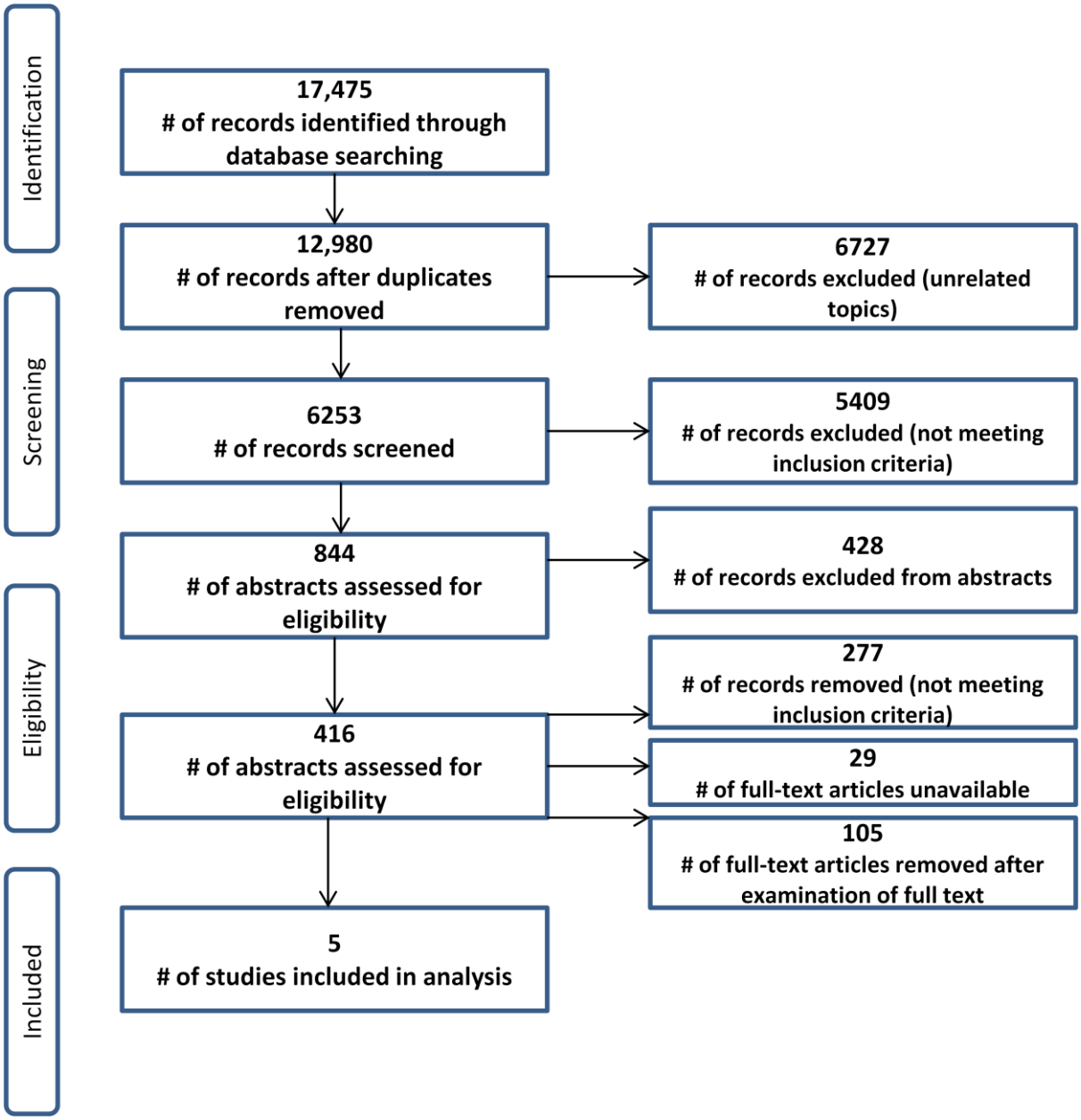

Figure 2.3. Study flow diagram.

Section II: Conceptualisation of delay

Four of the studies in the present review were longitudinal, while one was cross-sectional. Table 2.3 shows how each paper conceptualised delay. The one cross-sectional study (Miettinen & Paajanen, 2005) examined hesitation towards childbearing by investigating how pragmatic factors (e.g., enrolment in education, economic security, employment) and education and values (e.g., education level, importance of material well-being) related to childbearing hesitation among 724 childless young adults (aged 18-34 years old). Participants were grouped into those who planned to have children in the future but were not currently trying to get pregnant, those who were less certain about future childbearing and those who were more certain and had no plans for future childbearing. Those who had no future plans and those who were uncertain were grouped together while it was expected that those who held positive childbearing intentions were currently postponing childbearing. To examine hesitation (postponement) the authors investigated factors associated with postponement previously revealed by previous fertility literature to have an impact, namely partnership, education, economic security and differences in value orientation. The study did not propose an age at which individuals were considered to be postponers, rather age was treated as a control variable and grouped into three age categories to control for stage of life which were 18-24, 25-29 and 30-34. Logistic regression was employed to investigate the effect of factors on intention to have a child. As the study was cross-sectional it was not possible to ascertain whether the respondents in the study went on to have a child. The study did, however, sample a wide range of individuals as it used a random sample, mailed questionnaire.

The first of the four longitudinal studies (Barber, 2001) examined, among other hypotheses, whether individuals with positive attitudes towards education, careers and

consumer spending would be more likely to delay childbearing. The study examined 833 mother-child pairs over a 31 year period by interviewing the focal children at ages 18, 23 and 31. The sample was drawn from 1961 birth records and included white married women who had recently given birth. The study employed event history techniques to estimate the relationship between attitudes and the timing of first birth. Attitudes towards childbearing were measured by rating activities such as taking care of little children and talking with little children (10-point scale from dislike a great deal to enjoy a great deal). Respondents were also asked to rate whether children cause worry or strain (4-point scale from none at all to a great deal). Attitudes towards competing alternatives were measured with multiple questions about attitudes that compete with childbearing and preferences for different combinations of work and childbearing. Again, the study did not propose an age at which individuals were considered to be delayers, but rather investigated which factors were associated with influencing later first birth. The study used a large national sample, but excluded never married respondents and did not consider gender differences.

Berrington (2004) investigated the characteristics of older childless women who intended to have a birth. Although the study also examined fertility intentions and how they differed by age, parity and gender along with couple's conflicting intentions and persistence of fertility intentions the present review was concerned with delay or postponement of childbearing so only results relevant to delay were examined. Respondents were 151 childless women (aged 30-39) who were surveyed at two time points 1992 and 1998 (six year follow up). Berrington (2002) referred to 'perpetual postponers' as those who want to have a child in the future but may end up reaching the end of their reproductive years childless due to constant postponing. Multivariate logistic regressions (odd ratios) were performed on the data. Intentions were measured by asking

'do you think you will have any (more) children' (yes/no/do not know). Births were measured by retrospective fertility histories in the 6 year follow up. Although no exact age is given in reference to at what age a woman would be classed as delaying childbearing, women in their thirties were characterised as older women. Although the sample size for older childless women was small, the British household Panel Study (BHPS) from where the data was drawn samples around 5000 households so the data came from a national sample.

Heaton, Jacobson & Holland (1999) examined changes in intended childlessness and postponement of childbearing. Respondents were 1172 women and men (aged 19-39) who were all childless at wave I (1988). Respondents were followed up 6 years later in 1994. The study examined the reasons for having children, importance of non-family lifestyle, having time and energy for a career and having time and energy for leisure and social activities. Multinominal regression was employed. Intentions to have a child were examined at both waves. Respondents were categorised into four groups; (1) postponers (those who intended to have a child at wave I, did not have a child at wave II but still intended) (2) switch to childless (intended to have a child at wave I but no longer intended at wave II), (3) consistently childless (did not intend at wave I and did not intend at wave II) and (3) switch to parents/wanting a child (did not intend at wave I and were parents or intended to have a child at wave II). The study did not give an age range for postponers but categorised them according to their childbearing intentions at waves I and II. Postponers accounted for 45% of the sample. The study examined a large sample taken from the NSFH (National surveys of families and households).

Finally, Testa and Toulemon (2006) distinguished between voluntary and involuntary postponers. Respondents were 363 fertile and childless men and women

(aged 20-45). Respondents were interviewed at three time points; 1998, 2001 and 2003 (five year follow up). Voluntary postponers were those who wanted a child in more than five years at initial survey (1998), did not have one during 1998-2003 and still wanted to have a child at the end of the follow-up period. Involuntary postponers were respondents who wanted a child within five years in 1998, did not have one during 1998-2003 and still wanted to have a child in 2003. Logistical regressions were employed. Fertility preferences were measured by desire to have a child and likelihood of having a child. Child timing desires were measured by respondents indicating when they wanted to have a child while childbearing was measured by recording all births occurring in the two to five years before completion. Again, no actual age was described for delayers rather delay was measured by intentions at each wave. The sample was relatively small and there was little comparison between genders.

Table 2.3

Conceptualisation of delay by included papers

Study reference and country	Population	Sample size	Follow-up	Conceptualisation of delay
Cross-sectional				
Miettinen & Paajanen (2005) Finland	Men and women aged 18-34. Childless at time of study. Data drawn from the Family and Family Formation in Finland in 2002, part of the Population Policy Acceptance Survey (PPA2)	724 (315 women and 409 men)	N/A	Examined childbearing hesitation by dividing childbearing intentions into three categories (1) those who planned to have children in the future but not currently trying (yes), (2) those who were less certain about future childbearing (uncertain) and (3) those who were more certain and had no plans for future childbearing. Expected that those with positive childbearing intentions (yes) are currently postponing. The study aimed to examine the extent to which pragmatic factors and value orientation factors explain hesitation towards childbearing
Longitudinal				
Barber (2001) U.S	Mother-child (male and female) pairs. Original sample (from 1961 birth records) of mothers recently given birth. Mothers interviews after birth of focal child. Focal children interviewed at ages 18, 23 and 31	833 pairs of mother-child	8-waves over 31 years. (1961, 1980, 1985 and 1993)	Does not conceptualise delay, rather examines the hypothesis that individuals with positive attitudes toward education, careers and consumer spending will be more likely to delay.

Table 2.3

Conceptualisation of delay by included papers (continued)

Study reference and country	Population	Sample size	Follow-up	Conceptualisation of delay
Longitudinal				
Berrington (2004) U.K.	Childless women aged 30-39. Data drawn from the British Household Panel Study (BHPS)	151	6 years. Survey at 2 waves: 1992 and 1998	Refers to 'perpetual postponers' as those who maintain a positive or ambivalent intention to have a child but delay to some date in the future and may end up reaching end of their reproductive years childless Investigate the extent to which older childless women go on to have a birth at older ages and examine level of education, earnings, gender role attitude etc., and the presence of a partner are related to successful postponement (i.e., have a child) Compare older childless women who intend to have a birth (delayers) to those who do not intend.
Heaton et al. (1999) U.S.	Women and men aged 19-39. Data drawn from National Survey of Families and Households (NSFH)	1172	6 years Based on Waves I and II of survey: 1988 and 1994	Refers to postponers as those who intend to have a child at wave I, do not have a child at wave II but still intend to have a child. Do not specify any age group as delayers

Table 2.3

Conceptualisation of delay by included papers (continued)

Study reference and country	Population	Sample size	Follow-up	Conceptualisation of delay
Longitudinal				
Testa & Toulemon (2006) France	Women and men aged 20-45. Fertile and childless. Data drawn from Institut Natinal de la Statistique et des Etudes Economiques	363	5 years. Three interviews: 1998, 2001 and 2003	Distinguished between voluntary and involuntary postponers. Voluntary postponers wanted a child in more than five years at initial survey (1998) did not have one during 1998-2003 and still wanted to have one at the end of the follow-up period. Involuntary postponers wanted a child within five years in 1998, did not have one during 1998-2003 and still want to have one in 2003

Section III: Drivers of childbearing delay

The present review was concerned with the drivers behind childbearing delay. Miettinen and Paajanen (2005) investigated hesitation towards childbearing using a sample of 315 women and 409 men aged between 18 and 34 years old. Results were separated into men and women together, men only and women only. With regards to the factors that increased hesitation towards childbearing, for both women and men being aged 25-29 or 30-34 years old increased hesitation compared to those aged 18-24. Not being in a union, being unemployed and having more negative perceptions of family life with children all increased hesitation while having a higher education and close family relationships decreased hesitation towards childbearing. It was found that for both women and men together the area in which they lived, being a student, income, religion and material well-being did not have a significant effect. When examining men and women separately, negative perceptions of family life with children had no significant effect for men. All other associations found for when men and women were examined together remained the same. For women all the effects also remained the same with the exception of having a higher education and being unemployed which were not significantly associated with hesitation.

Barber (2001) examined later timing of first birth due to competing alternatives using a sample of 833 mother-child pairs where the focal children were interviewed at ages 18, 23 and 31. Results were separated into hazard of pre-marital first birth and marital first birth. For pre-marital first birth higher family financial assets, respondent's parents having higher education and respondent's mother being catholic were all associated with later first birth along with having more positive attitudes towards career and luxury goods. Respondents who went steady before the age of 18 and whose mother

had a higher number of children were associated with earlier first birth. Positive attitudes towards activities with children, belief that children cause worry or strain, larger family size preference, respondent's mother's age being higher at first birth, average early or later family income, family income declining, mother being divorced and remarried, mother being divorced and not remarried and respondent being female all had no significant effect. There were slight differences among those who were married in that belief that children cause worry and strain, family income declined, respondent's mother having been divorced and not remarried and having a more positive attitude towards luxury goods were all associated with a later first birth while having a larger family size preference, going steady before the age of 18, respondent's mother having a higher number of children and respondent being female were all associated with an earlier age at first birth. All other factors were not significantly associated.

Berrington (2004) examined the characteristics of women who start a family in their 30s by investigating 151 childless women aged between 30 and 39. When investigating whether the women who intended to a child at initial interview had a birth in the 6-year follow up it was found that, compared to those who did not intend to have a birth, older age was associated with less likelihood of having a birth. Having a partner at initial interview, having higher earnings and having positive or uncertain fertility intentions were all associated with having a birth. Higher education, having a more egalitarian gender role attitude had no significant effect. When investigating joint fertility intentions (of couples), for women who intended to have a birth or did not intend to have a birth those without a partner did not have a birth in the follow-up along with those who had a partner but did not intend. There was no significant effect if the woman intended but the partner did not intend.

Heaton et al. (1999) categorised 1172 women and men between the ages of 19 and 39 into postponers, those who switched to childless, those who were consistently childless and those who switched to parents/intended to have a child. For those classed as postponers (n = 641) only believing that mothers working was harmful to children was associated with postponing. Being black, having higher income, started cohabiting between waves, being married at wave I, got married between waves and strong personal motivation to have children were associated with a decreased likelihood of postponing. Age, being male, education, cohabiting at wave I, time and energy for a career, desired hours of work, time for leisure or social activities, familial motivation and marital stability had no significant effect.

Testa and Toulemon (2006) categorised 363 fertile and childless men and women aged 20-45 years old into voluntary postponers and involuntary postponers to examine persistent postponement of first child. Among voluntary postponers older age and being single at wave I and wave II were associated with persistent postponement. Being male, cohabiting, being enrolled in education, level of education, being unemployed, income, being religious and absence of fecundity impairment had no significant effect. Among involuntary postponers, older age was associated with persistent postponement while all other factors were not significantly associated with persistent postponement. See Table 2.4 for description of significant results and conclusions.

Table 2.4

Results and conclusions from included papers (N = 5)

Reference	Outcome & measurement	Sample (gender, age, data source)	Data (length of study, response rate, analysis)	Results[1, 2] (associated with delay or postponement only)	Conclusions
Barber 2001 (U.S)	Timing of first birth (DV). Event history techniques to estimate relationship between attitudes and timing	Mother-child (male & female) pairs (n=833 pairs) Original sample (from 1961 birth records) of mothers recently given birth. Mothers interviewed after birth of focal child (1961). Focal children interviewed at ages 18, 23 & 31.	Data from Intergenerational Panel Study of Parents and Children (IPS). 31 year (8 wave) panel study. 1961, 1980, 1985 & 1993. Response rate for 1962 was 92%. 85% of these responded to 1993 (n=882). Used pairs where focal child did not have birth before 1980 interview (n=833). Life history calendar (ages 23 & 31) for marriage, childbearing, education & work histories (to create the DV). Attitudes to childbearing, edu, career & consumer spending(age 18) to predict subsequent childbearing behaviour Logistic regression, log-odds ratios (negative coefficients = decreased monthly log odds/later first birth, 0=no effect)	Results taken from full model (model 8) **Factors influencing <u>later</u> 1st birth:** • If the respondent believes that children cause worry (-.16*)[F] • Family financial assets (-.18*) • If respondents mother divorced & not remarried (-.43*) • If the respondent has a positive attitude toward luxury goods (-.19*) • If the respondent is enrolled in school (-.64***)	Only includes women married at time of focal birth in original sample and white women. Negative attitudes toward childbearing will lead to later age at first birth
Berrington 2004 (U.K.)	Intentions & subsequent birth.	Childless women (n=151) aged 30-39 (characteristics of women who start a family in their 30s)	Data from the British Household Panel Study (BHPS).	**Characteristics of older childless women who intend to have a birth** (ref group: those who did not intend) i.e., Delayers	A significant number of women postpone childbearing into their 30s and still intend to start a family.

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	Outcome & measurement	Sample (gender, age, data source)	Data (length of study, response rate, analysis)	Results[1, 2] (associated with delay or postponement only)	Conclusions
Berrington *(cont)*	Intentions measured by asking 'do you think you will have any (more) children – yes/no /don't know. Births measured by retrospective fertility histories in wave 8 (6 years later)		Multivariate logistic regressions (odds ratios)	• If original intention was to have a birth in 1991, then a higher likelihood of birth (7X more likely) compared to those who did not intend • Being in the upper quartile of earnings positively associated with starting a family at an older age (0.93*) • Odds of having a birth 3x higher for those with a partner • With conflicting fertility intentions; in partnership where woman does not intend, less likelihood of a birth (-1.51**) as with no partner, woman intends (-1.53**) and no partner, woman not intend (-2.47***) (all compared to women with partners where both intend)	Women in the top earnings quartile are the most likely to have a child at an older age.

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	**Outcome & measurement**	**Sample (gender, age, data source)**	**Data (length of study, response rate, analysis)**	**Results[1, 2] (associated with delay or postponement only)**	**Conclusions**
Heaton et al. 1999 U.S.	Postponement Measured by fertility intention at time 1 (yes), had a birth between waves (no) & fertility intention at wave 2 (yes)	Males (who had partners at wave 1) and females aged 19-39, childless at start of study. (n=1172) Non-Hispanic whites and Blacks Postponers (n=641) (Those who intend to have a child at wave I, do not have a child at wave II but still intend to have a child.)	National probability sample based on Wave I and wave II of National Survey of Families and Households (NSFH.) 6 years follow-up (1988 & 1994) 4 groups: - Postponers (Those who intend to have a child at wave I, do not have a child at wave II but still intend to have a child.) - Switch to childless (Intend to have children at wave I but no longer intend at wave II) - Consistently childless (Do not intends at wave I and do not intend at wave II) - Switch to parents/wanting (did not intend at wave I and are parents/intend to have children at wave II) Multinominal regression (p values)	(Postponers group only) (**Models 1 & 2**: Sociodemographic plus partner status) • Higher levels of education increase postponing (.079*) • Higher income decreases postponing (-.209*) • Being black decreases postponing (-1.536*) • higher income decreases postponing (-.178*) • Beginning cohabiting between waves decreases (-.938*) • Being married at wave I decreases f postponing (-.2.398*) • Got married between waves decreases postponing (-1.472*)	Postponers made up the largest group (45%) and were of the age when previous cohorts were most likely to have a child. While some people make an early decision to remain childless, others postpone until age, career, education, lifestyle and other factors significantly reduce the possibility of having children.

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	Outcome & measurement	Sample (gender, age, data source)	Data (length of study, response rate, analysis)	***Results*[1, 2] *(associated with delay or postponement only)***	Conclusions
Heaton & Jacobson *(cont.)* 1999 U.S.				(**Model 3** :Sociodemographic plus career & lifestyle variables) • Higher levels of education increase postponing (.090*) • Higher income decreases postponing (-.175*) • Beginning cohabiting between waves decreases (-3.405*) • Got married between waves decreases postponing (-1.440*) • Believes 'mother's work harmful' increases postponement (.044*) (**Model 4** :Sociodemographic plus personal & familial) • Being black decreases postponement (-1.465*) • Beginning cohabiting between waves decreases postponement (-.996*)	

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	Outcome & measurement	Sample (gender, age)	Data (length of study, response rate, analysis)	*Results[1, 2] (associated with delay or postponement only)*	Conclusions
Heaton et al. (cont.) 1999 U.S.				• Being married at wave I decreases postponement (-2.421*) • Got married between waves decreases postponement (-1.483*) • Having strong personal motivation (to have a child) decrease postponement (-.198*)	
Testa & Toulemon (2006) France	Fertility preferences Self reports of couples. Desire to have a child, intention and likelihood.	Childless women and men aged 20-45 (n = 363) Childless at time of first interview Distinguished between voluntary (those who wanted a child within more than five years) and involuntary (those who wanted a child within the five years but did not) postponers	Data from survey on fertility intentions conducted by INSEE (Institut Natinal de la Statistique et des Etudes Economiques). Three interviews (1998, 2001 and 2003). 5 year follow-up Logistical regression, odds ratios, p values	**Taken from Table 7** (voluntary and involuntary postponement in follow up) • Age squared increases voluntary postponement (OR 2.0*) and decreases involuntary (OR 0.4*) • Being single in 1998 increased voluntary postponement (OR 18.0*) • Being single in 1998 and follow-up (2003) increased voluntary postponement (OR 18.0*)	Being young and single are reasons for deliberately postponing childbearing, while age is the most critical factor explaining involuntary postponement, with older respondents much more likely to remain childless due to involuntary postponement

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	**Outcome & measurement**	**Sample (gender, age)**	**Data (length of study, response rate, analysis)**	***Results*[1, 2] *(associated with delay or postponement only)***	**Conclusions**
Testa & Toulemon (2006) (cont.) France				• Those in a union for 3-6 were more likely to voluntarily postpone childbearing (OR 5.3*) • And less likely to involuntarily postpone (OR 0.1*)	
Miettinen & Paajanen (2005) Finland	Hesitation towards childbearing Intention to have a child measured by a single question with response options: 1 = no, 2 = uncertain, 3 = yes	315 women and 409 men aged between 18-34. Random sampling. (N = 724).	Data from the Family and Family Formation in Finland in 2002, part of the Population Policy Acceptance Survey (PPA2) Mail survey. Logistic regression, p vales.	**Taken from Table 3. Factors increasing or decreasing hesitation** **Males and females** • Age (25-29) compared to 18-24 increases (.327***) [B] • Age (30-34) compared to 18-24 increases (.159***) [B] • Not being in a union increases (.442***) [B] • Having higher education decreases (2.364**) [B] • Being unemployed increases (.410**) [B]	Uncertainty about whether to have a child is common among young Finnish adults. Enrolment in education one of the most important reasons for postponement

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	Outcome & measurement	Sample (gender, age)	Data (length of study, response rate, analysis)	*Results[1, 2] (associated with delay or postponement only)*	Conclusions
Miettinen & Paajanen (2005) (cont.) Finland				• Having close family relationship decreases (2.530***) [B] • Negative perceptions of family life with children increases (.409***) [B] **Males only** • Age (25-29) compared to 18-24 increases (.329***) [M] • Age (30-34) compared to 18-24 increases (.144***) [M] • Not being in a union increases (.321***) [M] • Having higher education decreases (3.045**) [M] • Being unemployed increases (.402*) [M] • Having close family relationship decreases (3.001***) [M]	

Table 2.4

Results and conclusions from included papers (N = 5) (continued)

Reference	**Outcome & measurement**	**Sample (gender, age)**	**Data (length of study, response rate, analysis)**	***Results*[1, 2] *(associated with delay or postponement only)***	**Conclusions**
Miettinen & Paajanen (2005) (cont.) Finland				**Females only** • Age (25-29) compared to 18-24 increases (.296**) [F] • Age (30-34) compared to 18-24 increases (.137***) [F] • Having close family relationship decreases (2.274**) [F] • Negative perceptions of family life with children increases (.232***)[F]	

Notes: [1]Only significant results taken. [2]Only results from parity 0 taken. [F] Females only. [M] Males only [B] both males and females.

Section IV: Synthesis of results

Table 2.5 shows the synthesis of results. The following section examines the relevant drivers according to all studies.

Age

Of the studies, four examined the effect of older age on delaying childbearing. Two studies found that older age was associated with increased likelihood of delay in both men and women (Miettinen & Paajanen, 2005) and among older women (Berrington, 2004). One study (Testa & Toulemon, 2006) grouped respondents into those considered to be voluntary postponers and those considered to be involuntary postponers and found that older age was associated with increased delay in voluntary postponers and decreased delay in involuntary postponers. Only one of the studies (Heaton et al., 1999) found no effect of age.

Gender (being male or female)

Two of the longitudinal studies (Heaton et al., 1999; Testa & Toulemon, 2006) investigated being male, both found no significant effect. A third longitudinal study also found no significant effect of being female (Barber, 2001).

Race and ethnicity

Only one of the longitudinal studies examined race (Heaton et al., 1999), finding that being black decreased the likelihood of delaying childbearing.

Education

Out of the five studies, all examined education with one study (Heaton et al., 1999) finding that higher education was significantly associated with a higher likelihood

of delaying childbearing while one study found that having a higher education decreased the likelihood of delay in men and women together along with men only but had no effect on women only (Miettinen & Paajanen, 2005). With regards to being enrolled in education, one study found that being enrolled in education increased the likelihood of delaying childbearing (Barber, 2001) while one found no effect (Miettinen & Paajanen, 2005).The remaining two longitudinal studies (Berrington, 2004: Testa & Toulemon, 2006) found no significant effect of education.

Occupation

Four studies examined employment status. One study (Testa & Toulemon, 2006) found no significant effect of being unemployed while one found that being unemployed increased the likelihood of delay for men and women together and men only but had no significant effect for women (Miettinen & Paajanen, 2005). One study (Heaton et al., 1999) found no significant effect of having time and energy for career or desired hours of work. One study (Barber, 2001) discovered that having a positive attitude towards career increased delay for non-married respondents but not for married respondents.

Finance

All five studies examined finance. One study (Heaton et al., 1999) found that higher income decreased the likelihood of delaying childbearing while one found no effect (Miettinen & Paajanen, 2005). One study (Berrington, 2004) discovered that higher income increased the likelihood of delay. One study (Testa & Toulemon, 2006) found no significant effect of income. One study (Barber, 2001) found that for both married and non-married respondents, having a positive attitude to luxury goods significantly increased the likelihood of delaying childbearing, having higher family financial assets increased the likelihood of delaying for non-married but not for married respondents

while family income declining increased the likelihood of delaying for married but not non-married respondents. Barber also found no significant effect for average early or average late family income.

Relationships

All five studies investigated partner relationships. One study (Barber, 2001) established that going steady before age 18 decreased the likelihood of delaying childbearing for both married and non-married respondents. Two studies found that either having a partner (Berrington, 2004) or being married (Heaton et al., 1999) at the beginning of the study significantly decreased the likelihood of delaying childbearing. One study (Heaton et al., 1999) found that either beginning cohabiting or getting married between waves decreased the likelihood of delaying childbearing, while marital stability had no significant effect. One study (Testa & Toulemon, 2006) found that being single increased the likelihood of delaying childbearing for voluntary postponers but not for involuntary postponers while one study found that being single had no effect (Miettinen & Paajanen, 2005). The two studies that examined cohabiting (Testa & Toulemon, 2006; Heaton et al., 1999) found no significant effect.

Familial

Of the four longitudinal studies, only one examined familial factors (Barber, 2001). It was discovered that respondent's parents having a higher education increased delaying childbearing for non-married respondents but not for married. Respondent's mother's age at first birth had no significant effect, while higher number of children decreased the likelihood of delaying childbearing for both married and non-married respondents. Respondent's mother being catholic increased the likelihood of delaying childbearing for non-married but not married respondents. Respondent's mother being

divorced and not remarried significantly increased the likelihood of delay for married but not non-married respondents while if the mother remarried there was no significant effect. The one cross-sectional study found that having close family relationships decreased the likelihood of delay for men and women together, men only and women only (Miettinen & Paajanen, 2005).

Religion

Only two of the five studies examined religion (Testa & Toulemon, 2006; Miettinen & Paajanen, 2005) and found no effect of being religious on delaying childbearing.

Gender role attitudes

The one study examining gender role attitudes (Berrington, 2004) found no effect of having egalitarian gender role attitude on delaying childbearing.

Intentions

Two of the studies examined intentions. One study (Berrington, 2004) found that higher fertility intentions decreased the likelihood of delaying childbearing while conflicting partner intentions increased the likelihood. One study (Barber, 2001) found that larger family size preference decreased the likelihood of delaying for married but not non-married respondents.

Parenthood expectations

One study (Heaton et al., 1999) found no effect of time for leisure and social activities on delaying childbearing.

Motivation

One study (Heaton et al., 1999) found that personal motivation for children decreased the likelihood of delaying childbearing, while familial motivation had no effect.

Positives of childbearing

One of the five studies (Barber, 2001) found that positive attitudes towards activities with children decreased the likelihood of delaying childbearing for married but not non-married respondents.

Negatives of childbearing

Out of the five studies, two examined negatives of childbearing. Barber (2001) found that when respondents believed that mothers work was harmful this increased the likelihood of childbearing for non-married but not married respondents while believing that children cause worry/strain increased the likelihood of delay for married but not non-married respondents. Another study (Miettinen & Paajanen, 2005) found that negative perceptions of family life with children increased the likelihood of delay for men and women together and women only but had no effect on men only.

Table *2.5*

Synthesis table of results from all studies (N = 5)

Factor	**Sub-category** (Studies that include the factors)	**Direction of results with regards to delay** (study ref)
Age	Older age [1,3, 4, 5]	↑***[1B], ↑***[1M], ↑***[1F], ↑**[3], ↔[4], ↑*[5V], ↓*[5IV]
Gender	Being male [4, 5]	↔[4], ↔[5V], ↔[5IV]
	Being a woman [2]	↔[2]
Race and Ethnicity	Being black [4]	↓*[4]
Education	Higher education [1,3, 5, 4]	↓**[1B], ↓**[1M], ↔[1F], ↔[3], ↔[5V], ↔[5 IV], ↑*[4]
	Educational expectation [2]	↔[2 NU], ↔[2U],
	O-level and above [3]	↔[3]
	Medium education [5]	↔[5V], ↔[5IV]
	Enrolled in education [1,2, 5]	↔[1B], ↔[1M], ↔[1F], ↑***[2], ↔[5 V], ↔[5 IV]
Occupation	Being unemployed [1, 5]	↑**[1 B], ↑*[1M], ↔[1F], ↔[5V], ↔[5 IV]
	Positive attitude to career [2]	↑**[2NU], ↔[2U]
	Time and energy for career [4]	↔[4]
	Desired hours of work [4]	↔[4]
Finance	Income [1,4]	↔[1B], ↔[1M], ↔[1F], ↓*[4]
	Average early family income [2]	↔[2 NU], ↔[2 U]
	Average later family income [2]	↔[2 NU], ↔[2 U]
	Family income declined [2]	↔[2 U], ↑*[2 U]
	Family financial assets [2]	↑**[2 NU], ↔[2 U]
	Highest quartile earnings [3]	↑*[3]
	Income mean [5]	↔[5]
	Has a positive attitude to luxury goods[2]	↑*[2 NU], ↑*[2 U]
Relationship	Went steady before age 18 [2]	↓***[2 NU], ↓***[2 U]
	Had partner at wave I [3,]	↓**[3]
	Began cohabiting between waves [4]	↓*[4]
	Married at wave I [4]	↓*[4]
	Married between waves [4]	↓*[4]
	Marital stability [4]	↔[4]
	Single[1], [5]	↑***[1 B], ↑***[1 M], ↑**[5 V], ↔[5 IV]
	Cohabiting [4, 5]	↔[4], ↔[5 V], ↔[5 IV]

Table 2.5

Synthesis table of results from all studies (N = 5) (continued)

Factor	**Sub-category** (Studies that include the factors)	**Direction of results with regards to delay** (study ref)
Familial	Average parents education [2]	↑* [2 NU], ↔ [2 U]
	Mothers age at 1st child [2]	↔ [2 NU], ↔ [2 U]
	Mother's no. of children [2]	↓*** [2 NU], ↓** [2 U]
	Mother catholic [2]	↑** [2 NU], ↔ [2 U]
	Mother divorced and remarried [2]	↔ [2 NU], ↔ [2 U]
	Mother divorced and not remarried [2]	↔ [2 NU], ↑* [2 U]
	Close family relationships[1]	↓*** [1B], ↓*** [1M], ↓** [1F]
Religion	Religion [1,5]	↔ [1B] , ↔ [1M] , ↔ [1F] , ↔ [5V], ↔ [5IV]
Gender role attitudes	Egalitarian [3]	↔ [3]
Intentions	Fertility intention [3]	↓*** [3]
	Conflicting intentions with partner [3]	↑** [3]
	Larger family size preference [2]	↔ [2 U], ↓** [2 U]
Parenthood expectations	Time for leisure, social activities [4]	↔ [4]
Motivation	Personal motivation [4]	↓* [4]
	Familial motivation [4]	↔ [4]
Material factors	Material well-being[1]	↔ [1B], ↔ [1M], ↔ [1F]
Positives of childbearing	Positive attitude towards activities with children [2]	↔ [2 NU], ↓** [2 U]
Negatives of childbearing	Believes mothers work harmful [4]	↑* [2 NU], ↔ [2 U]
	Children cause worry[2]	↔ [2 NU] , ↑* [2 U]
	Negative perceptions of family life with children[1]	↑***[1B], ↔ [1M], ↑***[1F]

Note., [1] Miettinen & Paajanen 2005, [2] Barber 2001, [3] Berrington 2004, [4] Heaton et al. 1999, [5] Testa & Toulemon 2006. ↑ Increases likelihood of delaying childbearing, ↓decreases likelihood of delaying childbearing, ↔ no effect: *p<0.05, **p<0.01, *** p<0.001. [F] Females only. [M] Males only [B] Both males and females [U]Married, [NU] Not married. [V] voluntary postponers, [IV] Involuntary postponers.

Discussion

Although many studies discuss delay or postponing childbearing until a later age (e.g., Langdridge, Connolly & Sheeran, 2005; Gerson, Berman & Morris, 1991) or discuss timing of childbearing (e.g., van Balen, 1997; Adsera, 2006), very few actually examine a relationship between factors that influence delay and the actual outcome of delay.

Of the studies included in the present review that did examine the relationship between drivers and the outcome of delaying childbearing there appeared to be a lack of coherency in the conceptualisation of delaying childbearing. There also appeared to be a lack of consistency of drivers that were found to impact on the decision to delay with only educational, relational and financial drivers emerging as common themes throughout all studies and results for these being mixed in terms of the effect they have on delaying childbearing. This suggests that although there is much literature regarding delay and postponing of childbearing there is not a comprehensive account of what this actually means and why it happens.

The differences in findings may be due, in part, to the majority of the studies only examining a relatively small sample in only one country along with examining different age groups and thereby having varying results given that the samples may not be representative of a larger population. For example, there were mixed results regarding education. Although two studies found that having a higher education (Heaton et al., 1999) and being enrolled in education (Barber, 2001) were associated with a higher likelihood of delay, others found no significant effect of education. According to Lappegård & Rønsen (2005) women who complete secondary education are initially amongst the slowest to cohabit and marry. However, once they had obtained a university

degree they were then amongst the fastest. This would suggest that these people are merely delaying childbirth until completing studies, which is reiterated by Skoog-Svanberg et al. (2006) who found that having completed education was an important consideration when considering having children. Conversely other studies posit that educational attainment, especially higher education, is strongly associated with the decision to remain childless (Abma & Martinez, 2006; Heaton et al., 1999; Keizer et al., 2008; Parr et al., 2005).

Additionally, there may be differences between individuals who are married and those who are not which may also explain the discrepancies in studies. The populations studied were at different developmental stages which may determine whether individuals are active or not in their plans to start childbearing. One factor that differed according to whether individuals were married or not was finance, which also revealed mixed results. While Heaton and Jacobson (1999) found that higher income was associated with less likelihood of delay, others (Barber, 2001; Berrington, 2004) found that higher income was associated with a higher likelihood of delay. While being married and encountering a decrease in family income is associated with a higher associated with delaying childbearing, this had no effect on those not married. Conversely having higher financial assets was associated with delay among those who were not married, while this had no effect on those who were married (Barber, 2001). This would suggest that financial factors are not only important on their own but also correlate with relationship factors in that those in a marriage (or union) may not need to take into account only their own financial status but would consider the income of both partners when considering the best time to start childbearing. As with education, this could signify a desire for some people to attain a certain level of income before considering having children. Those in a position

they consider to be financially stable may start childbearing earlier than those still looking to attain a higher level of financial security.

A factor that may be considered associated with financial reasons is that of career. Only one study in this review found that a positive attitude to career was associated with the likelihood of delay (Barber, 2001). This was, however, only found among those who were unmarried which again reveals the importance of relationship factors. Studies in this area have revealed that career is an especially important factor when considering childbearing among women (Schoen et al., 1997; Liefbroer, 2005). This highlights the fact that there may be a decision to be made between a career or having children for women as some may still believe that it is difficult to have both. These findings may be explained by cognitive dissonance (Barber, 2001) in that when an individual has positive attitudes to both childbearing and, for example, a career the individual may begin to adopt a less positive attitude towards one or the other in order to achieve cognitive consistency.

As expected, relationship factors have a large impact on the decision of childbearing with being in a partnership or marriage associated with less likelihood of delaying childbearing and being single associated with a significant increase in the likelihood of delaying. Traditionally, childbearing outside of a union is not favoured by many in society (Barber, 2001) and so being single will decrease the likelihood of intentional childbearing. This traditional attitude may also explain why two of the studies (Heaton et al., 1999; Testa & Toulemon, 2006) found that cohabiting had no effect on the decision to start childbearing as these people may well be waiting until being married before embarking on their childbearing plans. These results suggest that a secure relationship may be considered one of the most important factors when considering childbearing and the decision of when the right time to have a child is, with numerous other studies showing that among married couples childbearing is higher than among

those who are not yet married (Myers, 1997; Hank, 2003) or among those simply cohabiting (Liefbroer, 2005; Manning & Smock, 1995).

Further mixed results were found within familial factors and how the respondent's own parental experiences affected their likelihood of delaying childbearing. Previous research has shown that parental values and ambitions have an effect on the individual as they may adopt the same values as their parents (Axinn, Clarkberg & Thornton, 1994). While respondents' own parent higher education increased the likelihood of delay for those unmarried (Barber, 2001) it had no effect on those who were married. This suggests that while having parents with higher education may delay childbearing due to the respondent being also more inclined to pursue a higher education, it also suggests that those married had already met the precondition of being in a stable relationship and so education may have less of an effect on these. For both married and unmarried people, having a mother who had a higher number of children decreased the likelihood of delay. This may suggest that when parents had a higher number of children, respondents may also intend to have more than one child meaning that they would wish to start childbearing at a younger age so that their desire for a larger family size may be realised. Additionally, if the respondent's mother was catholic (religious) there was a higher likelihood of delay among those who were unmarried suggesting that, as mentioned previously, traditional values may delay childbearing for those unmarried as they would not wish to have children outside of marriage.

As anticipated, higher intentions to have children (Berrington, 2004) and higher personal motivation (Heaton et al., 1999) were associated with less likelihood of delay. However if fertility intentions conflicted with those of a partner then the likelihood of delay became positive, again highlighting the importance of relational factors. Moreover while positive attitudes towards children were associated with less likelihood of delay

among married people, there was no effect among those who were not married suggesting that those already married may be further along in their childbearing plans than those not married. This is in line with the Theory of Planned Behaviour (TPB) (Ajzen, 1991) as the TPB posits that intentions to perform certain behaviours are largely shaped by their attitude towards the behaviour along with subjective norms. Therefore, those having a more favourable attitude to childbearing, along with higher intentions and the belief that their partner wants the same would be expected to start childbearing sooner and not delay.

The results as a whole concur with the reproductive trends set out in the introduction. As stated previously the age at which people are having children is rising as is the number of people choosing to delay childbearing. The findings of this review reveal the importance that is now placed on education, employment and being in a stable relationship, especially by women. These factors are shown to have a significant impact on why people choose to delay childbearing and even forego it. This may help explain the change in trends over the past few decades, especially when examining whether people want children and timing of reproduction, as in previous years women may not have had the same opportunities for further education and careers as they do today. Even though times have moved on in relation to career and education opportunities for women it would still appear that attitudes towards childbearing outside of a union are still largely traditional with regards to intentions to begin childbearing. This poses a problem to women who may wish to have children but are held back by, amongst other preconditions, finding the right partner. Previous studies have found being in a stable relationship to be one of the most important considerations before starting a family (Lampic et al., 2006; Proudfoot, Wellings & Glasier, 2009) and this is a precondition that is not as easy to overcome as it may be to complete education or embark on a new career. There appears to be a lack of education advising women, not only of the adverse effects

of delaying childbearing (e.g., older age being associated with a decline in fertility), but also educating women about the different options available to single women considering childbearing (e.g., adoption). Further research needs to incorporate both of these issues in order to gain a clearer understanding of firstly whether individuals would want to consider the option of becoming a single parent and secondly how best to educate people about these options whilst decreasing the stigma attached to these options that may still be held by some people. Furthermore, subsequent research needs to establish at what ages certain preconditions become more or less important to people in order to establish the best time to educate people about fertility and possible consequences with delaying. This would allow informed choices to be made and childbearing desires met.

Chapter 3: The impact of fertility knowledge on help-seeking

Overview

It was shown in chapter 2 that although there is an ever-increasing trend towards women delaying childbearing until later ages, we do not know from this whether these women actually have knowledge about the fact that older age (along with other risk factors) can affect their fertility. Additionally, we do not know whether if women do have this knowledge, they then use this knowledge to optimise their own fertility by engaging in behaviours such as changing lifestyle factors (such as stopping smoking or drinking alcohol) or seeking help (such as visiting a GP for advice) or whether people perceive they may be susceptible to fertility problems. Therefore the present chapter aimed to, by using archival data taken from the International Fertility Decision-Making Study (IFDMS), examine the extent to which knowledge and awareness of risks factors associated with reduced fertility along with perceived susceptibility to fertility problems was associated with intentions to engage in fertility optimising behaviours (e.g., changing lifestyle or seeking help).

Introduction

There is increasing interest in the fact that women are having children later in life. The average age of the first time mother in the U.K has risen to 29.5 years of age (compared to 23 in 1968), while the percentage of women over the age of 35 having children has risen by 50% in the past 30 years (Office for National Statistics (ONS), 2011). Media reports regarding this trend appear mixed. On one hand we hear about ‘women who have it all’, those women who have the career and then the babies later in

life when they have the perfect financial security and have achieved all they wish to achieve (Hoffnung, 2004). On the other hand we also hear about the downside of 'leaving it too late', with reports of costs of In Vitro Fertilisation (IVF) (e.g., Katz, Nachtigall & Showstack, 2002) and increased risk to both mother and child (e.g., Tough et al., 2007). What we do not fully understand is whether women know about the downsides to having children later in life and if they do whether they actually apply this knowledge to themselves in their deliberation about childbearing.

Age-related fertility risk

There is now agreement in research that fertility declines with age with much evidence pointing to this fact. Research as early as 1953 has documented this decline with a study of the Hutterites, a religious sect living in the United States and Canada. The Hutterites are unaffected by issues such as birth control, as contraception is forbidden, giving a truer representation of fertility and fertility decline. Therefore their fertility pattern represents fertility close to the theoretical maximum level of fertility (Nonaka, Miura & Peter, 1994). The peak age for fertility was around the age of 30 with women averaging 11 live births in their lifetime. The research shows an age-related decline beginning around 35 and becoming pronounced at age 40 with fertility approaching zero by age 49 (Nonaka, Miura & Peter, 1994). More recently a prospective study examining fecundity in 18-40 year olds found that women between the ages of 19 and 26 had a significantly higher probability of pregnancy than those aged between 27 and 29 (Dunson, Baird & Colombo, 2004). While women aged between 30 and 34 were similar to those aged 27 to 29, women aged 35-40 had even further reduced probability of

pregnancy (Dunson, Baird & Colombo, 2004). In addition to this a study comparing the cause of infertility in older women (≥35 years of age) compared to younger women (<35) discovered that older women were significantly more likely to be diagnosed with unexplained infertility compared to younger women (Maheshwari, Hamilton & Bhattacharya, 2008). Older age also has an effect on the success rates of assisted conception such as IVF with success rates falling from 19.8% per attempt in women under the age of 25 to 9% per attempt in women over 40 (Piette, de Mouzon, Bachelot & Spira, 1990). In a retrospective study on 1621 consecutive cycles of IVF it was found that implantation rates remained at a constant until age 35 after which a 2.77% decrease per year could be seen (Spandorfer, Chung, Kligman, Davis & Rosenwaks, 2000).

This fall in female fertility related to age is caused by the decline in quantity and quality of oocytes. A woman is born with the maximum number of oocytes that she will ever have. Oocytes form in the first few weeks subsequent to conception with around 4-7 million being formed in a 20-week old foetus and these will have already halved by the time of birth (Nwandison & Bewley, 2006). During the average woman's lifetime approximately 400 oocytes will reach maturity and ovulate (Utting & Bewley, 2011) showing that women do not have an infinite number of oocytes. In addition to the decline in oocytes, those remaining in older women are shown to be of poorer quality (Utting & Bewley, 2011), making conception more difficult.

Lower chance of conception is not the only risk associated with older age. After the age of 35 there are significantly higher risks associated with complications such as pre-term birth, low birth weight (Prysak, Lorenz & Kisly, 1995), caesarean delivery (Peipert & Bracken, 1993), spontaneous abortion, ectopic pregnancy (Anderson, Wohlfahrt, Christens, Olsen & Melbye, 2000), and Down syndrome. The numerous risk factors associated with older age coupled with the fact that advancing age is not a factor

that can be modified to reduce risk makes it imperative that women are aware of and understand the risks posed by childbearing later in life.

In addition to age, there are other risk factors that may compromise or reduce fertility. Lifestyle factors (e.g., obesity, smoking, consuming more than 14 units of alcohol per week) known to affect fertility (Bunting & Boivin, 2008) are on the rise (ONS, 2008) while reproductive factors (e.g., endometriosis and irregular or absent menstrual cycle) are also indicators of reduced fertility (Bunting & Boivin, 2008).

Understanding risk

Whether people actually understand risk is a question that has much research devoted to it. Within the area of health there are numerous studies dedicated to examining what people know about health risks covering such topics as smoking, obesity, heart disease and many more. It has been proposed that although people know about risk they firstly have unrealistic expectations regarding risks to themselves (Weinstein, Marcus & Moser, 2005) and secondly, even when people have knowledge of risks they may not apply this knowledge to themselves (Bunting & Boivin, 2008). The tendency people have to think that the risk of negative events (e.g., smoking-related diseases, accidents) happening to themselves less than to other people is referred to as optimistic bias (OB) (Klein & Helweg-Larsen, 2002). This can be seen clearly in the case of smoking. It would be near impossible to not have heard of risks associated with smoking, yet in the UK alone in 2008 22% of all adults aged 16 and over smoked (ONS, 2008). In the same survey by the Office of National Statistics, it was found that smokers were significantly less likely than ex-smokers to mention smoking as the main cause of premature death

(39% versus 48%, respectively). Another area where we see the optimistic bias is that of breast cancer. A study examining the underestimation of breast cancer risk discovered that while 89% of women at high risk for breast cancer underestimated their actual risk, only 9% of women with low to average risk overestimated their risk (Bastani, Maxwell, Bradford, Prabhu Das & Yan, 1999).

According to Weinstein (1980) the reason that optimistic bias occurs is due to errors in information-processing. People have a lack of experience with certain risks which makes it difficult to envisage the risk affecting them. People will, therefore, compare themselves to those they consider to be at very high risk. By doing this and also by overestimating their ability to avoid being affected by the risk, people are able to maintain a sense of a low personal risk (Joffee, 2003). In other words, optimistic bias concerns the perception of one's risk relative to the risk of others.

Awareness of risk

Women's awareness of the risk of age-related fertility decline has been examined in a population of 360 female undergraduates (mean age = 21.28) which revealed that 88.9% reported intending to have children in the future, with the average number of desired children being 2.34, showing the importance of parenthood to the group (Bretherick, Fairbrother, Avila, Harbord & Robinson, 2010). While the majority of participants were aware that fertility declined with age, participants overestimated the chances of a pregnancy at all ages (20, 30 and 40 years of age) while underestimating the average number of months it would take women in their 20s and 30s to become pregnant. Less than half (45.5%) identified women's age as the strongest risk factor for infertility, while only 24.7% correctly identified women's age as the strongest risk for miscarriage.

Women appear to have some knowledge that age has an impact on fertility but do lack knowledge about specific effects of older age. In a sample of 1506 Canadian men and women (aged between 20 and 45 years of age) over half recognised that women over the age of 35 could experience trouble conceiving but less than 45% correctly identified that women over 35 were also more likely to have a caesarean section, premature baby or a stillbirth (Tough, Tofflemire, Benzies, Fraser-Lee & Newburn-Cook, 2007). In addition a qualitative study found that some women often believed themselves to be still fertile if they were menstruating regularly, erroneously assuming that they had a good chance of conceiving until the approximate age of 45 (Friese, Becker & Nachtigall, 2006). Tough et al. (2006) found that less than half of the 1506 women and men in their sample knew that maternal age was linked with an increased risk of not only stillbirth but also delivery by caesarean section and preterm births. In addition, Lampic et al. (2006) discovered that both men and women were inadequately knowledgeable regarding age-related fertility decline while also over-estimating female fertility.

Further studies have examined knowledge of other risk factors associated with reduced fertility. Bunting & Boivin (2008) examined fertility knowledge among postgraduate and undergraduate students including risks factors that are associated with female infertility (e.g., smoking, being overweight, being over 34 years old), beliefs in false fertility myths (e.g., lying down for 10 minutes after sex, not urinating after sex) and beliefs in the illusory benefits of healthy habits (e.g., never drinking alcohol, regular daily exercise). Participants were significantly better at identifying fertility risk factors compared with myths or illusory benefits, with an average correct score of 90.70% compared to 41.53% and 26.46% respectively. Although this illustrates that there is high knowledge regarding the risk factors associated with female infertility, worryingly

participants also believed that fertility myths and healthy habits could actually increase fertility. This demonstrates that although people may be aware of the risks involved with engaging in particular activities or being of an older age they may also think that they may be able to neutralise these risks to their fertility be engaging in healthy activities (e.g., exercising regularly).

These results suggest that people do have some awareness of the fertility related risk factors but lack precision about the critical thresholds at which point negative impacts on fertility occur. This lack of precision may reduce people's ability to safeguard their fertility via life style change or to optimise their fertility via help-seeking behaviours such as seeking medical advice. Although past studies examine level of awareness, the extent to which awareness is associated with intentions to optimise behaviour via lifestyle change or help-seeking has not been examined. (See Table 3.1 for an expansion on the studies examining delay and awareness).

Perceived susceptibility

In addition to being aware of risks posed to fertility by certain behaviours or lifestyle factors, how susceptible one may feel with regards to being at risk of fertility problems may also have an impact on how people address the issue of whether they feel that it is necessary to seek out help or advice concerning their own fertility. According to the Health Belief Model (HBM), perceived susceptibility (i.e., ones beliefs of the chances of getting a condition) is an important consideration in health-related action (e.g., seeking medical advice regarding fertility). It is proposed that people will not change their behaviour unless they feel at risk. Figure 3.1 illustrates the HBM model that comprises as

its main constructs perceived susceptibility, perceived severity of threat, perceived benefits and perceived barriers (Rosenstock, 1990). According to this model, the person would firstly consider how likely they would be to have a fertility problem (perceived susceptibility), how this would affect them (perceived severity of not being able to have children in the future) and whether seeking help regarding their concerns would provide reassurance and assistance (perceived benefits) or would incur financial costs (perceived barriers such as treatment costs). More recently, the additional concepts of cues to action and self efficacy outline how information from other sources (e.g., awareness campaigns) and confidence in one's own ability to take action also act as modifying factors in the likelihood of taking action to change behaviours (or seek timely medical advice) (Glanz, Rimer & Lewis, 1997). Therefore knowledge and awareness about fertility risks may not be sufficient for people to take action in future health behaviour, people may also need to feel that they are personally at risk (i.e., feel susceptible) to future fertility problems before they intend to either seek advice or intend to change their behaviour.

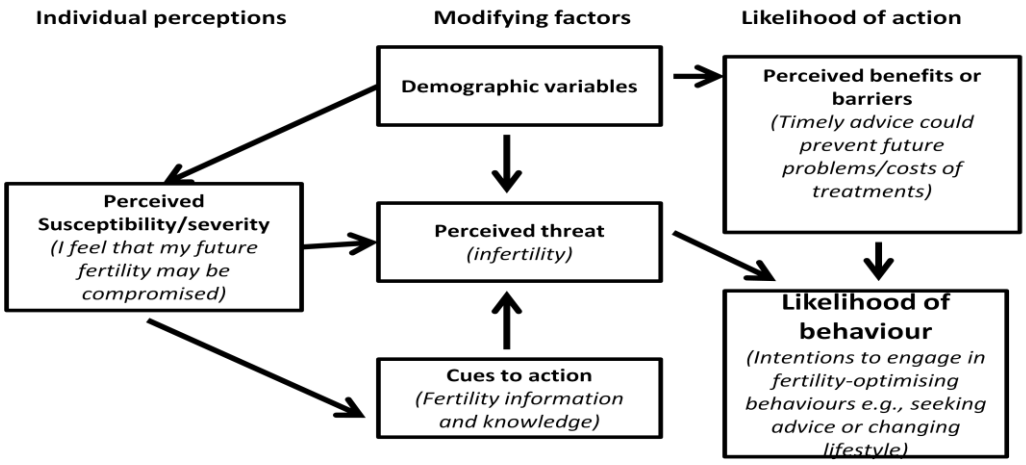

Figure 3.1. Constructs of the Health Belief Model. Adapted from Glanz, K., Rimer, B.K. & Lewis, F.M. (2002). *Health Behavior and Health Education. Theory, Research and Practice.* San Francisco: Wiley & Sons.

Table 3.1

Description of papers examining awareness of fertility risk factors

Reference	Sample	Methods	Awareness Results	Conclusions
Bretherick (2010) Canada Cross-sectional	N=360 (female undergraduates) mean age 21.28	Reproductive health Survey designed for the purpose of the study. Demographics, intentions, fertility history, Multiple choice questions	-significantly overestimated the likelihood of becoming pregnant after 1 month of regular unprotected sex at ages 20, 30 & 40 - underestimated the no of months of regular unprotected sex required for average woman to become preg - Less than ½ (45.5%) correctly identified age as the strongest risk factor for infertility- less than ¼ (24.7%) correctly identified age as the strongest risk factor for miscarriage	Need education regarding the decline of reproductive capacity to avoid unintentional childlessness
Bunting & Boivin (2008) U.K. Cross-sectional	N = 149 (110 female and 39 Male) undergraduate and Postgraduate students. Mean Age 24.01	Background information questionnaire Factors affecting fertility scale (FAFS) where participants rated their perception of an effect of a given factor (e.g., smoking) on a woman getting pregnant. Including risk factors (e.g., smoking), fertility myths and healthy habits	- Participants significantly better at correctly identifying risks compared with myths or healthy habits. - Participants identified all negative factors that decrease the chances of getting pregnant -Participants believed that fertility myths and habits had an impact on fertility rates	Although participants had knowledge of negative risk factors associated with reducing fertility, they believed in fertility myths and that healthy habits increase fertility.

Table 3.1

Description of papers examining awareness of fertility risk factors (continued)

Reference	Sample	Methods	Awareness Results	Conclusions
Kemkes-Grottenthaler (20036) Germany Cross-sectional	N=193 female academics (64 mothers, 5 involuntarily childless) Mean age 33.78	In-house questionnaire Self-administered survey assessing demographics, attitudes towards children, career satisfaction	- childless women (mean age 33.78) aimed to have 1st child by 38 - 1/3 aimed to have a child at an age past 40	Due to misconceptions about fertility, many who intend to postpone may end up involuntarily childless. (lack of awareness of issue of age)
Lampic (06) Sweden Cross-sectional	N=401 (222 female & 179 male) Undergraduate students	In-house questionnaire Demographics, intention to have children, importance of children, intentions in case of infertility, conditions of importance, life changes when parent, awareness of fertility issues) Questions regarding awareness were multiple choice	- 63% women & 46% men picked correct answer to 'age women are most fertile' - 33% & 23% picked correct answer to 'what age is there a slight decrease' - 38% & 34% believed slight decrease 30-34 while 25% & 38% believed 35-59. - 36% & 24% picked correct answer to 'what age is marked decrease' - 34% & 33% believed marked decrease age 40-44 while 12% & 30% believed 45-49 - both overestimate couples cumulative fecundity during 1 yr of unprotected sex - both overestimate chances of conception through IVF	Even though there is some knowledge of age-related risks, around half plan to have children after age 35 (i.e., when female fertility is decreased)

Table 3.1

Description of papers examining awareness of fertility risk factors (continued)

Reference	Sample	Methods	Awareness Results	Conclusions
Maheshwari (08) Scotland Cross-sectional	N=724 (362 women attending sub fertility clinic (mean age 32 years) & 362 pregnant women (mean age 29). University based tertiary care clinics (Aberdeen maternity hospital) Hypothesis: women attending the infertility clinic more likely to have postponed than antenatal population	Anonymous in-house questionnaire. 32 questions (demographics, decision to delay, awareness of limitations of infertility treatment existing age limits for treatment & tests for prediction of fertility). Completed in clinic Questions regarding awareness were multiple choice	- 93% subfertile & 88.3% pregnant aware that age affects chances of pregnancy - 85.1% subfertile & 76.5% pregnant believe chances decrease between 30-40 yrs - 53% subfertile & 45.6% pregnant aware chances of IVF decreased between 30-40 - more in subfertile group (85% vs. 77%) believed fertility treatment overcomes effect of age (p=.15) - 86.3 % subfertile & 85% pregnant had knowledge of age-related obstetric risks and 37.5% subfertile & 20% pregnant aware of age limit for fertility treatment - 18.1% subfertile & 12.2% pregnant had heard of any tests of ovarian reserve	Although women aware of age, many still believe fertility treatment will overcome this. Need more education. Used preg & subfertile women. These may have a higher knowledge so may need to also investigate those not currently pregnant or those currently trying

Table 3.1

Description of papers examining awareness of fertility risk factors (continued)

Reference	Sample	Methods	Awareness Results	Conclusions
Skoog Svanberg (2006) Sweden Cross-sectional	N=400 (200 female & 200 male) Postgraduates (age ≤40)	In-house questionnaire Demographics, intentions, obstacles & considerations, awareness of fertility issues. Awareness questions assessed by multiple choice	-48% women & 35% men correctly answered marked decrease in fertility with age 35-39. - 23% men and 28% women believed marked decrease occurred age 40-44. - 24% & 24% of both men and women believed marked decrease occurred age 25-34 - half of men & women overestimated a young woman's chance of becoming pregnant in 1 year - half of all had overly pessimistic perceptions of older women's fertility - half of all overestimated chances of IVF - preferred mean age for 1st child was 31 for women and 32 for men - 66% of women wanted last child after age 35	Many postgraduate students intend to have children at an age when fecundity is decreased. Therefore need more education

Table 3.1

Description of papers examining awareness of fertility risk factors (continued)

Reference	Sample	Methods	Awareness Results	Conclusions
Tough (06) Canada Cross-sectional	N=1044 women who had given birth in last 3 months. No mean age given (<25, 25-29, 30-34, 35-39, 40+). Women 35+ were over-sampled (31.7%) (to ensure sufficient no to determine if age was related to knowledge of delay)	Computer-assisted telephone interviews In-house questionnaire. Background info, knowledge of age-related risks and developmental & health-risks Questions regarding awareness were true/false	- less than 25% knew women 35 and over were at increased risk of caesarean, multiple birth, low birth rate or preterm delivery - only 37% scored higher than 50% on items about age-related risks - only 15.6% scored higher than 50% on risks associated with suboptimal infant outcomes	Women uninformed of the risks of delaying Respondents mainly Caucasian, married, employed, well-educated

Note: IVF In vitro fertilisation

The present study

The fertility awareness research indicates that although there is a general awareness that advanced age and other risk factors (e.g., obesity, smoking) affect fertility negatively; this knowledge is not very precise. The aim of the present study was to examine to what extent knowledge and awareness of fertility-related risk factors along with perceived susceptibility to fertility problems was associated with intentions to engage in fertility optimising behaviour (i.e., intention to engage in medical help-seeking, non-medical help-seeking and lifestyle change). Archival data for these analyses was taken from the International Fertility Decision-Making Study (IFDMS) dataset. The IFDMS was a joint collaboration between Cardiff University (Professor J. Boivin) and Merck Serono S.A., Geneva Switzerland (an affiliate of Merck kGaA Darmstadt, Germany) with funding from the Economic and Social Research Council (ESRC). The IFDMS was concerned with examining childbearing decisional factors in people who were currently trying to conceive and was carried out in 18 countries.

It was hypothesised that firstly, having higher fertility knowledge would be associated with a higher likelihood of intending to engage in fertility optimising behaviours (i.e., intention to engage in medical help-seeking, non-medical help-seeking and lifestyle change). Secondly those with higher fertility knowledge who were also deemed at risk for reduced fertility (i.e., due to being over the age of 34, having a body mass index (BMI) of over 25, smoking more than 10 cigarettes per day or longer duration of trying to conceive) would have a higher likelihood of intending to engage in fertility optimising behaviours than those who were not deemed at risk for reduced fertility. Thirdly, it was hypothesized that, along with being deemed at risk for reduced fertility,

feeling susceptible to fertility problems or having low perceived fertility would also moderate knowledge in that those with higher knowledge who felt susceptible to fertility problems or low perceived fertility would display higher intentions to engage in fertility optimising behaviours especially if also deemed at risk for reduced fertility.

Method

Participants

Participants were drawn from the International Fertility Decision-Making Study (IFDMS). The IFDMS surveyed in 18 countries to examine childbearing decisional factors in people currently trying to conceive. Inclusion criteria applied to the IFDMS was that participants were aged between 18 and 49 years, were currently married or living with their partner, were not pregnant and were currently trying to conceive. The final sample of the IFDMS consisted of 10045 participants (8355 women and 1690 men). For the present study the following inclusion criteria were additionally applied: (1) women (2) never had a birth and (3) never sought medical treatment. The final sample for the current analysis was 1345 women with a mean age of 28.6 (*SD* = 5.8), of which 722 indicated that they had not tried to change their lifestyle and thus were eligible for investigating whether they were likely to change their lifestyle (see Table 3.2 for sample characteristics)

Materials

The International Fertility Decision Making Survey (IFDMS) was a 45 minute survey aimed at couples trying to conceive to assess the correlates of the decision to have a child and the decision to seek treatment in the case of subfecundity. Based on relevant theories such as the Theory of Planned Behaviour (Ajzen, 1991), the Health Belief Model (Rosenstock, 1990), fertility theories (e.g., Preference Theory; Hakim, 2003) and a systematic review of fertility decision-making, items were generated to measure background characteristics and childbearing decisional factors. The survey consisted of 80 questions and was divided into five sections: (1) background information (2) parenting (participants indicated whether they agreed with statements related to parenting, e.g., 'having a child is the most important thing in life' and also indicated to what extent certain factors influenced the decision to become a parent, e.g., 'having a stable relationship), (3) about fertility and trying to get pregnant (participants answered questions related to trying to conceive and how fertile they believed they were. This also included a section where participants indicated to what extent they agreed with statements related to their own fertility and why they may not have conceived yet along with sections assessing participants knowledge concerning fertility and statements concerning medical treatment), (4) knowledge, beliefs, experiences and intentions about fertility medical services (participants answered questions related to whether they had received any form of advice or treatment and whether they would seek out different forms of advice and treatment) and (5) social situation, health and attitudes to general medical care. Only constructs relevant to the present analysis are described in detail.

Background variables

To assess background variables, respondents were asked their age (in years), how long they and their partner had been living together (in years and months), how long have they had been trying to get pregnant (in years and months), the highest level of education achieved (no education, primary school, secondary school, post-secondary/college, undergraduate or postgraduate). Additionally participants were asked whether they had paid work (yes/no) and whether their partner had paid work (yes/no).

Fertility risk indicators

Six questions concerned status on fertility risk indicators relevant to the present study. The fertility risk indicators were Body Mass Index (BMI), smoking, age and presumed infertility. People were considered at risk for reduced fertility if their BMI was over 25, they smoked more than 10 cigarettes per day, they were over the age of 34 or they had been trying to conceive for more than one year. To assess each risk indicator, all participants were asked 'do you smoke' (yes/no) 'if you do smoke, how many cigarettes do you smoke per day', 'how much do you weigh', 'what is your height' (weight and height were used together to compute BMI by dividing weight in kilograms by height in meters squared), 'how old are you' and 'how long have you been trying to conceive'. These IFDMS items were taken from Bunting and Boivin (2010) and have been shown to discriminate between fertile and infertile populations.

Fertility variables

Fertility knowledge was assessed using 13 items (all rated on a three point scale; *1=true, 2-false, 3=do not know)* derived from previous research (Bunting & Boivin, 2008; Adashi et al., 2000; Lampic et al., 2006; Tough et al., 2007). Each item was designed to examine the participant's level of fertility knowledge. Participants were asked (1) a woman is less fertile after the age of 36 years, (2) a couple would be classified as infertile if they did not achieve a pregnancy after one year of regular sexual intercourse without using contraception, (3) smoking decreases female fertility, (4) smoking decreases male fertility, (5) if you have a healthy lifestyle you are fertile, (6) about one in ten couples are infertile, (7) if a man produces sperm he is fertile, (8) these days a woman in her forties has a similar chance of getting pregnant as a woman in her thirties, (9) if a man has had mumps after puberty he is more likely to later have a fertility problem, (10) a woman who never menstruates is still fertile, (11) if a woman is overweight by more than 13 kilos (28 pounds) then she may not be able to get pregnant, (12) if a man can achieve an erection then it is an indication that he is fertile, and (13) people who have had a sexually transmitted disease are likely to have reduced fertility. All questions were rated on a 3-point scale (*0 = false, 1 = do not know, 2 = true*)).

Knowledge questions were re-coded so that for each question participants were given a score of either one (has knowledge) if they answered the question correctly or zero (no knowledge) if they answered the question incorrectly or did not know. The 13 items were combined into a single fertility knowledge factor with higher scores indicating more knowledge from zero (no knowledge) to 50 (average knowledge) to 100 (full knowledge). Reliability analysis of the 13 items revealed a Cronbach's alpha of .73.

Susceptibility and perceived fertility were measured with two questions: ("Do you suspect a fertility problem?" and "How fertile do you believe you are", respectively.) Susceptibility was dichotomous variable whereas perceived fertility was rated on a 5 point scale (*1=Not at all fertile, 2 = slightly fertile, 3 = moderately fertile, 4 = very fertile, 5=extremely fertile)* (Bunting & Boivin, 2007).

Help-seeking and behaviour change variables

To assess help-seeking behaviour, the likelihood of trying medical, non-medical interventions, and intention to change lifestyle were examined. The likelihood of trying medical intervention was constructed from the following variables and the likelihood of trying each of the following: diagnosis of infertility, medication to increase sperm and eggs, injections, surgery, insemination and IVF. The likelihood of trying medical advice was comprised of: seeking advice from a pharmaceutical company, a pharmacist, a general medical doctor and a fertility expert. The likelihood of trying non-medical intervention was constructed from combining the following: likelihood of trying alternative and complementary therapy and likelihood of trying non-medical methods to assess fertile time. The likelihood of trying non-medical advice was comprised of: seeking advice from friends and family, traditional healer and spiritual/religious healer. All likelihood variables were assessed on a 5-point scale (1=Not at all likely, 2 = slightly likely, 3 = moderately likely, 4 = very likely 5=extremely likely) and were derived from previous research (Boivin & Bunting, 2008; Stephen & Chandra, 2000; Greill & Macquillan, 2004; Boivin & Walker, 1995; Halman et al., 1992). Items were combined to form composite variables for both medical help-seeking and non-medical help-seeking. Reliability analysis revealed a Cronbach's alpha of .91 and .72 for medical help-seeking

and non-medical help-seeking respectively. Lifestyle change was assessed by a single variable where participants indicated how likely they were to change their lifestyle (e.g., quit smoking, lose weight) on a three point scale (*1 = not likely to try, 2 = likely to try, 3 = tried*)

Procedure

The IFDMS was translated into 8 languages and implemented on websites hosted in 18 countries. The survey was initially produced in English and then translated into six languages (Danish, French, German, Italian, Spanish and Portuguese). The first translation from English to the target language was performed by translators at Cardiff University. All translations were organised by the same person while the same guidance was given to all translators to ensure a common goal. First translations were examined by a local fertility expert who proposed revisions to ensure appropriate translations to fertility usage in the target community and to ensure appropriate wording with regards to local customs. The study took approximately 45 minutes to complete. In order to complete the questionnaire, participants were required to firstly confirm that they were over the age of 18, currently married or living with their partner and not currently pregnant or about to become a mother/father. Once the participant had consented to participate, the questions were presented in the sections as laid out previously. Throughout the questionnaire participants had the option to close the questionnaire without submitting any data. Once completed, participants were presented with a detailed explanation of the study and the option to submit their data.

Data analysis

The sample for the present study was 1354 women. Preliminary data screening produced nine participants that were excluded from the analysis due to being over the age of 44, leaving a final sample of 1345. This sample was used to investigate both medical and non-medical help-seeking as they had indicated that they had not previously sought help. The sample consisted of individuals who had and had not previously tried to change their lifestyle so the whole sample could not be used to investigate lifestyle change. Of the 1345, a subsample of 721 individuals had indicated that they had not tried to change their lifestyle previously and were therefore used to examine the outcome of intention to change lifestyle.

Regression was used to examine the main effects of relational factors, desire for a child and susceptibility in predicting fertility knowledge. Variables were entered in the following order: control variables (at least University education, Mcquillan economic hardship index and age of participant), relational factors (length of time in relationship and length of time trying to conceive), desire for a child (strength of own desire for a child, strength of partner's desire for a child and friends and family have children) and personal fertility awareness variables (susceptibility, perceived fertility). Further multiple regressions were used to examine the main effects of risk status, knowledge, susceptibility and their interactions in predicting help-seeking behaviour. Three regressions were computed for each dependent variable (i.e., seeking medical advice, seeking non-medical advice, life style change). The same analytic approach was used for each regression. Variables were entered in the following order: control variables (i.e., at least university education, Mcquillan economic hardship index), risk variables (BMI over 25, smoking more than 10 cigarettes, being over the age of 34, trying to conceive for

more than 12 months), fertility knowledge and personal fertility awareness variables (susceptibility, perceived fertility) and finally interactions (two and three way interactions).

Predictors were transformed to standard Z-scores. The standardised regression coefficients are presented and simple slope analysis was used to follow-up significant interactions.

Results

Overview

The results are presented in three sections. Section I shows the demographic characteristics of the whole sample, which was used to investigate medical and non-medical help-seeking and the subsample used to investigate intention to change behaviour. Section II shows the number of participants at risk from each of the fertility risk factors, participant's knowledge of fertility risks along with fertility knowledge by country and participant's beliefs regarding their susceptibility of fertility problems for the whole sample and the subsample Additionally, section II examines the association between relational factors (length of time in relationship and time trying to conceive), desire for a child (strength of own desire for a child, strength of partner's desire for a child, friends and family have children), susceptibility (suspecting a problem and believed personal fertility) and fertility knowledge Section III shows the association between being at risk, fertility knowledge, susceptibility (suspecting a problem and believed personal fertility) and help-seeking behaviour (medical help-seeking, non-medical help-seeking and lifestyle change).

Section I: Demographic characteristics of the sample

Table 3.2 shows the demographic characteristics of the whole sample (used to investigate medical and non-medical help seeking) and the subsample (used for investigating likelihood of changing lifestyle). The majority of both the total sample and the subsample were aged 30 or below, had been living with their partner for nearly four years, had been trying to conceive for around one and a half years and were educated to at least university level. The majority of the both samples also had paid work along with their partners.

Table 3.2

Demographic characteristics of whole sample (N = 1345) and subsample (n = 721)

Variable	**Whole sample (*N*=1345)** **Total**	**%**	**Subsample (*n*=721)** **Total**	**%**
Age (*SD*)	28.6 (5.8)		28.21 (5.7)	
Age range				
18-25	426	31.5	245	34
26-30	475	35.1	252	35
31-34	234	17.3	113	15.7
35-39	155	11.4	82	11.4
40-50	60	4.4	28	3.9
Years living with partner (*SD*)	3.8 (3)		3.64 (2.9)	
Years trying to conceive (*SD*)	1.5 (2)		1.5 (2)	
Highest education				
None	8	0.6	6	.8
Primary	37	2.7	22	3.1
Secondary	315	23.3	177	24.6
Post-secondary	299	22.1	159	22.1
Undergraduate	461	34.0	229	31.8
Postgraduate	230	17.0	126	17.5
Paid work (yes)	995	73.5	511	71.7
Partner has paid work (yes)	1204	88.9	639	89.9

Section II: Risk status, fertility knowledge, susceptibility and fertility optimising behaviour

Table 3.3 shows the number/percentage of the sample in each risk category. Nearly 40% of the whole sample had a BMI of 25 and over, 14% smoked more than 10 cigarettes per day, and 16% were aged over 34 while just over half of the sample would be considered infertile. Within the subsample over 30% has a BMI of over 25, 18% smoked more than 10 cigarettes per day, 15% were over the age of 34 and over half would be considered infertile.

Table 3.3

Frequency of risk factors in sample (N = 1345) and subsample (n=721)

Risk factor	**Whole sample (*N*=1345)**		**Subsample (*n*=721)**	
	Total	**%**	**Total**	**%**
BMI over 25	504	37.2	244	33.8
Smoke (yes)	354	26.1	211	29.3
Smoke (more than 10 per day)	192	14.2	130	18.0
Age	215	15.9	110	15.3
Presumed infertile	692	51.4	379	52.6

With regards to fertility knowledge, from the questions asked in the survey 55.6% of participants in the whole sample had average to high fertility knowledge (i.e., answered correctly over 50% of questions) while in the subsample 52.6% had average to high fertility knowledge. Figure 3.2 shows the mean percentage of fertility knowledge by country. There was significant variation in fertility knowledge according to country (X^2 (18) = 1574.446, p<.001) with respondents from Turkey having the lowest average score on fertility knowledge (16.23) and respondents from the U.K. having the highest score (73.01)

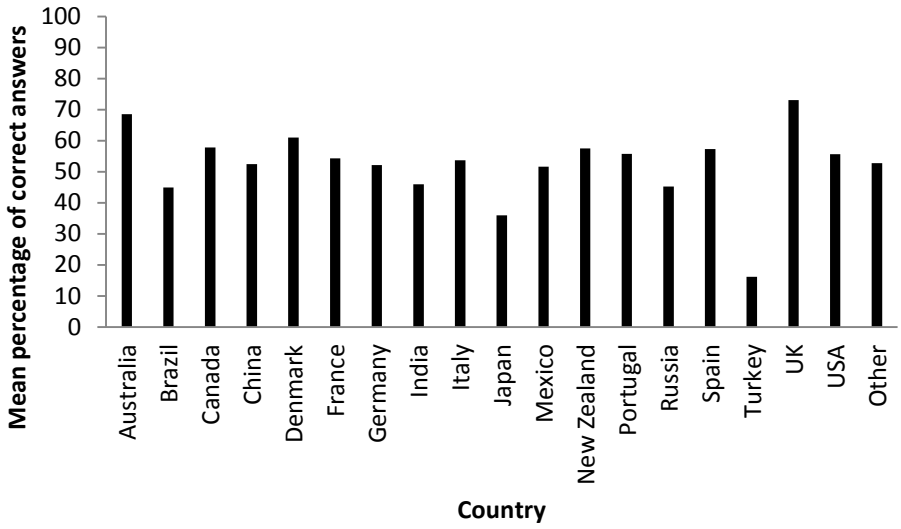

Figure 3.2. Mean percentage of correct answers to fertility knowledge questions according to country.

Table 3.4 shows participants beliefs about their own susceptibility to fertility problems by responding to questions regarding whether they suspected they or their partner had a fertility problem and how fertile they believed they were.

Table 3.4

Participant's perceptions of susceptibility to fertility problem and perceptions of own fertility

Susceptibility	**Whole sample (*N*=1345)** **Total**	**%**	**Subsample (*n*=721)** **Total**	**%**
Do you suspect a problem (yes)	798	59.3	413	57.3
How fertile do you believe you are				
Not at all fertile	138	10.3	73	10.2
Slightly fertile	370	27.5	192	26.6
Moderately fertile	629	46.8	355	49.2
Very fertile	174	12.9	81	11.2
Extremely fertile	26	1.9	15	2.1
	M	***SD***	***M***	***SD***
Mean score on how fertile do you believe you are	2.69	.89	2.68	.88

Within the whole and subsample, over half suspected a fertility problem. With regards to how fertile participants believed they were the majority believed that they were moderately fertile, while just over 10% believed themselves to be not at all fertile and 2% extremely fertile.

Table 3.5 provides a summary of regression coefficients for fertility knowledge. The overall model for fertility knowledge was significant (F (10, 1256) = 13.288, p<. RES = 483.519, R^2 = .096). Of the three control variables (step 1), having at least a University education, scoring lower on the McQuillan economic hardship scale and being older were significantly associated with higher fertility knowledge. Of the main effects (step 2) being in a relationship for a longer time, having a stronger desire for a child and suspecting fertility problem were all associated with higher fertility knowledge while trying to conceive for a longer time was negatively associated with fertility knowledge.

Table 3.5

Summary of regression for variables predicting fertility knowledge (N = 1345)

Variable	***B***	***SE B***	***β***
Step 1: Control variables			
At least University education	5.254***	1.295	.114
McQuillan economic hardship index	-2.265***	.641	-.097
Age of participant	2.614**	.721	.109
Step 2: Predictors of fertility knowledge			
Time in relationship	3.642***	.766	.156
Time trying to conceive	-5.907***	.782	-.249
Strength of desire to have a child	1.852*	.758	.079
Partner's strength of desire to have a child	-.452	.744	-.020
Friends and family have children	.071	.638	.003
Suspecting a fertility problem	2.843*	1.401	.060
How fertile do you believe you are	-1.122	.679	-.049

*P<.05, **P<.01, ***P<.001.

Section III: Association between being at risk, fertility knowledge, susceptibility and help-seeking behaviour.

Intention to seek medical help or advice.

Table 3.6 provides a summary of regression coefficients for intention to seek medical help. The overall model for medical help-seeking was significant (F (21, 1150) = 6.911, p <.001, RES = .874, R^2 = .112). Of the control variables (step 1) only having at least a university level of education was significantly associated with a higher likelihood of medical help-seeking.

Main effects (step 2) revealed that those who smoked more than 10 cigarettes per day along with those who had been trying to conceive for more than 12 months were associated with significantly lower intentions to seek medical help. Those with higher fertility knowledge and those who suspected that they or their partner had a fertility problem were associated with significantly higher intentions.

The results for the 2-way interactions (step 3) showed that main effects were qualified interactions. Figure 3.3 shows the joint effect of fertility knowledge and being older than 34 with slope analysis revealing that those below age 34 were significantly more likely to seek medical advice if they had high fertility knowledge (B = .313, p <.001) while this was not significant for those above the age of 34 (B = .108, p = .457). Age also interacted with susceptibility, with slope analysis revealing that those below age 34 were significantly more likely to intend to seek medical help if they suspected they had a fertility problem than when they did not suspect (B = .666, p <.001) (see Figure 3.4). Again, this was not significant for those above the age of 34 (B = .155, p = .598).

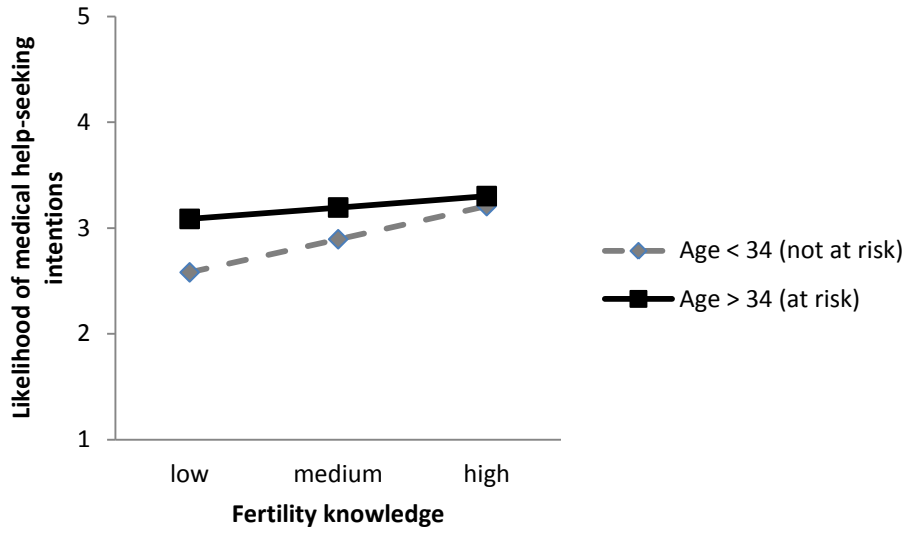

Figure 3.3. Interaction between age risk and fertility knowledge on likelihood of medical help-seeking intentions.

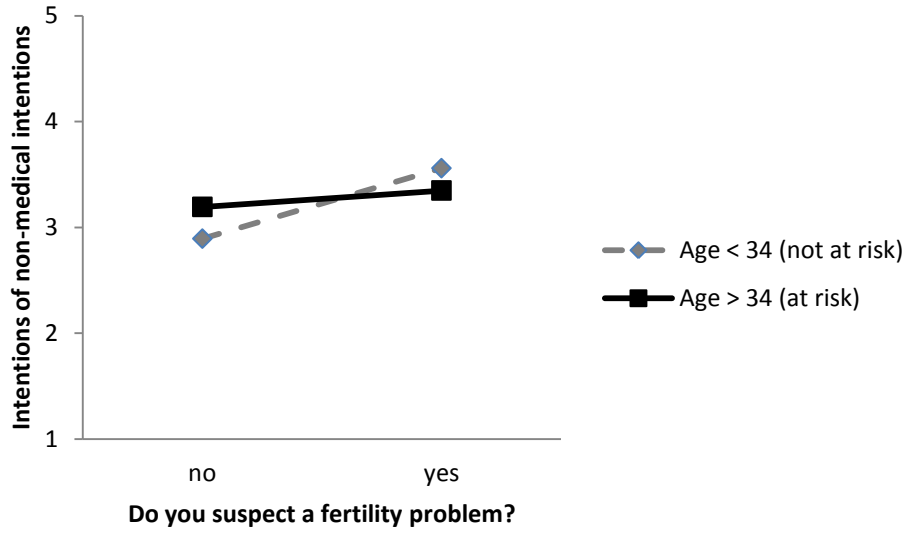

Figure 3.4. Interaction between age risk and suspecting a fertility problem on likelihood of medical help-seeking intentions.

A 3-way interaction (step 4) was found between risk of trying to conceive more than 12 months, suspecting a fertility problem and fertility knowledge. Overall, greater fertility knowledge was associated with stronger intention to seek medical help. However, those who had been trying for more than 12 months were associated with a higher likelihood of seeking medical help if they had high fertility knowledge, especially if they suspected a problem (B = .283, p <.001). They were also more likely to seek help when they did not suspect a problem if fertility knowledge was high (B = .188, p <.05). For those trying to conceive for less than 12 months, fertility knowledge was associated with increased likelihood of medical help seeking when they did not suspect a problem (B = .332, p <.001). For those who did suspect a problem the association between fertility knowledge and medical help seeking intentions was also positive but not significant (B = .124, p = .165) (Figure 3.5).

A second three-way interaction was significant. Trying for more than 12 months, fertility knowledge and perceived fertility was also found to have a joint effect on medical help-seeking with level of fertility knowledge being positively and significantly associated with the likelihood of intentions to seek medical help amongst those trying to conceive for less than 12 months (B = .350, p <.001) (Figure 3.6). For those trying to conceive for more than 12 months the association between fertility knowledge and medical help-seeking was also positive but not significant (B = .068, p = .519) (Figure 3.5). No other significant associations were found. A summary of coefficients can be seen in Table 3.6.

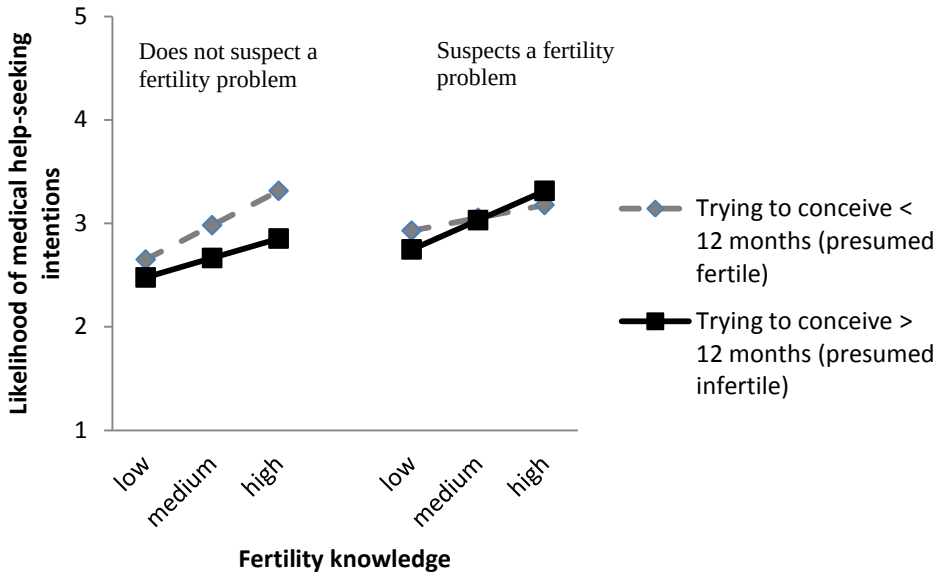

Figure 3.5. 3-way interaction between suspecting a fertility problem, time trying to conceive and fertility knowledge on likelihood of medical help-seeking intentions.

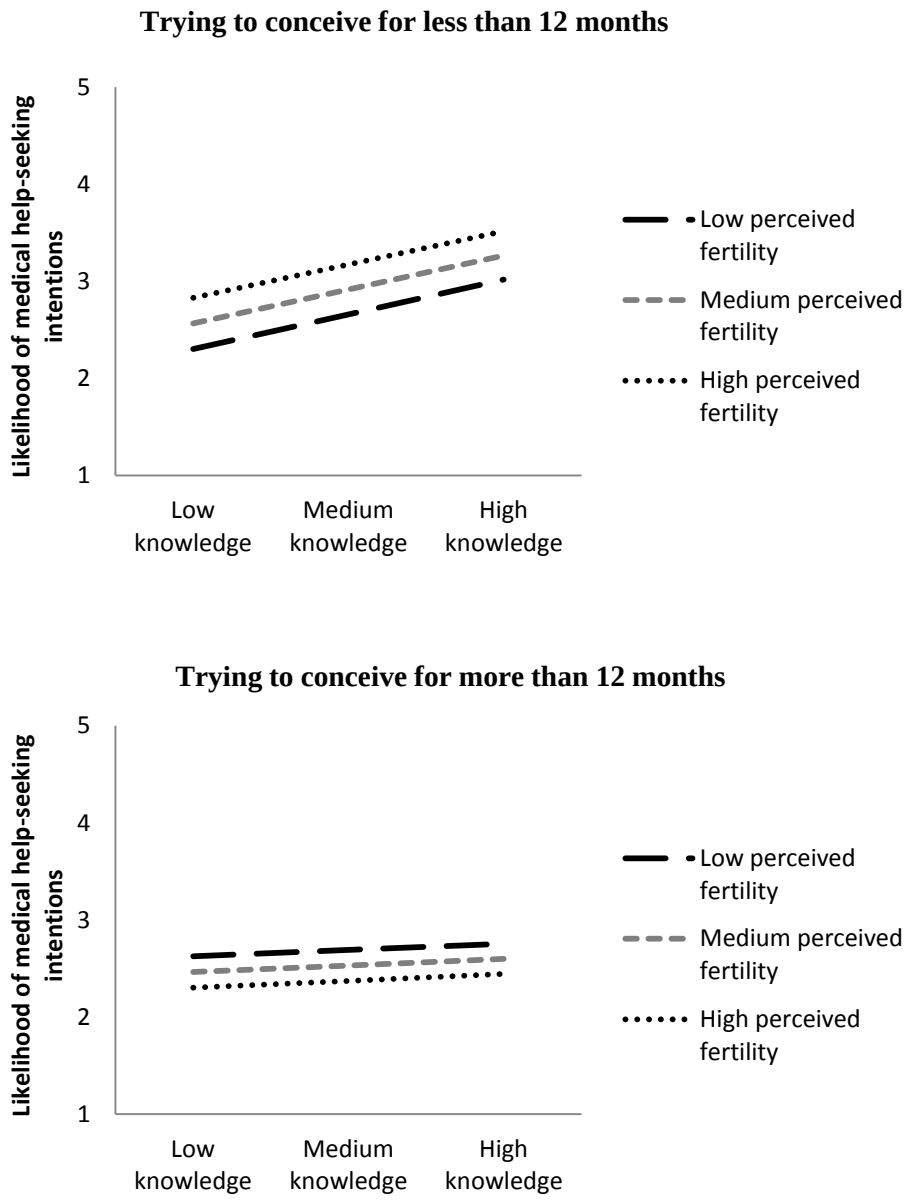

Figure 3.6. 3-way interaction between perceived fertility, time trying to conceive and fertility knowledge on likelihood of medical help-seeking intentions.

Intention to seek non-medical help or advice.

Table 3.6 presents regression coefficients for analysis on seeking non-medical help. The overall model for non-medical help-seeking was significant (F (21, 1150) = 3.266, p <.001, RES = .725, R^2 = .056). There was no significant effect of the control variables (step 1).

Main effects (step 2) revealed that smoking more than 10 cigarettes per day was negatively associated with the intention to seek non-medical help while having a BMI of over 25 and having higher fertility knowledge was positively associated with the intention to seek non-medical help.

A 2-way interaction (step 3) was found between suspecting a fertility problem and being over the age of 34 with slope analysis revealing that intention to seek non medical help was negatively associated with being above age 34 and suspecting a problem, although this was not significant (B = -.373, p = .166). There was no significant association for those under the age of 34 (B = .046, p = .840) (Figure 3.7).

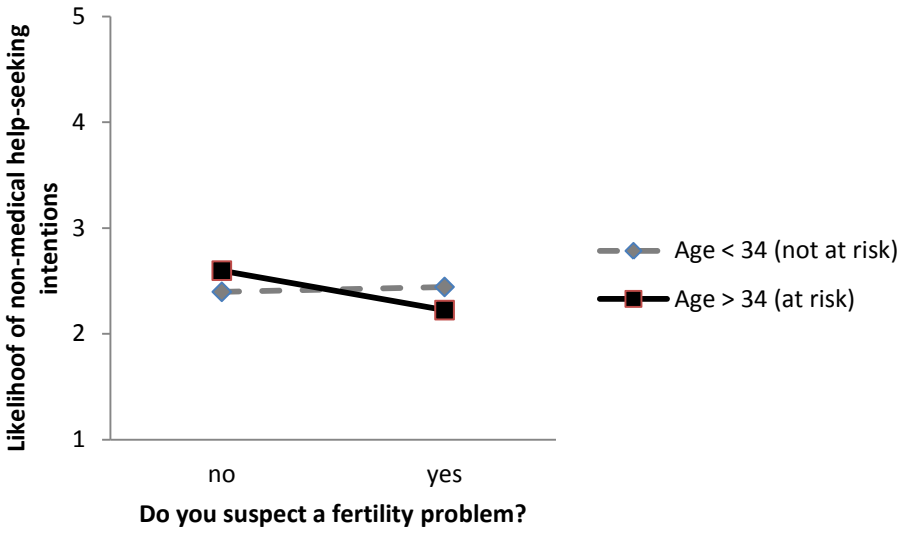

Figure 3.7. Interaction between age risk and suspecting a fertility problem on likelihood of non-medical help-seeking intentions.

A 3-way interaction (step 4) was found between smoke risk, fertility knowledge and suspecting a problem with slope analysis revealing that among those who smoked, there was a higher likelihood of seeking non-medical help when fertility knowledge was high and a fertility problem was suspected (B = .270, p <.05) whereas when no fertility problem was suspected there was less likelihood when knowledge was high although this was not significant (B = -.094, p = .483) (Figure 3.8). Among those who did not smoke there was a marginally significant positive association between knowledge and likelihood of seeking non-medical help when they did not suspect a problem (B = .136, P = .053) and when they did suspect a problem (B = .115, P = .057). A summary of coefficients can be seen in Table 3.6.

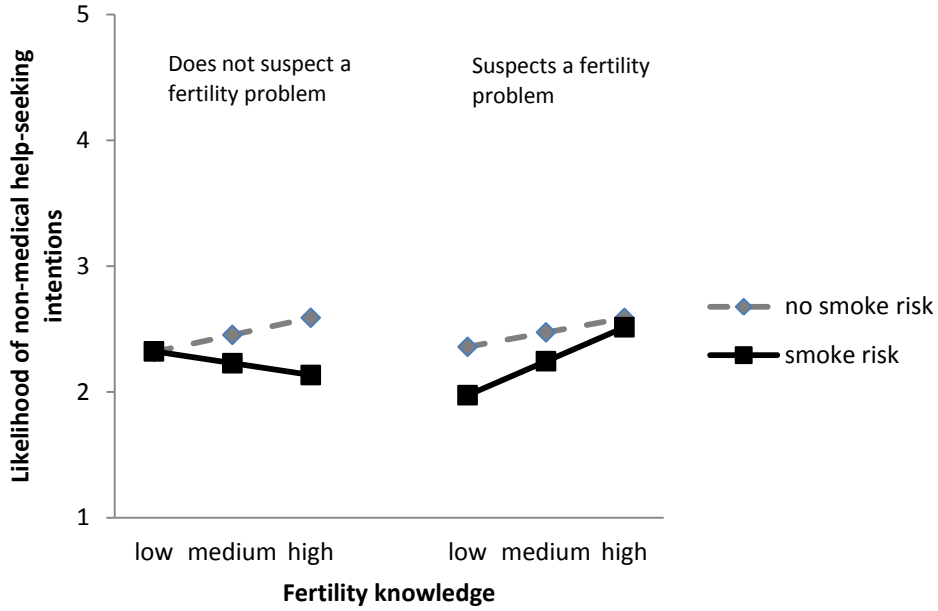

Figure 3.8. 3-way interaction between suspecting a fertility problem, smoke risk and fertility knowledge on likelihood of non-medical help-seeking intentions.

Intentions to change lifestyle

The overall model for intending to change lifestyle was significant (F (21, 608) =2.869, p <.001, RES = .1.857, R^2 = .090). Of the control variables (step 1), both having at least a University education and scoring higher on the Mcquillan economic hardship index were significantly associated with a higher likelihood of intending to change lifestyle.

Of the main effects (step 2) having a BMI of over 25 and having higher fertility knowledge were significantly associated with a higher likelihood of the intention to change lifestyle.

There was a significant 2-way interaction (step 3) between fertility knowledge and BMI with slope analysis revealing that those with a BMI higher than 25 were

significantly more likely to intend to seek help if they also had high fertility knowledge (*B* = .393, *p* <.01), while there was no significant difference in intentions in those with a BMI below 25 (*B* = .073, *p* = .605) (Figure 3.9).

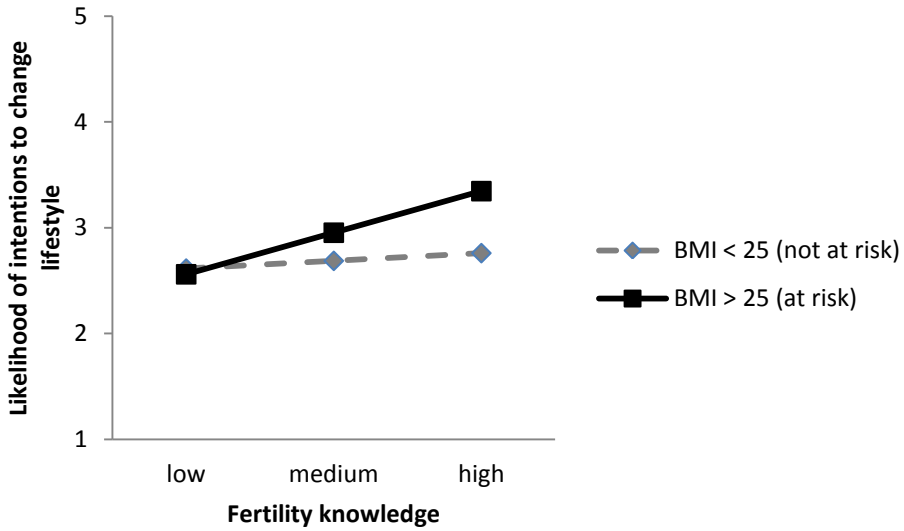

Figure 3.9. Interaction between BMI risk and fertility knowledge on likelihood of intending to change lifestyle.

There was a significant 3-way interaction (step 4) between smoking, fertility knowledge and suspecting a problem with slope analysis revealing that among those who smoked, fertility knowledge increased the likelihood of lifestyle change but only when they perceived themselves to be susceptible to fertility problems (*B* = .485, *p* <.05). When they did not suspect a problem there was a negative association between knowledge and intention to change lifestyle although this was not significant (*B* = -.372, *p* = .149) (Figure 3.10). Among those who did not smoke there was a positive association between fertility knowledge and intention to change lifestyle when they did not suspect a problem but this

was not significant (B = .118, p = .416) while among those not suspecting a problem the association was negative (B = -.025, p = .844). A summary of coefficients can be seen in Table 3.6.

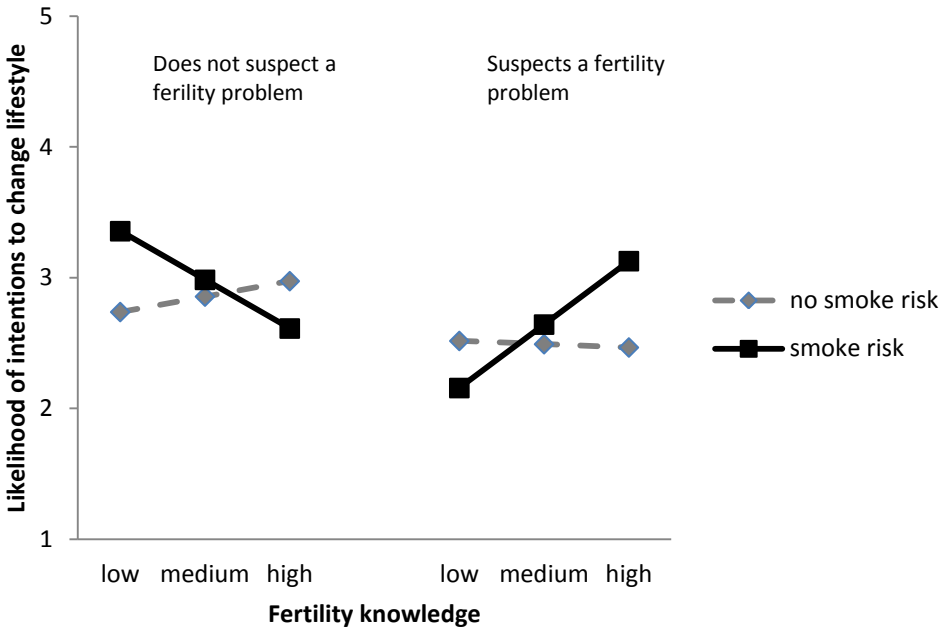

Figure 3.10. 3-way interaction between suspecting a fertility problem, smoke risk and fertility knowledge on likelihood of intending to change lifestyle.

Table 3.6

Summary of regressions for variables predicting likelihood of medical help seeking intentions (N = 1345), non-medical help-seeking intentions (N = 1345) and intention to change lifestyle (n = 721)

	Medical (*N* = 1345)			Non-medical (*N* = 1345)			Lifestyle change (*n* = 721)		
Variable	***B***	***SE B***	***β***	***B***	***SE B***	***β***	***B***	***SE B***	***β***
Step 1: Control variables[2]									
At least University education	.227***	.057	.115	.084	.051	.048	.341**	.111	.121
Mcquillan economic hardship index	.035	.029	.035	.049	.026	.056	.134*	.0558	.097
Step 2: Fertility[2]									
Having a BMI of 25 and above	.018	.058	.009	.125*	.052	.070	.435***	.117	.148
Smoking 10 or more cigarettes per day	-.178*	.079	-.065	-.202**	.072	-.083	.204	.142	.058
Being over the age of 34	-.010	.077	-.004	-.050	.070	-.021	.150	.152	.039
Trying to conceive for over 12 months	-.153**	.057	-.078	.096	.052	.055	-.016	.113	-.006
Fertility Knowledge (0-100)	.186***	.028	.190	.098***	.026	.113	.148**	.056	.108
Suspect you/partner has a fertility problem	.264***	.063	.132	.081	.057	.046	.055	.122	.019
How fertile you think you are (1-5)	-.046	.030	-.047	-.046	.027	-.053	-.006	.060	-.004
Step 3: 2-way interactions[1, 2]									
Fertility knowledge X BMI ≥25							.276*	.117	.114
Fertility knowledge X age >34	-.217**	.075	-.090						
Suspect problem X age >34	-.504**	.175	-.149	-.418**	.161	-.141			
Suspect problem X trying >12 months	.267*	.126	.129						
Step 4: 3-way interactions[1, 2]									
Smoke >10 X fertility knowledge X suspect problem				.381*	.165	.140	.956**	.319	.243
Trying > 12 months X fertility knowledge X suspect problem	.279*	.124	.170						
Trying > 12 months X fertility knowledge X how fertile	.137*	.061	.104						

*P<.05, **P<.01, ***P<.001. [1] Only significant interaction results presented (see Appendix F for full tables of results). [2] Results taken from corresponding models

Discussion

Knowledge about fertility risks may be associated with an increase in people's intentions to seek advice and change their lifestyle.

The sample used was a relatively high-risk sample with between 15% and 50 % displaying at least one fertility-related risk factor. This risk level is in line with UK population values. In the present sample, 37.2% were considered to be overweight (BMI over 25) while the population figure is 25% (ONS, 2008); 26.1% of the present sample smoked while 22% of the population smoke (ONS, 2008); 15.9% of the present sample was over the age of 34 while in the UK in 2009, 19.8% of all births were to women aged 35 or older. Worryingly, amongst the present sample, 50% had been trying to conceive for more than one year and would therefore meet the medical definition of being infertile. As the sample were all trying to conceive these findings demonstrate that people may be unaware of the precise implications of the risks posed to their fertility by their lifestyle choices and that people are not behaving optimally regarding their fertility by seeking timely advice or treatment especially when they have been trying to conceive for a longer duration. Evidently, although people may have some awareness of the risks posed by certain lifestyles they clearly need more education about the specific effects these lifestyles have on their own personal fertility and where to seek help in changing or adapting these behaviours.

Fertility knowledge was quite low among the present sample with just over half of the whole sample (55.6%) having average to high fertility knowledge (this figure was similar in the subsample where 52.6% had average to high fertility knowledge). This low level of fertility knowledge corresponds with other studies in the area. For example, a study of undergraduate students revealed that while 63% of women correctly identified

the age at which women are most fertile, only 33% of women correctly identified the age at which fertility decreases (Lampic et al., 2006). A further study of female undergraduates revealed that less than half (45.5%) correctly identified woman's age as the strongest risk factor for infertility (Bretherick et al., 2010). Furthermore, fertility knowledge differed dramatically according to county with the U.K. having the highest overall knowledge and Turkey the lowest overall knowledge. This may demonstrate important issues with regards to the differing levels of education and information on fertility in different countries. With regards to predictors of fertility knowledge, those with at least a University education along with those who scored lower on the McQuillan economic hardship index and those who were older demonstrated higher overall fertility knowledge. Higher fertility knowledge was also significantly associated with being in a relationship for a longer time, having a stronger desire for a child and suspecting a fertility problem. These results concur with other studies in the area in that those with a higher level of education are generally knowledgeable regarding fertility information about risks (e.g., Bunting & Boivin, 2008) while being in a stable relationship (e.g., Berrington, 2004) and having stronger desire for children (e.g., Heaton et al., 1999) are both important factors in the deliberation to have children. Therefore, those in what they may consider to be a more stable (or long term) relationship and those with a stronger desire for children may have sought out more information about fertility issues over time. In line with the Health Belief Model, suspecting a fertility problem was also associated with higher fertility knowledge. As awareness of a problem can be the first call to action in a health matter (Sheeran & Abraham, 1996), this may suggest that those who do suspect a fertility problem may seek out information on their own in order to optimise their own fertility.

Fertility knowledge overall was significantly associated with a higher likelihood of medical help-seeking, non-medical help-seeking and the intention to change lifestyle indicating that educating people about the risks associated with reduced fertility is imperative. This, along with other studies in the area, highlight the need for educating women at an earlier age of the risks associated with decreased fertility. Maheshwari, Porter, Shetty and Bhattacharya (2008), while examining awareness and perceptions of issues surrounding delay in subfertile and pregnant women (mean ages, 32.6 and 29.3 respectively), found that nearly all participants (94.5%) believed that women needed to be informed of the implications of delay at an earlier age. Additionally Friese et al. (2006) discovered that women conceiving after using donor oocytes (due to age related infertility) believed that earlier education about the risks of delay, leading to earlier conceptions if possible, would have been preferable to undergoing the emotional and physical stress associated with infertility treatments.

Risk factors overall had different effects on fertility optimising behaviours. For example while having a BMI of over 25 increased the likelihood of seeking help, smoking decreased the likelihood. There are several explanations for this. Firstly it may be the case that individuals may see weight loss as easier to achieve than giving up smoking due to the addictive properties of cigarettes along with the withdrawal symptoms that may be experienced when trying to give up (Doherty, Kinnunen, Militello & Garvey, 1995) while the benefits of losing weight may be more immediate. Additionally it has been shown that smokers who do not believe that any of their health problems are due to their smoking are less motivated to quit smoking than those who attribute problems to their smoking (Coleman, Barrettt, Wynn & Wilson, 2003).It has also been shown that some smokers believe that their risks of health problems such as cancer or heart disease are no higher than those who do not smoke (Ayanian & Cleary, 1999). If some

individuals who smoke do not regard their risk of smoking-related diseases as high, even though there is consistent advertising about the risks of these diseases, then it is feasible that an individual who smoked may not relate any problems with their fertility to the fact that they are a smoker. Further, health problems associated with smoking are likely to be seen as self-inflicted so individuals who smoke may be reluctant to seek help or advice for their fertility, especially medical, for fear of the stigma attached to being responsible for their own health problems (Weiner, Perry & Magnusson, 1988) while there may not be such a stigma of seeking medical advice for losing weight.

Risk factors also had an impact on help-seeking when combined with knowledge. While certain risk factors were positively associated with higher likelihood of fertility optimising behaviours when knowledge was high (e.g., having a high BMI) others were negatively associated (e.g., age). Several factors may explain this reluctance. For example, those who are over the age of 34 who know that fertility declines with age may feel that seeking advice will not help as their age cannot be changed. Additionally they may feel no need to change their lifestyle if they believe that the only factor that is hindering conceiving is their age.

In the case of BMI the intentions to seek medical help and change lifestyle only significantly increased when fertility knowledge was also high indicating that knowledge is fundamental in encouraging people to behave in a more optimal way when it comes to their fertility.

The present study found concordance between being at risk and perceived susceptibility (i.e., suspecting a fertility problem or low perceived fertility) in that those at risk who suspected a problem were more likely to seek help. As predicted there was interplay between knowledge, risk status, perceived susceptibility and their effect on

fertility optimising behaviours. Both fertility knowledge and perceived susceptibility appeared to have overall and specific effects while being at risk appeared to operate differently. Higher knowledge was also positively associated with seeking medical help, non-medical help and intending to change behaviour when combined with higher perceived susceptibility. However, this was only significant with certain risk factors. For example, among those who smoked the likelihood of intention of engaging in fertility optimising behaviours was higher among those who suspected a fertility problem, while amongst those who did not suspect a problem the association was negative especially with high knowledge. This may indicate, as previously stated, that those who do not suspect a problem do not believe that their smoking habits could impact on their fertility, indicating that when people do not feel susceptible to fertility problems there is no added benefit of having higher knowledge

Crucially, the present study found that among those over the age of 34 there was no increase in intention to seek either medical or non-medical help, even when knowledge was high or perceived susceptibility was high. It is possible, as previously mentioned, that the women in the older age group with higher fertility knowledge may already be aware that their age is affecting their ability to conceive and may not feel that it is worth seeking medical advice for something they already know about. This indicates that it is vital to target people before the age of 34 and that there may be a critical window of opportunity in which to educate women about the risks associated with their fertility.

The results as a whole support the Health Belief Model (HBM) (as set out in the introduction) in that higher fertility knowledge (or awareness) along with feeling susceptible to a fertility problem in many cases led to a higher likelihood of seeking help and advice and thereby optimising fertility. The HBM proposes that people will not change their behaviour unless they feel at risk (Rosenstock, 1990). This may also be the

case in some of the risk factors in the current study. For example, those with a BMI of over 25 who know that this is a risk to their future fertility and so decide to seek help or advice in losing the weight so that their fertility may not be compromised in the future. The perceived benefits to this (e.g., healthier lifestyle, increased chance of conception) may outweigh any perceived costs (e.g., having to follow a low-calorie diet). Conversely, many of those who smoked did not have as high an intention of seeking help unless they also perceived that they may have a fertility problem. In the case of smoking, the perceived barriers (e.g., the difficulty in giving up) may outweigh the benefits and so in some cases people may not seek out the advice that they need in order to optimise their fertility.

Although findings are generalizable in terms of cross-cultural validity and a large sample size was used, the cross-sectional design has limitations in that firstly, it is not possible to ascertain whether the respondents who did not engage in fertility optimising behaviours may do so in the near future. Secondly, the study examined many aspects of fertility risks and knowledge so it would be beneficial to know whether by simply asking questions about an individual's fertility it may have an impact further down the line on how respondents view and approach fertility optimising behaviours. In addition the current sample was recruited via an internet survey which may result in populations that are not necessarily representative. For example, the majority of the present sample were highly educated and therefore, may be more likely to have internet access. However, due to the entire sample currently trying to conceive it was possible to get a clear picture of knowledge and awareness of fertility risks among those who were currently in the transition to parenthood stage as oppose to examining those who intend to have children at some point in the future.

The present study clearly demonstrated the influence of knowledge concerning fertility risks when it comes to fertility optimising behaviour among those trying to conceive. Differences between countries with regards to fertility knowledge may demonstrate different levels of education regarding information about fertility and so needs to be taken into account in any further cross-cultural research. Furthermore, due to a paucity of research investigating cross-cultural difference in this area the findings highlight the need for further contemporary investigations into this area.

The study also revealed a need for education about fertility to be disseminated in a timely manner as after a certain age even high knowledge does not always encourage help-seeking for problems related to fertility. This shows that it is vital to examine and discover the time frame in which education about fertility and the risks associated with reduced fertility would be most beneficial.

Chapter 4: Raising awareness of risks associated with fertility

Overview

Whilst we already know that many women are delaying having children until an age that may mean that their fertility is compromised (chapter 2) and that even those who are aware of the risk that older age, along with other lifestyle factors, may pose to their fertility may not always behave in the most optimal way when it comes to their fertility (chapter 3), we do not know whether the way in which information about fertility issues is presented to people may make a difference in the way that they process that information. That is, whether people who may be aware of the risks that certain lifestyles (e.g., smoking or drinking alcohol) may have on their ability to conceive do not apply this knowledge to themselves and in turn modify their behaviours. Therefore, the present chapter aimed to examine whether presenting personalised information regarding fertility compared to non-personalised information would encourage any change in behaviours deemed risky to fertility (e.g., having unprotected sexual intercourse, smoking more than 10 cigarettes per day or drinking more than 14 units of alcohol per week) immediately following the study.

Introduction

Incidence and prevalence of fertility problems

Approximately 10% of couples who have regular unprotected sexual intercourse for a period of 12 months will not achieve their goal of pregnancy and are considered infertile (National Institute for Health and Clinical Excellence, NICE, 2004). On average just over half (~56.1%) of couples will seek medical care for infertility with only 22.4% receiving care (Boivin, Bunting, Collins & Nygren, 2007). These low numbers of people seeking and receiving care may demonstrate a lack of education with regards to what people know about their own fertility and when they should be taking action if they suspect that there may be a problem.

Nowadays we are seeing a rise in health tools and information that focuses on the individual assessing their own risks with regards to health and with the information gained from these tools being able to make informed choices about their lifestyle. A leading example of this type of personalised assessment tool is that of NHS Choices (Department of Health, 2006). For example, an individual can look up symptoms for depression, answer a series of questions relating to their symptoms and are then given advice on what to do next. Although the NHS choices offers information on infertility (e.g., causes, diagnosis, treatment) it does not offer the opportunity to answer personalised questions in order to obtain advice tailored to the individual's needs regarding their current and future fertility.

A second area that addresses public knowledge and education is that of public health campaigns which can also increase public awareness of specific disorders or

healthy options. For example, after campaigns regarding folic acid spontaneous awareness grew from 9% in 1993 to 39% in 1997 while sales and prescriptions of folic acid increased by 50% over an eight-month period. (Health Development Agency, 2006). Such changes show the effectiveness of mass media campaigns. However, there does appear to be a lack of these media campaigns with regards to fertility. While health advertisements on television and in magazines focus on issues such as smoking, cancer, heart disease and healthy lifestyle there is a distinct lack of advertising regarding the issues surrounding infertility with one of the only campaigns coming from the American Society for Reproductive Medicine (ASRM) in 2001 when they attempted to raise awareness of risks associated with compromising fertility (e.g., smoking, older age, obesity) with modest effects (Bunting & Boivin, 2008). With the number of people who will experience infertility, this lack of information needs to be addressed.

Awareness of age-related fertility decline

In addition to rates of infertility, fertility begins to decline from around the age of 35 years. There are increased risks to mother and baby from conceiving at an older age, while child-bearing at an older age means less time for subsequent births so that desired family sizes may not be achieved. Despite these facts, more and more women worldwide are delaying childbearing until after the age of 29, with the age at first birth in 2010 reaching a record high of 29.5 in England and Wales (Office for National Statistics (ONS), 2011), suggesting that women may not be fully aware of the risks posed by delayed childbearing.

There is some evidence for this interpretation. Berrington (2004) distinguished between whether a sample of highly educated women were childless due to actual planning or whether they were childless due to what she referred to as 'perpetual postponing'. Perpetual postponers were proposed to be individuals who intended to have a child at some point in the future but because of constant delaying became childless due to their reproductive years ending without them ever achieving a live birth (Berrington, 2004). It is possible that some of these perpetual postponers became so due to a lack of knowledge or awareness of how their age could limit their fertility potential.

To examine awareness of age-related fertility decline one study surveyed 360 female undergraduate students (mean age 21.28 years) in order to investigate their knowledge of the decline in fertility and increased risk of pregnancy loss associated with age (Bretherick, Fairbrother, Avila, Harbord & Robinson, 2010). Among the students surveyed, 88.9% reported intending to have children in the future, with the average number of desired children being 2.34, thus showing the importance of parenthood to these young women. Results also showed that while the majority of participants were aware that fertility declined with age, they still overestimated the chances of a pregnancy at all ages (20, 30 and 40 years of age). Further they underestimated the average number of months it would take women in their 20s and 30s to become pregnant. Less than half (45.5%) identified women's age as the strongest risk factor for infertility, while less than a quarter (24.7%) correctly identified women's age as the strongest risk for miscarriage.

Tough, Tofflemire, Benzies, Fraser-Lee and Newburn-Cook (2007) found that in a sample of 1506 Canadian men and women (aged between 20 and 45 years old) over half recognised that women over the age of 35 could experience trouble conceiving but less than 45% correctly identified that women over 35 were more likely to have a caesarean

section, premature baby or a stillbirth (Tough et al., 2007). In addition, a qualitative study found that women often believed themselves to still be fertile if they were menstruating regularly, assuming that they had a good chance of conceiving until the approximate age of 45 (Friese, Becker & Nachtigall, 2006). However, the presence of menstruation does not necessarily indicate fertility. Anovulation (absence of ovulation) is a case of infertility affecting between 6-15% of women but anovulatory women can still menstruate (Speroff, 2005).

Finally, research has also shown that young people want to have other things in place, such as a stable relationship and economic stability, before considering childbearing (Lampic, Skoog Svanberg, Karlstrom & Tyden, 2006). This indicates that young people may be thinking about their fertility only at a later age when fertility may begin to be compromised. The study, which examined attitudes towards childbearing among 222 women and 179 men, found that although the majority of people indicated that they wanted children around half of the women stated that they intended to have a child after the age of 35 (Lampic et al., 2006) when their fertility may be compromised.

Together the studies suggest that although many women appear to know that age has an impact on fertility, they lack precise knowledge about the magnitude of this effect or its full nature. Therefore there may be a need for educating women at an earlier age of the risks associated with delaying childbearing. A need acknowledged and reinforced by previous research. Maheshwari, Porter, Shetty and Bhattacharya (2008) examined awareness and perceptions of issues surrounding childbearing delay in subfertile and pregnant women (mean ages, 32.6 and 29.3 respectively). Results showed that nearly all participants (94.5%) held the belief that women should be informed of the implications of delay at an earlier age. Additionally Friese et al. (2006) discovered that women needing to

resort to using donor oocytes to conceive (i.e., due to late childbearing) believed that earlier education about the risks of delay would have been preferable to undergoing the emotional and physical stress associated with infertility treatments. Therefore knowledge about age-related constraints to fertility could be disseminated to people at a younger age in order for them to make more informed decisions about childbearing.

Other risk factors

Age has been highlighted as a major contributor to the decline in reproductive ability. However, numerous other factors associated with risk to fertility have also been identified including reproductive (e.g., menstrual cycle irregularities, pelvic surgery, endometriosis, menstrual cycle irregularities) and lifestyle factors (e.g., excessive use of alcohol, smoking, illegal drugs, unprotected intercourse with multiple partners, obesity) factors (Bunting & Boivin, 2010). For example, Bunting and Boivin (2008) found that the risk factors significantly associated with fertility impairment were age (being more than 34 years old), severe menstrual pain, endometriosis, pelvic inflammatory disease, having a long (more than 35 days), irregular or absent menstrual cycle, previous pelvic surgery, being overweight, having unprotected sexual intercourse and stress. In addition to this, smoking (more than 10 cigarettes per day) and drinking (more than 14 units per week) were associated with longer time to pregnancy. The impact of many of these factors may interact or worsen with age, compounding the base biological effect of older age. Indeed multi-factorial fertility models show that there is an increase in the time it takes to become pregnant with exposure to multiple risk or negative lifestyle factors (Hassan &

Killick, 2004). However some of these risks to fertility are modifiable, for example lifestyle factors such as drinking, smoking and weight.

The fact that some risk factors could be reduced or modified coupled with teaching young people about the risks of leaving childbearing too late may help young people better deliberate about their fertility at a younger age. However, to do so requires knowledge about how best to present fertility information to people. Dissemination should educate about fertility and the risk factors for reduced fertility as well as encourage people to act on the given information and make informed choices regarding fertility and reproduction. It appears that within school settings there is a focus on the prevention of pregnancy and sexually transmitted diseases rather that education on fertility issues and risks. Sex and relationships education (SRE) concentrates on avoiding teenage pregnancy and the importance of safer sex. For example, the National Assembly for Wales (2011) guidance states the following key points as important: preparing girls and boys for puberty, preparing girls for menstruation, access to and information regarding contraception, the moral and emotional aspects of abortion, the risks of STIs (including HIV/AIDS) and what safe sex is. However, none of the current curriculum discusses information about safeguarding future fertility or risks associated with reduced fertility, such as age-related infertility.

Empirical Literature on risk communication

The way health information regarding risk is presented to people may have an impact on how they respond to that information. Risk communication needs to be presented in an optimal way in order for people to understand the risks. This has been

difficult in the past due to there being no overall consensus as to how the information should be presented most effectively (Timmermans, Ockhuysen-Vermey & Henneman, 2008). However, one fast emerging method of effective health communication is that of tailoring. Tailoring has been described as combinations of strategies and information which are intended to be able to target specific people, based on the person's unique characteristics and related to the outcome of interest (Kreuter, Farrell, Olevitch & Brennan, 2000). Therefore tailoring differs to generic communication (which is in no way individualised or based on individual assessment) and targeted communication (in which certain sections of the population are targeted).

Studies show that tailoring (or personalising) health information can be an effective way of communicating risk information. Personalising health information involves taking information and strategies for change and combining them in order to reach specific individuals or groups, so that the information will be based on characteristics unique to the individual or group in question (Kreuter, Bull, Clark & Oswald, 1999). A meta-analysis examining 57 studies concerned with tailoring health information (Noar, Benac & Glavac, 2007) discovered that although overall it would appear that tailoring is effective in stimulating health behaviour, the effect size (r = .074) was slightly less than small. However, Noar et al. (2007) go on to explain that several of the studies had compared tailoring to no-treatment conditions that they described as not a true test of tailoring. From the 40 studies that did actually compare tailoring with a contrasting type of information, such as generic or targeted, it was found that tailored messages surpassed other types of comparison messages (odds ratio = 1.21) in bringing about changes in health behaviour.

One model used to explain why personalising information works more effectively and how persuasive messages may change attitudes in individuals, and thereby encourage them to change or modify behaviour is the elaboration likelihood model (ELM) (Petty & Cacioppo, 1984). The ELM proposes that there are two different types of routes through which messages can be received and processed: the central route and the peripheral route. The central route posits that when an individual is motivated to think about a message, able to pay attention to it and the message is strong then they will more likely be persuaded by the message as they will be able to elaborate more extensively. When messages are elaborated on in this way, they would be more likely to be retained and therefore more likely to lead to attitude or behaviour change (Kreuter, Farrell, Olevitch & Brennan, 2000). The peripheral route holds that when unable to extensively elaborate on a message, then an individual may still be persuaded by factors that do not necessarily have to do with the actual content. For example, they may still be drawn to the message if they are already familiar with or have positive attitudes to content in the message (Petty, Cacioppo & Schumann, 1983).

Therefore, according to the ELM, if a health message is perceived as personally relevant it should stimulate more thoughtful and thorough deliberation of a behaviour change.

This has been shown in a study comparing tailored and non-tailored weight-loss materials (Kreuter et al., 1999). Participants with a body mass index of 27 or over and an interest in losing weight were randomly assigned to receive information regarding weight loss which was either tailored to unique needs and concerns, pre-printed by the American Heart Association or information from the American Heart Association formatted to look identical to the tailored information. Although there were no significant differences

between groups with regards to the information being perceived as useful in helping to lose weight (after a month follow-up), the tailored materials were rated significantly more favourably in terms of liking, being attention catching, easy to understand and the extent of agreement with the content, which is in line with the ELM.

A study examining ways of increasing mammogram uptake for women with a first-degree relative with breast cancer (i.e., those women at higher risk) interviewed women deemed at higher risk before sending them information booklets on risks of breast cancer (Bastani, Maxwell, Bradford, Prabhu Das & Yan, 1999). Half of these women also received a letter containing tailored information about their personal risk. An overall increase of 8% was found within the intervention group (i.e., those sent personalised letters). However, all of the effects were found in the age group of women over the age of 50, suggesting that different age groups may see information differently and this would need to be considered when producing booklets relating to health information. Furthermore, as the risk of breast cancer is higher in women aged more than 50 years (Yancik, Wesley, Ries, Havlik, Edwards & Yeats, 2001) these findings may also suggest that tailoring works best in groups already perceiving themselves as at risk. In studies such as these 'personalised' is defined as presenting person-specific risk alongside the general information presented.

According to Bandura (2004) an individual will only change certain behaviours (e.g., lifestyle habits such as smoking and drinking) if they have appropriate knowledge of the health risks and benefits. Therefore, if there is a lack of knowledge of how these behaviours may affect aspects of health (e.g., future fertility) there will be no incentive for the individual to change these habits in order to give themselves the best chance possible of conceiving later on in life. It has also been suggested that although people are

aware of certain risk factors, they do not always seem to apply them to themselves (Bunting & Boivin, 2008).

Examining attention to health communication

Modified Stroop task

One way of examining whether information has been processed is to study attention. Attentional bias is the enhanced allocation of attention towards threat-related cues (Schwerdtfeger, 2006) and one of the more common ways of examining this is the modified Stroop task, which identifies attentional bias to threatening words. Originally, the Stroop task was a colour-naming task in which colour names were printed in differently coloured ink (Stroop, 1935). Participants had to name the colour of the ink (e.g., red) whilst ignoring the actual content of the word (e.g., blue). It was found that participants were slower to name the ink colour when it differed to the actual word content (interference effect).

More recently the Stroop task has been modified to include threatening or emotional words and this modified Stroop task is one of the most common methods for assessing attentional bias (Owens, Amundsen, Hadjistavropoulos & Owens, 2004). This method has been used to assess the degree to which individuals may exhibit a non-conscious processing bias to specific threatening stimuli (Karademas, Christopoulou, Dimostheni & Pavlu, 2008). For example, in the case of health anxiety (the fear of having an illness) a modified Stroop task may be used to measure whether individuals who are anxious about a certain aspect of their health (e.g., cancer) would show greater attentional bias when presented with cues related to the specific problem causing the anxiety.

During the modified (or emotional) Stroop participants are required to name the colour of a word presented to them whilst ignoring the meaning of the word. If the word presented to participants is related to a concern they may have about their own health, it is hypothesised that the participant would be slower (known as 'interference effect') or make more errors compared to when presented with neutral words (Moradi, Nehat-Doost, Taghavi, Yule & Dalgleish, 1999). The emotional Stroop task, along with interference effect, has been shown to be a reliable measurement of attentional bias (MacLeod, 1991) and a suitable method of examining biased processing of information in a variety of settings including health settings such as women with a family history of breast cancer showing greater interference to cancer-related stimuli than those without family history (Erblich, Montgomery, Cloitre, Valdimarsdottir & Bovbjerg, 2003). That is, women with a family history of breast cancer had more errors and longer colour naming reaction times.

An application of the modified Stroop task with regards to women entering fertility treatment has been used alongside self-report measures of neuroticism, trait anxiety and state anxiety to investigate the role of attentional biases together with the role of neuroticism and trait anxiety towards threat in a prospective study in which 49 women entering fertility treatment were administered a Stroop task (alongside self-report measures). State anxiety was assessed again after failed in vitro fertilization (IVF) or intracytoplasmic sperm injection (ICSI) treatment (Verhaak, Smeenk, van Minnen & Kraaimaat, 2004). Women starting IVF or ICSI treatment took part in a modified Stroop task measuring interference in response to seeing potentially threatening fertility words (e.g., infertile) (Verhaak et al., 2004). In the modified Stroop task participants were presented with neutral words, general threat words (e.g., pain) and infertility threat words

(e.g., miscarriage). Participants were required to name the colour that each word was presented as quickly as possible. To calculate interference scores between threat and neutral words, reaction times on neutral words were subtracted from the reaction times on both the general threat words and the infertility threat words. Results revealed significantly greater interference (i.e., slower reaction time) regarding infertility threat words compared to general threat words in an infertile group (Verhaak et al., 2004).

Although there is much evidence demonstrating that colour naming timings are longer in those individuals anxious or concerned about the syndrome-specific words presented in such tasks compared to neutral words (Williams, Mathews & MacLeod, 1996), there appears to be limited use of Stroop tasks in health anxiety (Karademas et al., 2008) and none that the author is aware of that concerned anxiety or concern about an individual's future fertility.

Physiological indicators

In addition to examining attention, one can also examine arousal in order to investigate the processing of information, and specifically threat information. This can be achieved by examining physiological indicators (e.g., heart rate or skin conductance).

Heart Rate (HR) is generally measured in beats per minute (BPM) and for a normal adult this ranges from 60 to 100. Many activities including stress can elevate HR (along with sweat gland activity), which will return to normal once the stressor passes (Sun, Kuo, Cheng, Buthpitiya, Collins & Griss, 2003). For example, Watson, Pettingale & Goldstein (1983, as cited in Ordonana, Gonzales-Javier, Espin-Lopez & Gomez-Amor, 2009) established that when showing an antismoking film to both smokers and non-smokers only the smokers showed an increase in arousal, suggesting that measuring

arousal may be especially useful in examining whether information tailored to the individual has more of an effect than general information.

Galvanic Skin Response (GSR) is another physiological method used and is a technique of measuring the electrical conductance of the skin as it varies with moisture level. As sweat glands are controlled by the sympathetic nervous system, GSR is often used as an indication of physiological or psychological arousal (Martini & Bartholomew, 2003). A GSR monitor will apply a constant voltage to the skin through electrodes attached to fingers (where along with feet, the density of sweat glands is highest). Even though the voltage is so small that it cannot be detected by the individual wearing the electrodes, the current that flows through the skin can be detected and displayed by the monitor. The output recorded by the GSR monitor is expressed in units called microSiemens (µS). External stimuli (e.g., sounds, sights) will induce time related change in skin conductance. These increases in the conductance of the skin may last 10-20 seconds and will then return to baseline. Spontaneous fluctuations in GSR will be seen in individuals (i.e., with no external stimuli being presented) and typically occur between one and three times per minute (Martini & Bartholomew, 2003).

GSR has been shown to be positively correlated with HR while at the same time is not influenced by change in HR at rest (Taylor & Schatz, 2011), making it ideal to measure alongside HR. However, as GSR is most commonly measured by placing electrodes on fingers one must consider that GSR shows high variability on external factors such as temperature and this must be taken into account (Taylor & Schatz, 2011).

Theoretical models on health behaviour

As well as capturing attention and educating people about certain risk behaviours and lifestyles associated with fertility, one must also consider ways in which we can bring about positive change in behaviours that may be compromising fertility. Numerous theoretical models have been proposed and an outline of these can be seen in Table 4.1.

Health Belief Model

The Health Belief Model (HBM), initially developed by Rosenstock (1966), posits that an individual will perform certain behaviours as a result of a series of core beliefs that have been refined over time. Although the HBM was originally developed to predict preventative health behaviours it is now used to explain an array of health behaviours (Ogden, 2004).

According to the HBM an individual will take action when threatened by a perceived threat that they believe may have consequences on their life. If an individual is presented with fertility risk information pertaining to their own lifestyle that threatens their belief that they will have children in the future then the individual may think about modifying their behaviour (e.g., drinking less, losing weight, stopping smoking, etc.) in order to counteract that threat. This behaviour would also depend, in part, on the individual also believing that any costs (or barriers) of the action (or behaviour) taken (e.g., difficulty in giving up smoking) would be outweighed by the benefit of the action (e.g., I will be healthier, less threat to fertility) (Rosenstock, 1990).

Protection Motivation Theory

The Protection Motivation Theory (PMT) is an expansion of the Health Belief Model and describes how an individual will use appraisal processes in response to coping with threat. According to the model, individuals will use either threat appraisals or coping appraisals resulting in either adaptive or maladaptive coping (Conner & Norman, 1996). While threat appraisal refers to individual perception of susceptibility to, or severity of, the threat being presented, coping appraisal refers to how the individual will assess different behaviours that may reduce the threat. The PMT posits that there are two ways in which information is sourced, firstly through the environment (e.g., information from others) and intrapersonal information (e.g., prior experience). According to the model, individuals will either deal with the information presented with an 'adaptive' coping response (e.g., will intend to improve health by changing their behaviour) or with a 'maladaptive' coping response (e.g., denial, avoidance).

Transtheoretical Model of Change

The Transtheoretical Model of Change (TTM) is a model of intentional behaviour change describing the relationship between specific stages (Prochaska, DiClemente, & Norcross, 1992). The Precontemplation stage involves the individual having no intention of changing their behaviour in the near future. They may be unaware that they are at any specific risk (e.g., unaware that drinking more than 14 units of alcohol may affect their fertility). At the contemplation stage the individual will be aware that a problem exists and will give serious consideration to changing the behaviour but will not yet take action. At this stage the individual will weigh up the costs and benefits associated with changing

the behaviour (e.g., giving up drinking will be good for my health but I may feel like I am missing out on social occasions). The preparation stage involves the intention to take action, while the action stage involves the individual actually modify their behaviour (e.g., quitting or cutting down on alcohol intake). Finally, the maintenance stage is the stage in which the individual will have changed their behaviour for a longer period of time.

The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) proposes that the intention itself to perform a behaviour (or change a behaviour) is governed by several beliefs (Ajzen, 1991); attitude towards a behaviour, subjective norms and perceived behavioural control (Conner & Norman, 1996). Attitudes are comprised of positive or negative assessments of the behaviour in question and the beliefs about the outcome of said behaviour (e.g., giving up smoking will improve my health). Subjective norms are made up of the individual's perception of social norms and pressure to perform a behaviour and the individual's own evaluation of their own motivation to comply with the norms and pressure (e.g., the people around me want me to give up smoking and I want to please them). Perceived behavioural control is the belief that an individual can perform a certain behaviour based on them considering both internal control factors (such as skills and information) and external control factors (such as barriers and opportunities). For example a person may give up smoking if they believe they have the willpower to do so along with help from outside influences, such as NHS stopping smoking information.

All these models can help explain why people behave in certain ways when it comes to health and have been applied in many areas of health behaviour change (see Table 4.1). The Health Belief Model has been applied to a number of health behaviours to

include condom use (Mahoney, Thombs & Ford, 1995), prevention of sexually transmitted infections (STIs) (Hiltabiddle, 1996) and breast self-examination (Champion, 2007). According to Glanz, Rimer and Lewis (2002) the HBM may be used to effectively develop health messages in order to persuade individuals to undertake health actions such as screening mammography. Despite some criticisms of the model (e.g., small effect sizes even with the factors significantly predicting behaviour: Abraham & Sheeran, 1997 and there being no room for change or development within the HBM: Schwarzer, 1992) there has been much support for the HBM, particularly in predicting intentions. For example, perceived barriers and perceived susceptibility have been found to be important predictors of breast self-examination (Wyper, 1990). The Protection Motivation Theory, as with the HBM, has been applied to areas such as reducing alcohol intake and adopting a healthy lifestyle (Boar & Deydel, 1996). However in line with the HBM, the PMT does not account for social or environmental factors (Ogden, 2004) although there is evidence that response effectiveness, severity and self efficacy reliably predict intentions (Rippetoe & Rogers, 1987). The Transtheoretical Model of Change is often used as a start to developing interventions that are tailored to specific stages of an individual's behaviour change (e.g., different interventions at different stages). Due to the different interventions at different stages, this model has been successfully applied to health-related behaviours such as smoking and exercise (Lamb & Joshi, 1996). Despite the success of the model, it has been noted that even though the model acknowledges the different needs of people at different stages, it does not outline the specific beliefs or strategies they employ in order to move through the stages (Weinstein, 1980). Finally, the Theory of Planned Behaviour attempts to link health beliefs directly to behaviour and has been used to assess a variety of health related behaviours such as testicular self-examination (McClenahan, Shevlin, Adamson, Bennett & O'Neil, 2007), contraceptive use (Peyman & Oakley, 2009) and

exercise (Rhodes & Courneya, 2003). Although the TPB has received less criticism than other models described, it has been criticized for the fact that it does not explain the order of the different beliefs or direction of causality as although the theory states that intention is the immediate determinant of the behaviour, there is heterogeneity in the relationship between intentions and behaviour (Schwartzer, 1992).

Although a plethora of research exists supporting these models and their role in predicting and changing health behaviour, little is known about how people adapt and change their behaviour in response to information about risks to their fertility as these models have not yet been implemented in this context. It appears that fertility (or risks to and causes of infertility) information lags behind that of other health areas (e.g., cancer or heart disease) in terms of dissemination from professionals to population about the signs, symptoms and risks.

Theories such as TPB have, in fact, been applied to childbearing research but this has not involved changing behaviour in order to optimise fertility. Application of the TPB has explained reproductive decision making (Billari, Philipov & Testa, 2009). For example, positive attitudes towards childlessness have been shown to be strongly correlated with intentions to remain childless (Koropeckyj-Cox & Pendall, 2007) while married couples with negative childbearing attitudes have been shown to become parents later than individuals with positive childbearing attitudes (Barber, 2001).

To this end, we must examine whether presenting fertility risk information to people in different ways can affect their subsequent behaviour. That is, whether they change the way they behave after receiving such information. Once we have improved knowledge on how to raise awareness on fertility issues as a whole, it will be more possible to target specific areas such as age. In order to initially raise awareness of

fertility issues and examine behaviour change one can look to the Health Belief Model. By introducing threatening information regarding a person's fertility (e.g., drinking more than 14 units of alcohol per week can reduce fertility, smoking more than 10 cigarettes per day can reduce fertility), behaviour change (i.e., reducing drinking or smoking) may be observed in those who feel that it is important to them to protect their fertility. That is, those individuals with a high need for parenthood may be more likely to address and change risky behaviours once educated about the risks posed to their fertility.

Table 4.1 *Theoretical frameworks, constructs and application*

Theory and construct	Description of construct	Application
Health Belief Model (Rosenstock, 1990)		
Perceived susceptibility	Individual's opinion of having condition	Define at risk population. Personalise risk based on population
Perceived severity	Individual's opinion on how serious the condition is	Identify and state consequences and risks of the condition
Perceived benefits	Individual's belief in the action to reduce risk	Describe action to take to minimise risk
Perceived costs/barriers	Individual's belief that benefits outweigh costs	Reduce costs though reassurance and further information
Cues to action	Strategies to activate 'taking action'	Offer information on ways of taking action
Self-Efficacy	Confidence in individual's own ability to take action	Offer guidance to help perform action
Protection Motivation Theory (Rogers & Prentice-Dunn, 1986)		
Perceived severity	Individual's opinion on how serious the condition is	Identify and state consequences and risks of the condition
Perceived probability	Individual's opinion of their vulnerability to condition	Personalise information that intended population can relate to
Perceived response efficacy	Confidence in recommended action to take	Describe action to take to minimise risk
Perceived self-efficacy	Confidence in individual's own ability to take action	Offer guidance to help perform action
Adaptive coping response	Individual intends to change behaviour	Offer guidance to help perform action
Maladaptive coping response	Denial, avoidance	In-depth information and guidance
Transtheoretical Model of Change (Prochaska, DiClemente, & Norcross, 1992)		
Precontemplation	Individual may be unaware of any problem	Identify at risk population. Personalise risk
Contemplation	Individual recognises problem. Weighs up costs and benefits to change	Describe action to minimise risk. Further information, reduce costs
Preparation	Intention to change behaviour	Information & guidance on ways to take action
Action	Behaviour is modified	Reassurance & guidance on maintaining behaviour
Maintenance	Individual maintains new behaviour	Reassurance & guidance on maintaining behaviour
Theory of Planned Behaviour (Ajzen, 1991)		
Behaviour	Intention to carry out the behaviour or action	Identify risky behaviours and offer information and guidance
Behavioural intention	How hard the individual is willing to try to perform the behaviour	Identify and state consequences and risks of the condition
Attitude	Individual's favourable or unfavourable evaluation of the behaviour	Describe action to take to minimise risk
Subjective norm	Influence of social pressure to perform (or not) the behaviour	Identify social norms and behaviours
Perceived behavioural control	Individual's belief of how hard or easy the behaviour	Offer guidance to help perform action

The present study

Combining what we know about age-related fertility risk with how best to present this information to women of childbearing age may enable us to better prepare women to make more informed choices about their fertility. Therefore, the aims of the present study were to examine how best to present fertility risk information to raise awareness of these issues (i.e., by comparing personalised information with non-personalised information), and whether the information presented regarding fertility encouraged any change or modification in risky behaviours immediately following the study.

In the present study, participants were exposed to adverts that varied in personal tailoring via random allocation to groups presented with advertisements that either showed just shapes and colours (Control Advert- ConA), information about the impact of lifestyle choices on future fertility (General Advert - GenA) or the same information as GenA plus statements asking the participants about their own lifestyle habits (Personal Advert – PerA). Heart rate (HR) and Galvanic Skin Response (GSR) were measured before and during exposure to the advertisement task in order to record physiological responses. To assess the impact of the different types of information presented in the advertisement task, a modified Stroop task was used. In the task participants were asked to indicate whether different coloured target words (consisting of neutral, general threat and fertility threat words) were of the same colour as black primer words spelling different colour names. Reaction times (RTs) were recorded for this task.

Participants were then asked to complete a behavioural diary for the three days immediately following the experiment, documenting their lifestyle habits for the preceding 24 hours to assess any changes in behaviour, namely behaviours deemed as

risky to fertility (i.e., smoking more than 10 cigarettes per day, drinking more than 14 units alcohol per week, having unprotected sexual intercourse) and these were compared to baseline information on these habits that participants provided on the pre-experimental assessment.

In line with previous research it was hypothesised that participants in the PerA group with personalised messaging would demonstrate more attention (i.e., greater interference on the modified Stroop task) for fertility threat-words, more arousal (heart rate, skin conductance) and more behaviour change after exposure than both those who saw shapes and colours (ConA) and those who saw general fertility information only (GenA).

Methods

Participants

The final sample size consisted of 164 female undergraduates recruited from Cardiff University. The mean age of participants was 19.7 years (SD=1.6) and 76 were in a romantic relationship. Participants received course credits or £5 for their participation.

Research design and experimental manipulations

The study was conducted as a between-subjects design. Participants were randomly allocated into one of three manipulated groups. The groups were based on the

information that the participants were presented with in the advertisement task (ConA, GenA and PerA).

Materials and Apparatus

Physiological arousal

Heat rate and galvanic skin response were used to measure arousal in response to the fertility risk advertisements. To measure heart rate (HR), a Polar RS800CX – Multisport heart monitor was used. This instrument continuously measures heart rate via a combined sensor and transmitter worn across the chest that transmits information to a specialised recorder watch. The watch outputs HR in beats per minute (BPM), the average BPM for women is 75 (Ross & Wilson, 2006). Galvanic skin response (GSR) was measured using a skin conductance sensor. This consists of a circuit box with leads, ending in Velcro sensor straps, extending from it. The Velcro sensor straps are fastened around the middle of the first and second finger of the non-dominant hand. Conductance rates are measured using tiny electrical voltage applied through the sensors and displayed on the circuit box. GSR measures the electrical conductance of the skin and the variations in moisture level (Tortora & Derrickson, 2010) to record changes in perspiration, and is recorded in microSiemens (µS).

Music

A neutral piece of music lasting approximately six minutes was played to participants in order to get baseline readings of HR and GSR. The music was a neutral mood task in accordance with other studies (e.g., Moore & Oaksford, 2002).

Experimental design (advertisement task)

Participants in the PerA group saw advertisements from the American Society for Reproductive Medicine (ASRM, 2006) giving information on how certain lifestyle choices/habits can affect fertility (Appendix G for advertisements). The advertisements showed a picture of a baby's bottle being used in different ways depending on five lifestyle factors (age, alcohol intake, body mass index (BMI), smoking and STIs) with statements related to that habit or lifestyle and how these factors affect fertility and the ability to have children. For example, the advert for smoking showed a baby's bottle being used as an ashtray. To personalise the advertisements, participants in the PerA group saw an additional statement at the bottom of the picture to which they had to respond yes or no as applied to them. For the age advertisement participants responded to the statement "I am 34 years or older", for the alcohol advertisement they responded to "I drink more than 14 units of alcohol per week", for the BMI advertisement they responded to "I am more than 13 kilos overweight", for the smoking advertisement they responded to "I am a smoker who regularly smokes more than 10 cigarettes per day". Finally the participants responded to two statements regarding STIs; "I have unprotected sexual intercourse with multiple partners" and "I have had a sexually transmitted infection".

These personalised statements come from FertiSTAT (Bunting & Boivin, 2010) which is a validated fertility awareness tool enabling women to identify known risks to their fertility and obtain guidance on what to do about the risks present (e..g., change life style, seek medical advice). The act of assessing the personal relevance or not of the advert to oneself is a way of personalising the risk information. Participants in the GenA group saw exactly the same advertisements but without the personalised statement.

Participants in the ConA group saw images using the same shapes and colours as the advertisements but without any text about risk information.

Modified Stroop Task.

A computerised modified Stroop task (adapted from Verhaak et al., 2004) was used to measure attentional allocation to the advertisements. The experiment was programmed using Superlab Pro (Abboud, 1999). Participants were required to determine whether words presented in a certain colour (target words) were the same colour as named by a previous black ink word spelling out colour names (primer word). If the target word was of the same colour as the primer then the participant pressed yes on the keyboard. If the target word did not match the primer word colour then they pressed no on the keyboard. Instructions were presented on-screen, with participants pressing the spacebar to continue onto each set of instructions. Target words consisted of five neutral words (cushion, ornament, wardrobe, chimney, and mantelpiece) (neutral words – N), five general threat words (blood, torture, violence, deceit, pain) (general threat words – GT) and five fertility threat words (unfruitful, childless, barren, sterile, infertile) (fertility threat words – FT). Primer words consisted of four colours: red, green, yellow or blue.

The modified Stroop task consisted of one practice block (12 trials) and three test blocks (40 trials in each) with a 30 second rest between each block. The practice trial consisted of 12 control words (e.g., pineapple, strawberry, and pear). Every trial presented a fixation point for 500ms, followed by a primer word presented for 800ms, a blank screen for 200ms and finally a target word, following which the participant would indicate whether the target word matched the primer word or not by pressing the appropriate key on the keyboard. Test trials were randomised in order to control for practice effects.

The data extracted from the modified Stroop task included reaction times, number of errors and interference scores. Reaction times were the length of time in milliseconds (msec) it took the participant to press the yes or no key in response to the target word. Higher reaction times were considered to signify greater attentional allocation to those words, suggesting selective attentional processing. Errors (i.e., pressing yes when the colours did not match and vice versa) made by participants were counted (maximum error score for neutral words = 6, maximum error score for general threat words = 7, maximum error score for fertility threat words = 8). Interference scores were calculated by subtracting the reaction times for neutral word trials from reaction times on general threat word trials as well as from fertility threat word trials to produce two interference score: general interference and fertility interference. Higher interference scores signified greater attentional allocation.

Pre-experimental Assessment

Participants responded to a pre-experimental assessment (appendix H) made up of four sections: background information, lifestyle habits, fertility information and childbearing intentions and desires.

Background information: The demographic information collected was: age in years, whether they were in a relationship and if so, whether their partner was same-sex, how long they had been in the relationship (in years and months) and if they lived together, how long had they been living together (in years and months).

General life satisfaction and physical health: A single item regarding general life satisfaction taken from the World Health Organisation (WHO) ('Are you satisfied with your quality of life') was rated on a response scale of very dissatisfied, neither satisfied

nor dissatisfied to very satisfied (range 1-5) (WHO-Group, 1998). The single item 'In general, would you say your health was: poor, fair, good, very good, excellent' used to assess self-reported physical health was taken from the Short Form-36 (SF-36) (Ware & Sherbourne, 1992). Five questions asked participants whether they suffered from: cardiovascular disorders or diseases, respiratory disorders or diseases, alcohol or drug related disorders or diseases, diabetes, high blood pressure and/or cholesterol (yes/no). One question related to awareness of any family history of cardiovascular disease (yes/no) and if yes, participants were asked to specify. One question related to whether the participant was currently suffering from common cold symptoms (yes/no) and finally one question related to whether participants were currently taking any prescribed drugs/herbal medicine (yes/no) and if yes, to specify which. Physical health questions were asked as physiological measures were taken during the study.

Lifestyle habits: Items regarding lifestyle habits were adapted from 'Improving health: Changing behaviour', which is a National Health Service (NHS) trainer handbook (Department of Health, 2008) available from the NHS choices website. Two questions were asked about exercise, specifically how many days per week, hours on a typical day and minutes on a typical day participants engaged in vigorous and moderate activities. Participants were asked how many days in a week that they ate fruit, vegetables, fried food and high fat dairy food, their weight (stones and pounds or kilos), their height (feet and inches or centimetres) and whether they considered themselves to be more than 13 kilos (28 pounds/2 stone) overweight (yes/no). The latter critical threshold corresponds to degree of overweight associated with reduced fertility (Bunting & Boivin, 2010). Participants also indicated whether they drank alcohol (yes/no) and caffeinated drinks (yes/no) and if so, to estimate the number of units per week consumed of each. Finally

participants indicated whether they smoked (yes/no) and if yes whether they were a regular or social smoker and the number of cigarettes they smoked per day (for regular) and per week (for social). Items assessing sexual activity required participants to tick whether they were currently or previously sexually active or never sexually active. If they had been sexually active, participants then indicated whether they used contraception (yes/no) and if yes, which contraception. Two items assessed whether participants had ever had unprotected sex (yes/no) and whether they had ever had a sexually transmitted infection (yes/no).

About your fertility: Participants indicated whether they were currently trying to conceive (yes/no) and if yes, for how long. Items assessing own perception of fertility ('How fertile do you believe you are?') were rated on a response scale of not fertile to extremely fertile (range 1 to 5) and confidence in own fertility ('How confident are you that you would become pregnant if you tried to get pregnant?') was rated not at all confident to completely confident (range 1 to 10). (Bunting & Boivin, 2007). Participants indicated whether they had any reason to believe they would have difficulties getting pregnant (yes/no) and to indicate any reasons for why this might be so.

Childbearing intentions and desires: Need for parenthood was assessed using several items. "Having a child is the most important thing in life" and "Being a parent is one of the most important thing a person can do" (Newton, Sherrard & Glavac, 1999) rated from strongly disagree to strongly agree (range 1 to 5). Two items assessed how strong the desire was to have a child (self and partner) and how strong was the intention to have a child (self and partner) (Fritsche, Jones, Fischer, Koranyi, Berger & Fleischmann, 2007). Both items were rated on a ten-point scale from no desire at all to very strong desire. Finally, participants were asked to indicate the age at which they felt

would be the best age for them to have a first child, the age at which they felt would be the best age for women in general to have a first child and the age at which they felt would be the best age for men in general to have a first child.

Behaviour Diaries

Participants were asked to complete online behaviour diaries for three days following the study (Appendix I). Behaviour diaries required participants to indicate their lifestyle habits for the previous 24 hours. Specifically, how many cigarettes smoked, the number of alcohol units consumed, whether they had done any moderate exercise (in minutes), whether they had done any vigorous exercise (in minutes). Participants indicated whether they had, in the past 24 hours, eaten any fruit, vegetables, fast food or high fat dairy food (yes/no), whether they had had sexual intercourse in the past 24 hours (yes/no), whether they used protection (yes/no) and if yes, to indicate what protection they used.

Fertility confidence and future intentions: On the final day of the diaries (day 3) (Appendix J) participants were asked to indicate, by writing a number between 0 and 100%, how confident they were that they would get pregnant if they actually tried. To measure future behaviour intentions participants indicated to what extent the information presented to them in the study would encourage them to: "If you smoke, reduce the number of cigarettes you smoke", "if you smoke, consider quitting", "If you drink alcohol, monitor the units of alcohol you consume per week", "If you drink alcohol, reduce the number of units of alcohol you consume per week", "If you drink alcohol, consider quitting", "Maintain a healthy weight through a healthy diet", "Maintain a healthy weight through regular exercise" and "Have a sexual health check up". All of the

intention items were rated on a five-point response scale of not at all, a little, somewhat, very much and not applicable.

The two items assessing future intentions to reduce cigarettes or to quit cigarettes were combined to make one single item to assess future cigarette intention (α=.819). Three items regarding monitoring alcohol, reducing alcohol and quitting alcohol were combined to make a single item assessing future intentions of alcohol intake (α = .728). Finally 'not applicable' was re-coded in SPSS so that the scales ranged between 1 and 4 (not at all to very much).

Manipulation check: Participants were asked a series of questions about the study to assess whether they understood the study and whether they felt it was personally relevant to them ("Was the information easy to understand", "How interesting was the information presented to you", "How believable was the information presented to you" and "To what extent did you feel the information addressed you personally").

Two items concerning whether participants felt the stimuli advertisement was relevant to them ("To what extent did you feel the information was personally relevant to you" and "To what extent did you feel the information addressed you personally) were combined to make one new scale assessing personal relevance (range 1-9. Higher scores indicated more agreement). Cronbach's alpha was .776 and there was a significant positive correlation between the two items (r = .634, p < .01).

Additionally two items concerning whether the study made participants consider their fertility ("Did the information make you think about your fertility" and "After being presented with the information did you feel worried about your fertility") were combined into a single scale (range 1-9. Higher scores indicated more agreement) examining

whether the study made participants think about their fertility. Cronbach's alpha was .684 and there was a significant positive correlation between the two items ($r = .520$, $p < .01$).

Procedure

After reading and signing a consent form, participants were shown an A4 sheet of paper with four blocks of colour (red, green, yellow and blue) and asked to name each colour as pointed to by the experimenter to test for colour blindness. The experimenter explained to the participant how to attach the heart strap around their chest and left the room while this was done. The watch showing readings was placed between the experimenter and participant so that the experimenter could take readings. Upon return, the experimenter asked the participant to sit by the computer and then placed the skin response monitors onto the index and middle finger of the participant's non-dominant hand. After checking that both HR and GSR were being picked up the experimenter sat at the table next to the participant (separated by a screen so that the experimenter could not see the participant's computer screen at any point) and took readings of both HR and GSR every 30 seconds for three minutes. Once the three minutes were up the experimenter explained to the participants that they would listen to a piece of music while baseline readings were taken. The music was played through windows media player and the experimenter took both HR and GSR readings every 30 seconds for the duration of the music. Once the music task was finished the experimenter explained to the participant that they would now see a series of images (advertisement task) on the screen and they were to follow the instructions on screen and inform the experimenter when the task had finished. The three groups (ConA, GenA and PerA) were re-coded in the computer as

earth, moon and sun by a researcher not involved in the experiment so that the experimenters running the experiment would be blind as to which group was the experimental group. The experimenter then opened the relevant picture group (earth, moon or sun), entered in the participant's identification number, and returned to sit behind the screen. Each advertisement (regardless of group) was presented for 30 seconds. At the end of the 30 seconds instructions appeared on the bottom of the screen. In the ConA and GenA group the instruction "Press the spacebar to continue" appeared and by pressing the spacebar they moved onto the next advertisement, while in the PerA group the statement relevant to the advert appeared (e.g., "I am 34 years or older"). In this group they moved onto the next advertisement by pressing the yes or no keys in response to the statement. Once again the experimenter recorded HR and GSR every 30 seconds for the duration of the advertisement task (six minutes). Following the advertisement task the experimenter removed the galvanic skin monitors (leaving the heart strap on so as not to disrupt the experiment too much), opened the modified Stroop task and entered the participant ID number. Participants were instructed to read through the instructions carefully and inform the experimenter once they had finished the task. After the modified Stroop task was completed, the experimenter opened up the pre-experimental assessment and instructed the participant to complete online. Once everything had been completed, the experimenter explained that the participant would be asked to complete an online behaviour daily diary for the following three days, receiving the first of three emails containing the link to the diary the next day between 6 and 7pm and asking them to complete by midnight. Debrief forms were sent to the participants via email once the final behaviour diary had been received.

Data analysis

A total of 170 women participated in the study. However, preliminary data screening excluded six participants (3.5%) from the final data set. Two participants were missing the follow-up behavioural questionnaire, three had missing reaction times due to technical problems while heart rate and galvanic skin response was not recorded for one participant. To identify outliers, standard-scores (Z-scores) were calculated for all reaction time scores and an individual score was removed if it was more than three standard deviations above or below the group mean, in line with existing research (Verhaak et al., 2004; Egloff & Hock, 2003). Outlier analysis on individual reaction times in the modified Stroop task revealed that in the ConA group there were 21 outliers on neutral words, 22 on general threat words and 40 in the fertility threat words. In the GenA group there were 21 outliers on the neutral word, 31 on the general threat words and 21 on the fertility threat words. Finally, in the PerA group there were 35 outliers on the neutral words, 28 on the general threat words and 22 on the fertility threat words.

Errors made by each group on each word type were added; reaction times were examined in milliseconds and interference scores were calculated for both general threat words (GT) and fertility threat words (FT) by subtracting reaction time on neutral words (N) from reaction time on general and fertility threat words. Positive values indicated slower reaction times on threat words compared to the reaction times on neutral words.

Analysis of Variance (ANOVAs) was conducted to examine differences among groups. In these analyses the model was a 3 (Group: ConA, GenA, PerA) X 3 (Word Type: N, GT, FT) mixed ANOVA for error scores and reaction times and a 3 (Group: ConA, GenA, PerA) X 2 (interference score: general, threat) mixed ANOVA to examine

interference scores. Simple effects tests within groups were conducted on significant findings.

In order to examine arousal as a function of type of advertisement, 3 (Group: ConA, GenA, PerA) X 2 (HR/GSR Phase: resting, task) ANOVAs were conducted to investigate differences, while correlations performed to investigate associations between HR and GSR.

For the manipulation check participants were, in addition to original groups, also grouped according to behaviours they engaged in deemed risky to behaviour (smoking, drinking more than 14 units per week and ever having had unprotected sex). The level of risk in the sample was low and therefore a new variable 'Any Risk' was computed in order to distinguish between participants who engaged in any behaviour known to be associated with impaired fertility versus those not exposed to any risk. The risk thresholds were based on previous research and included: smoking (as only 2 participants smoked more than 10 cigarettes per day, all smokers were included in this variable), drinking over 14 units of alcohol per week and having had unprotected sex or an STI. These three variables were the only risk variables included in the new any risk variable due to them being the only ones that could be measured accurately post study (from information provided in the daily diaries) as well as at baseline. In addition , a variable 'number of risks' was also computed which categorised participants on whether they had either zero, one, two or three of the previously mentioned risk variables.

A series of 3 (Group: ConA, GenA, PerA) X 4 (Number of risks: 0, 1, 2, 3) ANOVAs were conducted to examine differences in whether the information provided was thought to be personally relevant or make the participants think about their fertility.

Further, future intentions to change behaviours were examined through Univariate ANOVAs.

To examine whether there was an effect of which day the study took place on, chi-square tests and one-way between-subjects ANOVAs were conducted while three new weekend effects variables were created to distinguish between follow-up diaries which were completed on the weekend (Thursday, Friday or Saturday) or not (Sunday, Monday, Tuesday, Wednesday): Weffect1 (if study completed on Monday, Tuesday or Wednesday), Weffect2 (if study completed on Monday or Tuesday) and Weffect3 (if study completed on Monday or Friday)

McNemar and Chi-squares tests were conducted in order to examine any changes in engaging in behaviours deemed risky to fertility. In order to examine the difference pre and post intervention with regards to alcohol, units consumed on an average per day were calculated by dividing the original number per week by seven. New variables were then computed to allocate a score if the number of units per day exceeded 2 (score of 1) or was equivalent to 2 units or below (score of 0). As per alcohol units, new variables were created for smoking for the three follow-up days so that participants were coded into whether they smoked (score of 1) in the previous 24 hours or not (score of 0). New variables were created in order to examine differences in groups with regards to positive or negative behaviour change. There were three variables for positive and three for negative behaviour change for each of the three behaviours (unprotected sex, alcohol consumption and smoking) Six variables were created to examine unprotected positive behaviour change (i.e., from having had unprotected sex at baseline to using protection) and negative behaviour change (i.e., from never having had unprotected sex to having unprotected sex) from baseline to day one, day two and day three. Six variables were

created. Six variables were created to examine alcohol consumption positive behaviour change (i.e., from drinking more than two units per day to drinking two units or less) and negative behaviour change (i.e., from drinking two or less units per week to drinking more than two units per day. Finally, six variables were created to examine positive and negative smoking behaviour (i.e., from smoking to not smoking and from not smoking to smoking). Chi-square tests were performed to examine differences.

Results

Overview

Results are presented in five sections. Section I describes attentional allocation as a function of type of advertisement and examines the number of errors made by each group (ConA, GenA and PerA) on the stroop task along with average reaction times and interference scores. Section II describes arousal as a function of type of advertisement and compares HR and GSR prior to and during the advertisement task. Section III examines the future intentions of those participants who engage in behaviours deemed risky to future fertility and whether they intended to modify these behaviours. Section IV examined behaviour change pre to post intervention. Finally, section V describes the manipulation check which examines whether the participants found the information presented to them personally relevant and also whether it made them think about their fertility.

Section I. Attentional allocation as a function of type of advertisement

a) Modified Stroop task: error rate

Figure 4.1 presents the average number of errors made by each group (ConA, GenA and PerA) for each word type (N, GT and FT). A 3 (Group: ConA, GenA, PerA) X 3 (Word Type: N, GT, FT) mixed ANOVA with word type as the repeated measure showed no main effect of word type (F (2, 322) = 1.019, p = .362) or group (F (2, 161) = 1.445, p = .239). There was a significant interaction between word type and group (F (2, 161) = 2.649, p < .05). Simple effects analysis revealed that within the ConA group, significantly more errors were made for fertility threat words (p<.05) than for general threat words (M.diff = .491) while in the PerA group significantly more errors were made for general threat words (p<.05) than for neutral words.

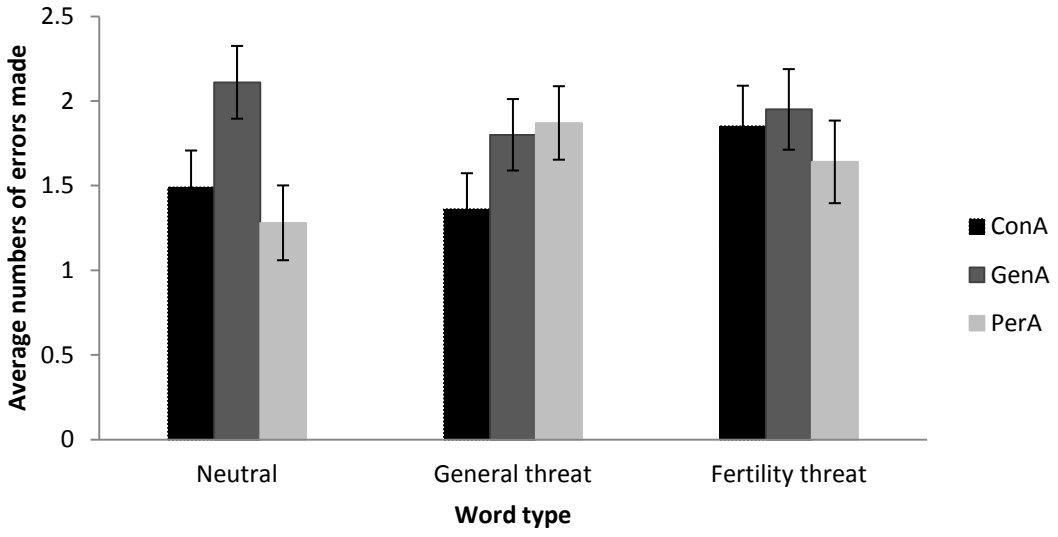

Figure 4.1. Average number of errors made for each word type by each group. Error bars represent standard errors.

b) Modified Stroop task: reaction time

Figure 4.2 presents the average reaction time (in milliseconds) for each group (ConA, GenA, and PerA) to respond to each word type (N, GT and FT). A 3 (Group: ConA, GenA, PerA) X 3 (Word Type: N, GT, FT) mixed ANOVA, with word type as the repeated measure, showed no main effect of group (F (2, 161) = .396, p = .674). However, there was a marginally significant effect of word type (F (2, 322) = 2.276, p = .104) and a marginally significant interaction between word type and group (F (4, 322) = 2.037, p = .089).

Simple comparisons revealed that the difference in word type was between neutral and fertility threat words with participants taking significantly longer ($p < .05$) to name colours of fertility threat words than neutral words (*M.diff* = 6.912), There was no significant difference in reaction time between neutral and general threat words (*M.diff* = -4.363, p = .184) or between general threat and fertility threat words (*M.diff* = -2.548, p = .122).

Furthermore, simple effects analysis of the marginal interaction revealed that within the ConA group, participants took significantly longer ($p < .05$) to name colours of fertility threat words relative to neutral words (*M.diff* = 13.56) and longer, but not significantly so, to name general threat words (*M.diff* = 1.001, p = .859)

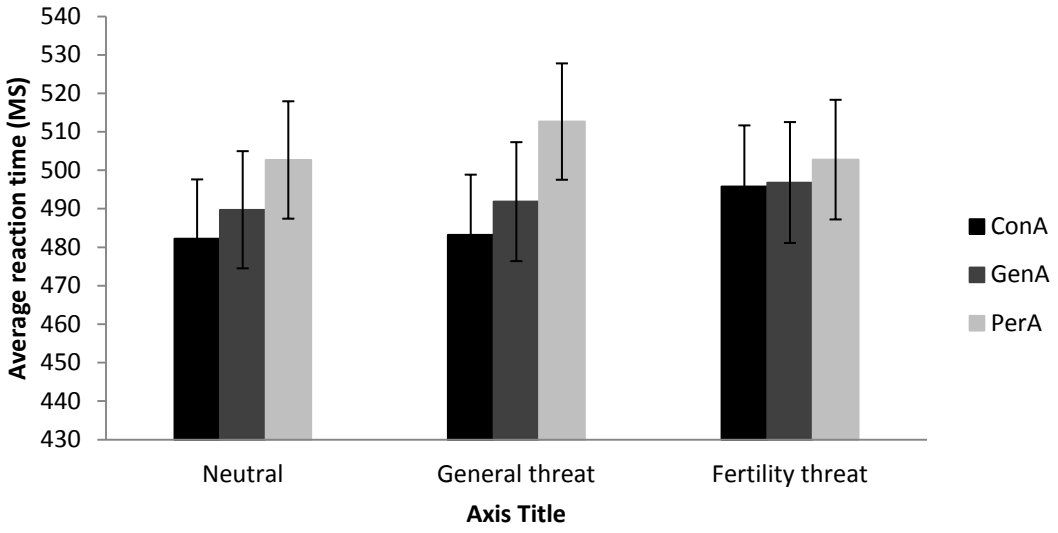

Figure 4.2. Average reaction time (ms) for each word type by each group. Error bars represent standard errors.

c) Modified Stroop task: interference score

Figure 4.3 presents the average interference scores for both the general and fertility threat words. A 3 (Group: ConA, GenA, PerA) X 2 (interference score: general, threat) mixed ANOVA, with interference scores as the within measure, revealed no main effect of word type (general or fertility) (F (1, 161) = .659, p = .418) or group (F (2, 161) = .080, p = .923). There was a significant interaction between word type and group (F (2, 161) = 4.342, p < .05).

Simple effects analysis revealed that the ConA group showed significantly higher fertility threat interference (p < .05) than general threat interference (*M.diff* = 12.56) while the PerA groups showed less fertility threat interference (p < .10) than general threat interference (*M.diff* = -9.89). There was no difference within the GenA group between general threat interference and fertility threat interference (*M.diff* = -4.966, p = .357)

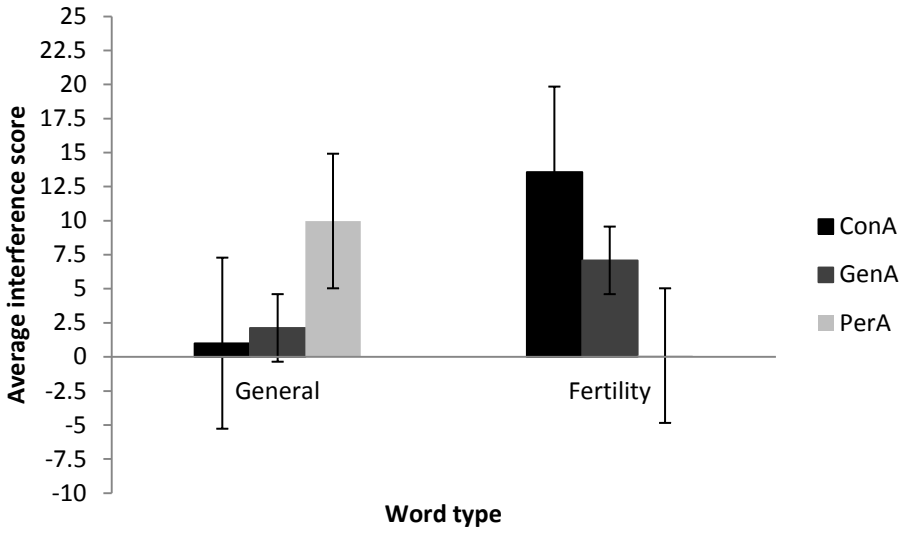

Figure 4.3. Average interference scores for both general and fertility threat words for each group. Error bars represent standard errors.

d) Risk status

Table 4.3 shows the percentage of participants in each group with 'at risk' status. A 3 (group: ConA, GenA, PerA) X 2 (risk status: at risk, not at risk) X 3 (word type: neutral, general, fertility) mixed ANOVA, with word type as the within subject variable, revealed no significant interaction between group, risk status and errors made (F (4, 260) = 1.408, p = .232).

A 3 (group: ConA, GenA, PerA) X 2 (risk status: at risk, not at risk) X 3 (word type: neutral, general, fertility) mixed ANOVA, with word type as the within subject variable, revealed no significant interaction between group, risk status and reaction time (F (4, 260) = .244, p = .913).

Furthermore, a 3 (group: ConA, GenA, PerA) X 2 (risk status: at risk, not at risk) X 2 (interference score: general, fertility) mixed ANOVA, with interference score as the

within subject variable, revealed no significant interaction between group, risk status and interference score (F (2, 130) = .299, p = .742).

Table 4.3

Percentage (and number) of participants in each group with 'at risk' status

		Any one of the risk factors	
Group	**No risk**	**At least one risk**	**Total**
ConA	27.7 (13)	72.3 (34)	100 (49)
GenA	34.9 (15)	65.1 (28)	100 (43)
PerA	37.0 (17)	63.0 (29)	100 (46)

Section II. Arousal as a function of type of advertisement

a) ***Arousal: Heart Rate (HR) and Galvanic Skin Response (GSR)***

Figure 4.4 presents HR (in beats per minute (BPM)) for all groups while resting and whilst completing the advertisement task. A 3 (Group: ConA, GenA, PerA) X 2 (HR Phase: resting, task) ANOVA, with HR as repeated measure, revealed no main effects of group (F (2, 161) = .960, p = .329) or HR phase (F (2, 161) = .472, p = .624). Furthermore there was no interaction between group and HR phase (F (2, 161) = .074, p = .929)

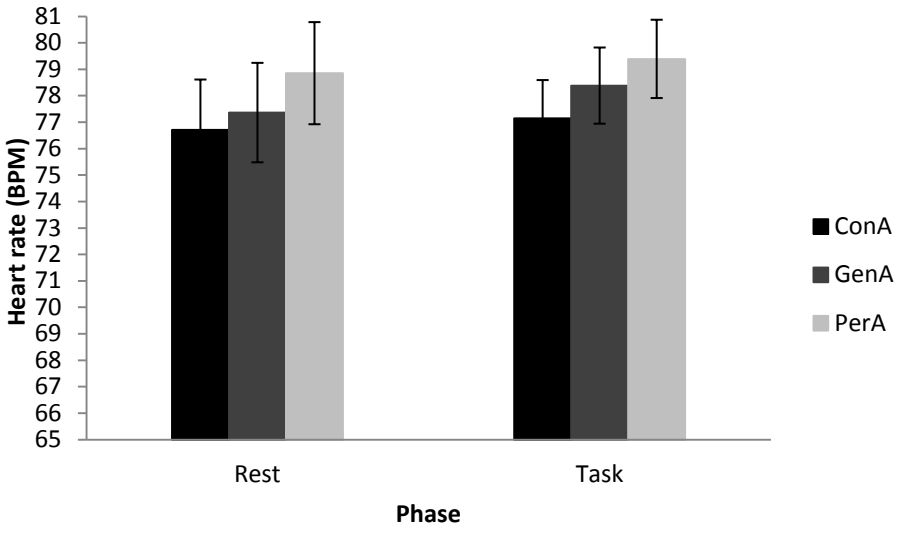

Figure 4.4 Average heart rate (BPM) for each group for rest phase and task phase. Error bars represent standard errors.

Figure 4.5 presents GSR (µS) for the three groups while resting and completing the advertisement task. A 3 (Group: ConA, GenA, PerA) X 2 (GSR Phase: resting, task) ANOVA, with GSR as repeated measure revealed a main effect of phase (F (1, 161) = 79.65, $p < .001$). GSR was significantly higher ($p < .001$) for all groups in the task phase (M = 64.08) than in the rest phase (M = 58.06). There was no main effect of group (F (2, 161) = .424, p = .655) and no significant interaction between group and phase (F (2, 161) = 8.90, p = .788).

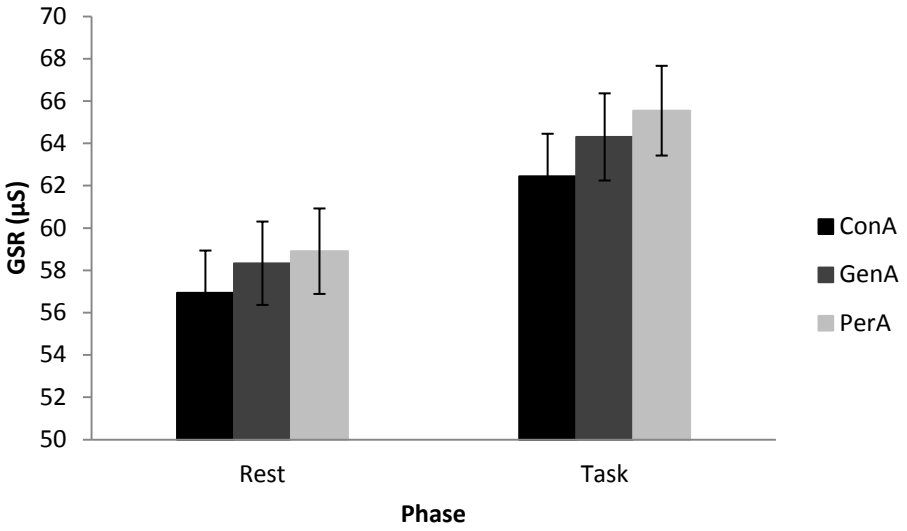

Figure 4.5. Average galvanic skin response (GSR) for each group for rest phase and task phase. Error bars represent standard errors.

b) Risk status

A 3 (group: ConA, GenA, PerA) X 2 (risk status: at risk, not at risk) X 2 (HR: rest, task) mixed ANOVA, with HR as the within subject variable, revealed no significant interaction between group, risk status and HR (F (2, 130) = 2.107, p = .126). Furthermore, a 3 (group: ConA, GenA, PerA) X 2 (risk status: at risk, not at risk) X 2 (GSR: rest, task) mixed ANOVA, with GSR as the within subject variable, revealed no significant interaction between group, risk status and HR (F (2, 130) = .519, p = .597).

c) Arousal: Correlations between rest and task for Heart Rate (HR) and Galvanic Skin Response (GSR).

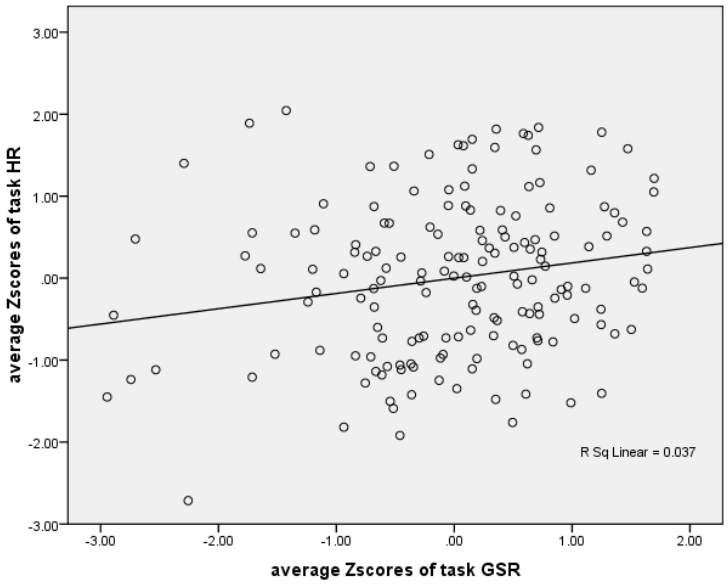

Figure 4.6. Correlation between resting HR and resting GSR (Z scores).

Figure 4.7. Correlation between task HR and task GSR. (Z scores).

There was a significant positive correlation between resting HR and resting GSR (r = .243, p < .01) and a significant positive correlation between task HR and task GSR (r = .192, p < .01). However, correlations were low (< .70) so could not be combined into a single composite arousal variable.

Section III: Future intentions

Of the sample (N = 164) 14% (n=23) smoked, 24% (n=36) drank more than 14 units of alcohol per week and 57% (n=81) had had unprotected sexual intercourse. Table 4.4 shows the number of participants engaging in each risk according to advertisement group. Table 4.5 shows the mean intentions of each group to change future behaviour.

Table 4.4

Number of participants engaging in behaviours deemed risky to fertility

	Group		
Behaviour	**No text (55)** ***n* (%)**	**Non personal (56)** ***n* (%)**	**Personal (53)** ***n* (%)**
Smoking (yes)	9 (5.5)	7 (4.3)	7 (4.3)
Drinking (>14 units per week)	12 (8)	10 (6.7)	14 (9.3)
Ever had unprotected sex (yes)	33 (23.4)	24 (17.0)	24 (17.0)

Univariate ANOVAs comparing participants at risk revealed that of the 23 smokers there was no effect of group on whether they intended to modify cigarette use (F

(2, 14) = .019, p = .982). On average participants stated their intention to modify was between a little and somewhat (M = 2.6, SD=1.04).

Among the 36 participants who drank more than 14 units of alcohol per week, there was no difference between the groups regarding intention to modify drinking behaviour (F (2, 21) = .349, p = .709). Intentions to modify alcohol intake were lower than that of smoking, with participants, on average, stating between not at all to a little intention of reducing alcohol intake (M = 1.80, SD= 0.71).

Similarly, no difference between groups was found among the 81 participants who had had unprotected sex as to whether they would have a sexual health check-up (F (2, 55) = .481, p = .621) with the average mean being 2.4 (SD = 1.21) which would indicate between a little and somewhat.

Table 4.5

Mean intentions of each group to modify future behaviour.

	Group			
Intention to modify behaviour	**ConA**	**GenA**	**PerA**	**Overall**
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*
Smoking	2.56 (1.15)	2.67 (.76)	2.67 (1.17)	2.62 (1.04)
Alcohol	1.73 (.86)	1.67 (.82)	1.96 (.48)	1.81 (.71)
Sexual health check-up	2.56 (1.19)	2.33 (1.18)	2.19 (1.33)	2.4 (1.21)

Note: All variables assessed on a 4-point scale where higher score indicated higher likelihood of intention

Section IV: Differences between groups in positive and negative behaviour change

Participants were enrolled in the study throughout the week and behaviour may have been affected by which day of week the study started and whether the subsequent three days of behavioural follow-up included the weekend. Analyses of study day of week on behavioural follow-ups showed no significant effect (Appendix K).

Chi-square and McNemar tests revealed no significant differences across follow-up days (Appendix L) or within groups (Appendix M). Therefore the three follow-up days were collapsed and analyses conducted on whether participants positively or negatively changed behaviour as a whole.

A) Unprotected sex

A 3 (Group: ConA, GenA, PerA) X 3 (Behaviour change: positive, negative, none) Chi-square test revealed no significant difference between groups with regards to positive behaviour change (i.e., from not using protection to using protection), negative behaviour change (i.e., from using protection to not using protection) or no change in behaviour: $\chi 2$ (4, N = 87) = 1.263, exact p = .881 (Table 4.6).

Table 4.6

Percentage (n) of participants displaying positive, negative behaviour and no change for unprotected sex from baseline to follow-up

	Group (n)			
Behaviour change	**ConA % (n)**	**GenA % (n)**	**PerA % (n)**	**Total % (n)**
Positive change	27.3 (6)	27.3 (6)	45.5 (10)	100 (22)
Negative change	42.9 (3)	28.6 (2)	28.6 (2)	100 (7)
No change	27.6 (16)	34.5 (20)	37.9 (22)	100(58)

B) Alcohol units consumed

A 3 (Group: ConA, GenA, PerA) X 3 (Behaviour change: positive, negative, none) Chi-square test revealed a marginally significant relationship between behaviour change and group with regards to alcohol: $\chi 2$ (4, N = 150) = 8.020, exact p = .092. (Table 4.7)

Table 4.7

Percentage (n) of participants displaying positive, negative behaviour and no change for alcohol units consumed from baseline to follow-up

	Group (n)			
Behaviour change	**ConA % (n)**	**GenA % (n)**	**PerA % (n)**	**Total % (n)**
Positive change	30 (12)	22.5 (9)	47.5 (19)	100 (40)
Negative change	21.4 (6)	42.9 (12)	35.7 (10)	100 (28)
No change	40.2 (33)	32.9 (27)	26.8 (22)	100(82)

C) Smoking

A 3 (Group: ConA, GenA, PerA) X 3 (Behaviour change: positive, negative, none) Chi-square test revealed no significant differences in smoking behaviour: $\chi 2$ (2, N = 23) = 2.874, exact p = .320 (Table 4.8).

Table 4.8

Percentage (and number) of participants displaying positive, negative behaviour and no change for smoking from baseline to follow-up

	Group (n)			
Behaviour change	**ConA % (n)**	**GenA % (n)**	**PerA % (n)**	**Total % (n)**
Positive change	44.4 (4)	44.4 (4)	44.4 (4)	100 (9)
Negative change	0	0	0	0
No change	35.7 (5)	21.4 (3)	42.9 (6)	100 (14)

Section V Manipulation check

A total of 124 participants responded to the questions regarding personal relevance while 123 responded to questions about whether the information made them think about their fertility (scale 1-9, with higher numbers being more agreement). Table 4.9 shows the means and standard deviations of the responses to the two scales according to presence or absence of any risk for each group.

Two 3 (Group: ConA, GenA, PerA) X 4 (Number of risks: 0, 1, 2, 3) ANOVAs were conducted to examine whether the introduction of the variable 'number of risks' would affect perceptions of the relevance of the risk information. With regards to whether the information was perceived as personally relevant, there was no main effect of group (F (2, 113) = 1.590, p = .209) or number of risks (F (3, 113) = 1.620, p = .189). There

was a significant interaction between group and number of risks (F (5, 113) = 2.816, p < .05). Analysis of simple effects revealed that group differed at the level of 3 risks only (p < .01) with participants in the PerA group perceiving the information as more personally relevant if they had three risks (p <.05) compared to if they had two risks (*M. diff* = 3.50), one risk (*M. diff* = 4.28) or no risks (*M. diff* = 3.80).

With regards to whether the information made participants think more about their fertility, there was no main effect of group (F (2, 112) = 2.157, p = .120) or number of risks (F (3, 112) = 1.987, p = .120) and no significant interaction between group and any risk (F (5, 112) = .353, p = .879).

Table 4.9

Personal relevance and thinking about fertility for each group and risk

	Scale	
	Personal relevance	**Think about fertility**
Group	***M (SD)***	***M (SD)***
No text		
No risk	4.72 (1.74)	3.90 (1.38)
At least one risk	5.07 (1.53)	4.38 (1.57)
Non personal		
No risk	4.7 (1.5)	3.9 (1.1)
At least one risk	4.5 (1.86)	4.42 (1.35)
Personal		
No risk	4.86 (1.70)	4.36 (1.22)
At least one risk	5.0 (1.78)	4.95 (1.76)
TOTAL		
No risk	4.78 (1.61)	4.09 (1.22)
At least one risk	4.89 (1.69)	4.56 (1.57)

Note: scores assessed on a 9-point scale where higher scores indicate more agreement.

Discussion

The current research shows that by personalising information we can encourage participants to attend to important information presented to them. However, this attention does not appear to be sustained and quickly passes. This initial attention to information can be seen with regards to reaction times, as all participants in general were significantly slower to name fertility threat words than neutral words. What differs to previous research, however, is the fact that this effect appears stronger for the ConA group who had not previously seen any fertility information. Although in general with a modified Stroop task it is hypothesised that participants will be slower to name general emotional words (e.g., cancer) than neutral words (e.g., wind) (Gotlib & McCann, 1984), the largest effect is usually seen in those presented with words related to an area of concern the individual may have for themselves (Waters, Sayette, Franken & Schwartz, 2005). For this reason we would have expected participants in the personalised (PerA) group to exhibit greater interference to the fertility threat words as they would have answered questions relating to their own behaviour in relation to fertility. This task was expected to make salient any concerns about how participants' behaviour affected their fertility which, in turn, was expected to make them slower to name fertility threat words as they would allocate more attention to these words. Secondly we would have also expected to higher heart rates (HR) and galvanic skin response (GSR), particularly in the PerA group as they had been made to think about their own behaviour in relation to their fertility, as both of these physiological changes are the result of the body's response to environmental changes (e.g., tasks) (Klauer, Voss & Stahl, 2011). Lastly we would have also expected, within the PerA group, a modification of behaviours deemed risky to fertility as within

this group they were not only made aware of the risk factors through advertisements but also had to examine their own engagement in these behaviours by answering questions about them.

One explanation for not finding the expected effects could be that of word frequency, the frequency with which words occur in a given language. This is thought to have an effect on the efficiency with which an individual can recognise and respond to the word in question (Monsell, 1991). Those words that occur frequently are processed more accurately and rapidly than words occurring less frequently Fertility threat words (e.g., barren) may not occur as frequently to the population studied in this experiment as neutral words (e.g., cushion) or general threat words (e.g., violence). Similarly, Morrison and Ellis (1995) have argued that the age at which an individual first learns a word affects the processing of the words (age of acquisition). This explanation may have an effect on the present study as again, fertility threat words such as infertile are more likely to have been learned later than words such as wardrobe or pain. In the present study, those in the GenA and PerA group would have been primed to fertility words by the advertisements presented immediately before the modified Stroop task and for that reason may not have found the words to be as unexpected as for participants in the ConA group.

Another explanation as to why the present study did not find the same effects as previous research may be that although participants in the PerA group were presented with information which was personalised (i.e., answering questions relating to the advertisements about their own behaviours) they did not regard the information as very highly personally relevant. Comparisons between groups showed no difference on whether information was perceived as personally relevant or whether it increased thoughts about fertility. The lack of relevance may be due to undergraduate students not

being at a stage in their lives when they were thinking about their own fertility and childbearing plans. The average age of first birth in the UK is currently 29.5 (ONS, 2011), while the mean age of the present sample was 19.7 years (SD=1.6). Lampic et al. (2006), while investigating fertility awareness and childbearing intentions, reported that among 222 female students the mean age that women wanted their first child was 28 (*SD* = 2.7). Therefore, whilst the individuals in the study may have paid attention to the adverts the impact of personalised adverts was not sufficient to cause interference due to a lack of immediate relevance.

The results suggest that it is imperative to discover the ideal age at which to educate women about their fertility. If the women are too young they may not pay attention and not think that the information is relevant to them (e.g., at university age) and if educated at an older age we are at risk of educating people when damage to fertility (from sub-optimal behaviours) has already had a detrimental effect (e.g., after the age of 34). If women plan on having their first child around the age of 28 (Lampic et al., 2006) then education about fertility would need to occur before this time but not so early that the individual feels that it does not apply to them. Although there is a plethora of research investigating the consequences of delaying childbearing and the risk factors associated with fertility there appears to be a lack of research investigating when people should be educated about these risks and consequences and how best to develop this education

Additionally, those who have not actually been diagnosed with a fertility problem or were not concerned about a condition related to the threat words presented in a Stroop task (i.e., diagnosis or concerns about their own fertility) may not perceive their own risk (e.g., having difficulty conceiving) to be very high. Weinstein (1980) stated that individuals believe that they are less vulnerable to risks than others. Known as optimistic

bias, this is one explanation as to why participants may not have been affected by the fertility risk information presented. Although results show that participants did pay attention, they did not engage sufficiently to cause interference. However, within the PerA group, 63% of the participants engaged in at least one risky behaviour. This would suggest that even though participants were firstly presented with information on risk factors that affected their fertility and then had to assess their own engagement in these behaviours, participating in these behaviours did not alarm the participants enough that interference was caused.

Optimistic bias has been shown in many different areas of health such as risk of pregnancy in college students (Smith, Gerrard & Gibbons, 1997), STI risk (Kaplan & Shane, 1993) and smoking risk (Strecher, Kreuter & Kobrin, 1995). More worryingly, optimistic bias has been associated with sub-optimal health behaviour with one study revealing that among 800 college students interviewed four times over two years regarding their drinking behaviours, those who believed they had a smaller chance of having a drinking problem compared to other students (unrealistic optimism) were more likely to develop and exhibit negative drinking behaviours later on (Dillard, Midboe & Klein, 2009). Studies such as these reinforce the need to design and implement effective health messages to younger people in order that they pay attention and relate the information to themselves.

Optimistic bias may also explain why there were lower numbers than predicted who changed their behaviour following the study as if they do not perceive themselves to be at risk of future fertility problems, or to be at risk from the risky behaviours they engage in then they would see no need to modify their behaviours. Furthermore, a study examining unrealistic optimism about breast cancer discovered that unrealistic optimism

was associated with higher education levels (Waters et al., 2011), which would further explain the level of unrealistic bias in the present sample as they were all were University students.

Additionally, if an individual is not concerned about childbearing at the present time, they may not think about changing their behaviours immediately. Although the information may give them reason to think about modifying their behaviour at some point in the future when they are actually planning to start childbearing if they feel that this time is some way off then it may not have an immediate effect. This finding is in line with the Health Belief Model (HBM) which posits that perceived susceptibility (i.e., ones beliefs of the chances of getting a condition) is an important consideration in health-related action (e.g., seeking medical advice regarding fertility). While a person may change or modify their behaviour if the feel at risk (or susceptible) to fertility problems, those who do not feel susceptible to future problems may feel no need to modify any behaviours, believing they have time to do so in the future if they become an issue. The sample in the present study were also not planning on having children in the near future so may not feel affected by the thought of any infertility concerns (perceived severity) and may not see any benefits of changing their behaviour at this time, only the costs of changing behaviours that the sample may currently perceive as enjoyable (e.g., drinking).

Moreover, in relation to other theories presented in this chapter participants may have had no intention of changing their behaviour in the near future which may link in with the precontemplation stage of the Transtheoretical Model of Change as they may be unaware that they could be prone to specific risks regarding their fertility while according to the Theory of Planned Behaviour, participants may have had negative attitudes towards the intention to change any of their behaviours and thereby not be prepared to change.

Strengths, limitations and future directions

The present study builds on previous literature by adopting a new approach to investigating the effect of fertility information on a population who are not currently experiencing problems with fertility. This research will allow us to investigate and build on the knowledge that more education is needed in the area and is a first step into examining how best to disseminate this information to the general population. Additionally, the Stroop paradigm is well validated and has been repeatedly used to study attention to threatening stimuli.

One potential weakness of the study was that it did not compare age groups and only focused on undergraduate students. As previously discussed, this age group may not yet be thinking or worrying about their fertility so it would be useful to compare the findings from this age group to an age group (e.g., around the age of 28) who are more likely to be considering starting childbearing.

A flaw with the experimental design in the current study was that word frequency and length were not matched across the conditions. Due to the sample being undergraduate students the infertility threat words used in the study would most likely be quite unfamiliar to many of the participants who may not be at a stage in their lives when fertility issues may be a concern. Therefore, future studies may wish to examine presenting information to participants at a time preceding the experimental stroop task so that words presented would be more recognisable. Additionally, further piloting of fertility words may prove useful in establishing which words may be more familiar within the target sample. Furthermore, the words used in the present study were not matched for word length. As with words that are used less frequently, words used in an experimental setting which are both long and short may cause more or less interference on reaction

times (Ellis, 2004). Therefore future studies should use words of equal frequency of use and words of either long or short length. Additionally, the adverts used were from the American Society for Reproductive Medicine (ASRM, 2006) and therefore contained American information (Appendix G) below the advertisement. As the sample in the current study was from a British University this information may have led to people dismissing the information provided as they may have felt that it did not apply to them. Future studies should consider adapting the information to make it relevant to the target audience. For example, using NHS information for British participants would ensure the information was instantly recognisable and appropriate to them.

Another potential limitation is the lack of sub-optimal behaviours associated with reduced fertility in the present population. As there were low numbers of participants who met the critical thresholds of some of these behaviours and as the majority of participants only engaged in one risky behaviour it may be difficult to establish whether the tailored information may have had a greater effect if more behaviour were above the critical threshold or they engaged in more than one. Additionally, follow-up diaries were only completed for the three days after the study so it is not possible to know whether the information changed any future behaviour. Time constraints within the project meant that the follow-up period was shorter than ideal and thus it was not possible to discover the true effects of the information presented. It would be beneficial, if repeating the study, to allow for a longer follow-up period where any change in participant's behaviour could be monitored over a period of weeks rather than days to reveal a truer picture of any modifications that may have occurred over time.

Future research in this area needs to examine different age groups in order to investigate whether personalising fertility information and presenting fertility threat words may have more of an impact on those who may be closer to beginning childbearing. Presenting this information and study to different age groups may also aid us in investigating the best age to educate women about their fertility and how sub-optimal behaviours may compromise their ability to have children in the future. In addition to this future research should investigate changes in behaviour not just immediately after the study but also further down to line in order to establish whether any changes in behaviour may occur once the individual has had more time to process the information.

Chapter 5: Delayed parenthood: Understanding age and preconditions

Overview

We have thus far learnt that although there is a current trend towards delaying childbearing until such time that fertility may be compromised (chapter 2) and that even when people have knowledge of risks (such as older age and negative lifestyle factors) they may not always apply this knowledge to themselves and seek help or advice when it comes to their own fertility (chapter 3). Additionally it has been shown that although there is evidence supporting the fact that presenting people with personalised information may help ensure that they pay more attention to this information and modify their behaviours, this was not the case when presenting personalised information about how certain risky behaviours could affect future fertility in undergraduate students (chapter 4). Due to chapter 4 investigating a sample of undergraduate students who may not yet be concerned about their fertility and future plans to conceive and may therefore not attend to the information presented, the present chapter aimed to examine differences between different age groups with regards to the importance they placed on childbearing preconditions while also aiming to achieve a better understanding of childbearing delay. By investigating these areas it may be possible to ascertain more precisely at which age different preconditions become more important, thereby obtaining a clearer idea of the optimum time to educate people about their fertility.

Introduction

Data from the Office of National Statistics (Office for National Statistics (ONS), 2011) reveals that the average age of first time mothers in the United Kingdom has risen from 23.6 in 1971 to 29.5 in 2010, while the average age of married women having a first birth rose from 23.9 in 1971 to 30.2. This trend is not just limited to the United Kingdom, in many countries in Europe the average has also risen to between 29 and 30 years of age (Eurostat yearbook, 2009). There has been a marked increase in women giving birth over the age of 30 (see Figure 5.1 for births in England and Wales in 2008, ONS, 2008) and an increasing trend of women over the age of 35 attempting to conceive (Bewley, Davies & Braude, 2005). In Sweden the average age of motherhood rose from 24 in the early 1970s to an average age of 29 in 2005 (Sobotka, 2006) in the U.K. in 2004 the average age of first birth was over 27 years (Shaw & Giles 2007), while in Canada nearly 50% of women giving birth were aged 30 or over in 2003 (Benzies, Tough, Tofflemire, Frick, Faber & Newburn-Cook, 2006). Trying to conceive in mid to late thirties is problematic due to the fact that fertility declines with age, with the decline starting when a woman is in her late 20s and rapidly declining after age 35 (Dunson, Colombo & Baird, 2002). Thus people starting childbearing efforts at a later age are at an increased risk of reduced fertility.

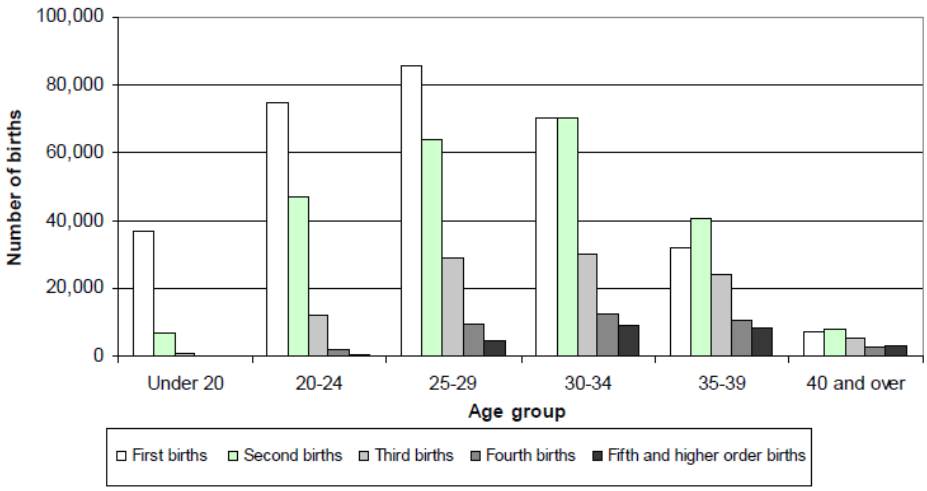

Figure5.1. Live births by mother's age and birth order, England and Wales (ONS, 2008).

Defining delay

There does not appear to be consensus on how best to define delay in research on the timing of childbearing. Some studies examine women in their 30s and older (e.g., Berrington, 2004; Kemkes-Grottenthaler 2003; Boivin et al., 2009) and others investigate women in specific age ranges for example 20-45 years of age (Tough et al., 2007) or 25-45 years of age (Skoog Svanberg, Lampic, Karlstrom & Tyden, 2006). Other studies only discuss delay in general terms of waiting until women have a career, relationship (Skoog Svanberg et al., 2006; Bretherick, Fairbrother, Avila, Harbord & Robinson, 2010) or feeling socially and financially prepared (Lampic, Skoog Svanberg, Karlström & Tydén, 2006). The variability between studies shows that there is not one consistent age at which delay is considered to start.

For this reason a first step in research would be to examine what delay actually means and how people regard delay. There are several ways that delay may be

conceptualised but by definition it implies that there is an optimal time for conception/childbearing to take place. This optimal period could be defined according to several criteria: biological (e.g., age-related fertility decline), social (e.g., friends having children or average age at first birth) and/or psychological / individual (e.g., feeling ready).

It is also important to recognise that different goals and achievements are more important to individuals at different ages. According to the life-span theory, opportunities and challenges that are encountered throughout life impact on personal goals (Salmela-Aro, Aunola & Nurmi, 2007). An example of this may be that of further education impacting on the goal of having children. Pursuing further education (after an undergraduate degree) may have consequences on childbearing as waiting to finish education and career ambitions may lead to a later than intended age for childbearing. There are certain ages between which individuals may experience different life events. For example, completing an undergraduate degree will typically take place between the ages of 18 and 24 years old, the average age of childbearing in the UK is 29.5 years (ONS, 2011) while mean age of first marriage is now 30 years old (ONS, 2011)

According to Arnett (2000) the majority of young adults will feel confident about being able to realize future goals and ambitions (e.g., being in well-paid employment). Nonetheless, as individuals progress through their lives some goals (e.g., finding the right partner) may not be realized and the individual may therefore have to adapt and change other goals (e.g., childbearing) (Liefbroer, 2005). Thus it is imperative to examine different age groups to investigate whether goals and ambitions become more or less important as individuals proceed through life.

Biological criteria and theories

From a biological point, the ideal age to conceive appears to be before the age of 35. However, although a steep decline in fertility begins around age 35, there is a noticeable decline beginning after the age of 30 (Fox, 2000; Baird et al., 2005). This decrease in fertility is illustrated in Figure 5.2 (Broekmans, knauff, te Velde, Macklon & Fauser, 2007), which documents the decrease in monthly fecundity rate according to age (fecundity refers to a measure of the ability to produce offspring). The decline starts from around 31 years of age after which probability of conception declines rapidly. This decline in fertility is caused by a process referred to as ovarian ageing, which comprises two distinct events: a decay in oocyte quality leading to gradual loss of fertility (i.e., natural sterility) and a parallel decline in follicle numbers leading to cessation of menses (i.e., menopause) (Baird et al., 2005). During puberty women have around 300,000 eggs. At each menstrual cycle an egg is released. For each of these eggs that are released, around 500 do not mature so are not released and are absorbed by the body. At menopause (approximately 50-55 years of age) there will only be several thousand eggs remaining. As a woman ages so do the remaining eggs therefore making them less capable of fertilization. However, it should also be noted that menstruation may still occur even if a women is not fertile. This is known as anovualtion and refers to a menstrual cycle in which the ovaries do not release an oocyte thereby meaning that ovulation does not take place (Lambalk, van der Steeg & Steures, 2011).

Figure 5.2. Decrease in monthly fecundity rate according to female age.

Wasser and Isenberg (1986) proposed the Reproduction Suppression Model (RSM) which states that if present conditions for reproduction (e.g., environmental or physiological conditions) are inadequate in comparison to future conditions which may provide improved probability of reproductive success then individuals should delay until such a better time (Wasser & Isenberg, 1986). According to the model reproduction can be highly risky and physically demanding so suppressing reproduction until conditions are optimal will result in higher lifetime reproductive success. As with many theories concerning reproduction there is cross-over with other areas such as social and psychological as not only do physiological conditions need to be optimal but also social, personal and economic situations need to be taken into consideration. To this end, although it may appear preferable to delay childbearing until conditions such as financial stability, finding the right partner and social environment factors are met it is also vital

that age is taken into consideration as advancing age means a decreased ability to conceive and carry a pregnancy.

As with the RSM, life history theory (LHT) is an evolutionary theory that examines resource-allocation mechanisms with regards to reproduction, suggesting that reproduction involves costs to the individual such as energy, reduced survival and reduced probability of future reproduction (Vitzthum, 2008). Resources such as time, effort and energy are finite so using these for one objective such as childbearing limits them for other purposes. Therefore, people not only need to consider their health when considering when the best time to start a family would be but also the impact this would have on other areas of their lives, such as social and psychological implications.

Social criteria and theories

In social terms the ideal age to conceive may well be around the age of 29, which is the national average (ONS, Social Trends 38, 2008). Social influences may well have an impact on the decision of when to have children. Women now feel that it is socially acceptable to wait until a later age to have children (Benzies et al., 2006) and do not believe that it is out of sync with their generation. Waiting until an older age can also be seen as beneficial by some. Hofferth (1987) proposed the maternal maturity hypothesis which posits that older mothers are more likely to provide an optimal home environment. One of the reasons that more people delay childbearing until a later age and see that as more acceptable could be explained by Diffusions of Innovation Theory. Diffusion of innovations theory explains how and why a new idea or concept (innovation) may spread through populations or cultures by explaining that if a new idea is adopted by a few

people, then this will spread through other people over time who may also wish to adopt the new practice until nearly all of the people who may wish to adopt the new practice have done so (diffusion) (Rogers, 2004). How individuals make decisions according to this model is explained as consisting of five stages; Knowledge (exposure to the new innovation), persuasion (forming either a favourable or unfavourable attitude towards the innovation), decision (engaging in activities that will lead to a choice of adopting or rejecting the innovation), implementation (putting the innovation to use) and confirmation (seeking reinforcement) (Rogers, 2003). This theory may help explain the rising age at first birth that is being seen today and why more women appear to be delaying childbearing. Berwick (2003) suggests that there are three things that influence the rate at which an innovation spreads. The first influence is perception of the innovation, for example older age of childbearing. If the innovation that older age is perceived as more beneficial to an individual than younger age (e.g., more freedom, more time for career prospects and so forth) the individual will be more likely to adopt it. Secondly, the characteristics of the individual will influence the rate. For example, individuals who wish to pursue demanding careers or those who wish to continue their education may choose to wait until an older age as this will enable them to concentrate fully on their ambitions as they may regard having children as a barrier to these goals. The final influence is thought to be contextual factors. Individuals may not regard themselves as being in a supportive social network, have friends that are waiting until an older age or not have family close-by which, in turn, may lead some to consider that having children later in life may be a better option for them. More support for social criteria influencing childbearing comes from Miller (1994) who states that social context is an important determinant for childbearing. Miller (1994) proposed that social networks can influence a person's motivation to have children through others' approval and encouragement of

childbearing. In support of this, a study of postgraduate students noted that some of the most important considerations in the decision to become a parent included friends having or expecting children. All of these factors may contribute to a delay in childbearing as until people have all these preconditions in place they may not wish to begin their reproductive careers (Skoog Svanberg et al., 2006).

Additionally Bandura's Social Cognitive Theory, a learning theory based on the notion that the way people learn is by watching what others around them do or how they behave, may help explain social influences (as well as individual) on having children as it states that human behaviour is an interaction of personal factors, behaviour and the environment (Bandura, 1998). That is, the way that people interpret their own behaviour will impact on their environment and personal factors which will, in turn, impact on subsequent behaviour (Figure 5.3). The theory suggests that an individual's behaviour depends on external factors (perceptions of environment), behavioural attitudes (how confident a person is of performing a certain behaviour) and internal factors (how the individual applies strategies to deal with thoughts and experiences). Social cognitions examine an individual's representation of their social world which include other people and the broader social world (Ogden, 2004). Therefore, people will take into account the behaviour and thoughts of people around them when considering having children and how this will impact on themselves and their social circle. For example, if an individual feels that everyone around them is having children then they may feel under more pressure to do the same or feel that the time is right for them as their close friends and family are doing the same so they may feel that they would fit in better in their social surroundings.

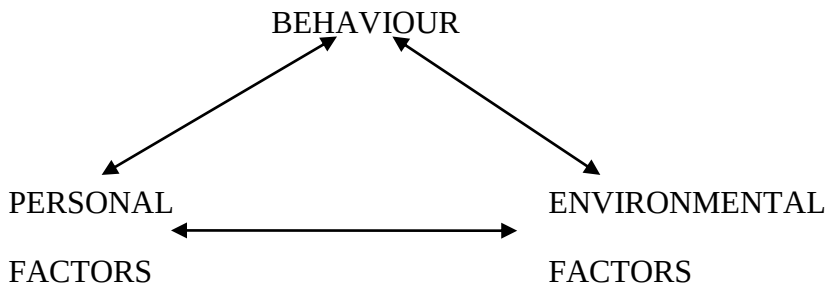

Figure 5.3. Interaction between personal factors, behaviour and environment.

Individual criteria and theories

In addition to biological and social criteria, there are also individual factors that contribute to whether and when people decide to have children with people needing to feel not just sufficiently ready to have children (Lampic et al., 2006) but also sufficiently mature (Taris, 1998). Individual childbearing intentions, desires and motivations have been studied extensively. For example, the value of children along with what a person perceives to be positives or negatives of having children will impact on their motivation or desire for childbearing (Langdridge, Connolly & Sheeran 2005).

However, with so many different individual factors (e.g., education, employment, finding the right partner, being psychologically ready) affecting the decision whether to and when to have children it would be impossible to identify a particular age or time that would be optimal for everyone as people achieve different goals at different ages and times in their lives. Conversely, meeting these preconditions seems to give people a sense of being ready. Chapter 2 demonstrated that within childbearing decision making

there are many factors that influence the timing of parenthood but it mainly appears to be a question of fulfilling personal preconditions (e.g., having a career, stable relationship, financial security) and these things take time to achieve. Therefore if the optimal age for a person is after these preconditions have been met, then the chances are that the optimal time will most likely be in mid-thirties. We can see the effect of these factors not only when we observe the rise in age at first birth but also when we observe the rise in age at first marriage and the rise of number of people, and in particular women, in further education. The age of first marriage in England and Wales has risen from 27.5 years old in men and 25.5 in women in 1991 to 31.9 and 30.2 respectively in 2010 (ONS, 2011), while the number of women in further education in 2006/2007 was 2.1 million, nearly three times more than in 1970/1971 (ONS, Social Trends 39, 2009).

As with social theories, psychological theories that cover individual factors tend to also examine the role of others and their influence on the individual. For example, Miller (1994) examined childbearing motivations, desires and intentions and from this built a framework to explain how individuals are influenced in their decision to have children. Miller (1994) proposed a four-step psychological sequence that explains why people become motivated to have children (Figure 5.4). This sequence incorporates the formation of traits, the activation of traits into desires, the translation of desires into intentions and the implementation of intentions in the form of behaviour. Traits refer to the dispositions individuals have to act in certain ways and childbearing motivations represent the disposition of the individual to react either positively or negatively to childbearing. Desires refer to psychological states which represent what an individual is wishing for and these desires are influenced by motivations, attitudes and beliefs. Finally, intentions are the psychological states representing what the individual actually plants to

do. Although based on desires, they also take into account what others may desire (e.g., when thinking about childbearing a partner's wishes will more than likely be taken into consideration).

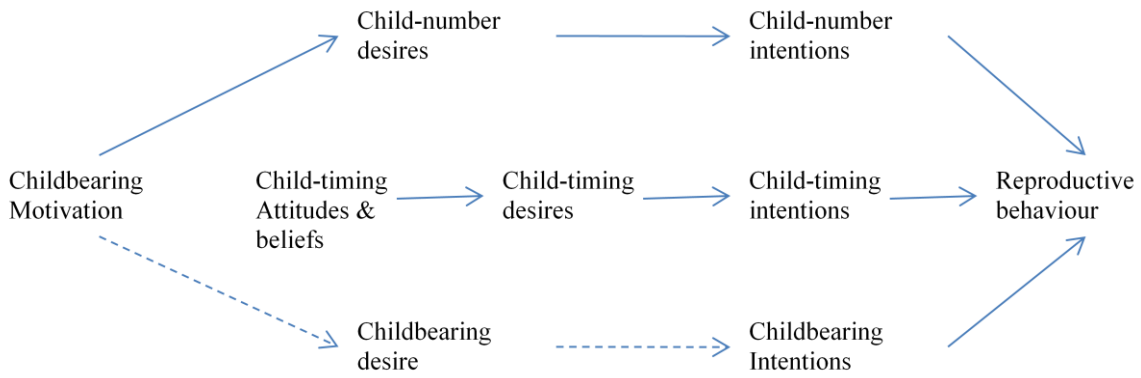

Figure 5.4. Pathways between childbearing motivation, desires, intentions and behaviour. Adapted from Miller, W. B. (1992). Personality traits and developmental experiences as antecedents of childbearing motivation. *Demography, 29*, 265-285.

In addition to psychological theories, demographic theories and explanations regarding childbearing may also help us understand how individual factors influence childbearing decisions. Hakim's (2000) preference theory puts forward an explanation to how women make reproductive choices by proposing that there are three key groups that women are categorised into. These groups comprise of those who favour a family life, often with many children and less emphasis on paid employment (home-centered), those whose main priority is employment and who may voluntarily remain childless (work-centered) and finally women who combine children along with paid employment (adaptive). Whilst both home-centered and work-centered women are predicted to

account for approximately 20% of women each, adaptive women are thought to make up the remaining 60%. Preference theory suggests that these choices of different lifestyles have been brought about mainly due to historic changes in society which include widely available contraception, equal opportunities in the workplace, the growth of white-collar occupations, more opportunities for secondary earners and the fact that individual choices are now more driven by personal preferences and values (Hakim, 2003). Preference theory was tested using survey-based data and face-to-face interviews with randomly chosen men and women (n = 2900) aged 16 and over in Britain (Hakim, 2003). Questions included those relating to lifestyle preferences, ideal family models and work orientations. Analysis of the data revealed that the figures were in line with preference theory in that among women of working age 14% were characterised into home-centered, 16% into work-centered and 70% into adaptive. This theory may help to explain the change in trends over the years as discussed earlier. As there are more and more opportunities for women to undertake further education and concentrate on careers before marriage and childbearing, hence falling into the category of work-centered rather than the more traditional home-centered role, the age at first marriage and first birth may continue to rise.

Consequences of childbearing delay

According to the U.S. Department of Health and Human Services Centers for Disease Control and Prevention (CDC, 2007) the most important factor affecting the chances of a live birth is a woman's age[1]. Increasing age does not only result in reduced

[1]In some fertility treatment women can use the donated eggs of a younger woman to conceive. The CDC statistics assumes the woman is using her own eggs.

fertility but also many complications for pregnancy and pregnancy outcomes (Leader, 2006). These consequences include risk of chromosomal abnormalities, low birth weight, stillbirth, preterm delivery, physical and developmental disabilities for the infant and higher chance of miscarriage (Tough, Benzies, Newburn-Cook, Tofflemire, Fraser-Lee, Faber & Sauve, 2006). In addition to medical risks there is also the possibility of remaining childless due to age-related infertility, which could lead to regret later on in life (Jeffries & Konnert, 2002) and to significant distress if the person opts to undergo fertility treatments (Lukse & Vacc, 1999).

These consequences demonstrate the problems associated with delaying childbearing. It is imperative that both women and men are made fully aware of these possible consequences before making the decision to delay childbearing until such a time that these risks may become a reality. Not only are these consequences psychologically damaging to the individual in question, they also contribute to financial costs, not just within the NHS with regards to treatment and healthcare, but to the individual as well.

The present study

The present study aimed to achieve a better understanding of childbearing delay by examining the differences between age groups with regards to biological, social and individual childbearing preconditions. Firstly, the extent to which each of these criteria (if any) was important in the decision to start trying to conceive was investigated. Specifically, the association between social criteria (i.e., being aged 28 or 29) and individual criteria (i.e., having already achieved a higher level of preconditions) on various indicators of delay was examined using multiple regression analysis. The present

research investigated delay by asking questions about respondent's ideal age to have a first child and when they actually planned to start trying. Delay indicators thus included whether participants had passed their ideal age to have a child and whether they planned to have children sooner or later. Biological criteria (i.e., being over the age of 35) could not be tested in the present study as only 16 participants met this criterion. Secondly, variations in these associations were examined according to age group to obtain a clearer idea of at what the optimum age may be to educate people about their fertility so that the knowledge may be applied to the individual's own childbearing wishes. Age was examined in groups as oppose to a continuous variable as the purpose of the present study was to attempt to ascertain at which approximate age range education and information regarding fertility would be best received and attended to. In line with other studies in this area (e.g., Miettien & Paajanen, 2005) age groups were created according to different stages of life and based on an approximate age range for these different stages of life. For example, while undergraduate and postgraduate education will typically take place between the ages of 18 and 24 this age group was split into 18-21 and 22-24 as we have already seen in chapter 4 that between the ages of 18-21, individuals may not yet be thinking about their future fertility plans. Those between the ages of 25-27 were grouped together as although they may have finished their education they were below the average age of childbearing. The average age of childbearing in the UK is 29.5 so the age group 28-30 was created to cover this age range, while ages older than this average were grouped into the 31 and over age range.

Methods

Participants

Participants were males and females aged 18 to 49, who did not have any children, were not pregnant or about to father a child and who were not trying to conceive. This was to enable us to get a true picture of which factors influence the decision to have a first child and also whether the participants had a discrepancy between the ideal age they would like to have (or have had) a first child and the age at which they stated they planned to start trying to conceive. Participants were recruited via Cardiff University notice-board while local companies were also be targeted in order to place links to the survey on in-house notice-boards and an advert was placed on Facebook. A total of 1021 participants completed the survey. The final number of participants was 945 (185 males and 759 females, mean age = 23.4, SD = 4.6). A total of 884 respondents were recruited through Cardiff University while 61 were recruited though local companies and Facebook. Participants were assigned to one of five age groups; 18-21, 22-24, 25-27, 28-30 and 31 and over.

Materials

The aim of the survey was to examine how biological, social and psychological factors integrate, and are associated with the decision of when to have children along with examining discrepancies in time between ideal age to have a first child and planned age to have a first child. Biological (Repression Suppression Model, Wasser and Isenberg 1986), social (Theory of Planned Behaviour, Ajzen, 1991 and Theory of Reasoned Action,

Langdridge, Sheeran & Connolly, 2007) and psychological (Preference Theory, Hakim 2000) theories were used to generate the questionnaire along with scales from Langdridge et al. (2007) and Miller (1994). Time discrepancies between optimum and actual age of starting a family were examined by asking participants when they felt the ideal age for them to have a child is and their actual age. The questionnaire was split into seven parts examining background variables (e.g., age, education), childbearing intentions and desires, social factors (e.g., opinions of people around you), individual factors (e.g., reasons for and concerns about starting a family), biological factors (e.g., physical aspects of parenting), fertility knowledge and finally a section investigating to what extent the individual felt they had already achieved certain preconditions deemed important in thinking about starting a family.

(i)Background information: Background information included gender, age, country of residence and origin, employment status (full time, part time, unemployed, student, retired, other), education (none, primary/elementary, secondary/high school, post secondary, undergraduate, postgraduate, other), relationship information (whether participants were in a relationship, length of relationship, whether participants were living with their partner, how long they had been living together and whether the relationship was same sex.

(ii) Childbearing desires, intentions and timing: participants answered questions on timing of childbearing (participants were asked to state the ages that they considered would be too early to have a first child, the ideal time and too late) for themselves and also for men and women in general, strength of desire to have a child (for self and partner if appropriate), strength of intention to have a child in the next 2 years (for self and partner if appropriate), strength of intention to have a child in the next 5 years (for self

and partner if appropriate) and when they planned to actively start trying to have their first child. Questions were adapted from Benzies et al. (2006) Tough et al. (2007) and Lampic et al. (2006).

(iii) Social factors: participants were asked to rate (from strongly disagree to strongly agree) a list of 13 social reasons for starting a family, including statements such as 'starting a family would bring me closer to family members who already have children', 'starting a family would make me more involved in family life' and 'I feel under social pressure to have a child'. Social factor scales were adapted from Langdridge at al. (2007); Benzies et al. (2006) Tough et al. (2007) and Lampic et al. (2006). Subjective norms (e.g., 'my parents think I should start trying for a family', 'generally speaking, I want to do what my parents think is best') were adapted from Callan et al. (1988).

Participants were also asked about media influences (media reports make me/people in general feel they should be starting a family sooner than intended/later than intended/no effect on intentions), media perceptions of older and younger mothers (ages you think the media means and ages you think this means). Finally participants were asked to rate the extent to which they agreed with 11 statements regarding delay according to their age (either 34 and younger or 35 and older) e.g., 'I intend/intended to have my first child after the age of 35', 'I think it would be/have been easier to have my first child after the age of 35'.

(iv) Individual factors: Participants were asked to state their three most important considerations when thinking about starting a family and to rate ten statements (from not at all important to extremely important) concerning goals people want to achieve before starting a family e.g., finish education, own their own home, be with a suitable partner.

Participants were then asked to rate to what extent they agreed with six concerns about starting a family, e.g., 'starting a family now would leave me with financial difficulties' and 13 statements regarding different emotions e.g., 'starting a family would make me feel excited' and 'I would make a very good father/mother'. Individual factor scales were adapted from Langdridge at al. (2007); Benzies et al. (2006) Tough et al. (2007) and Lampic et al. (2006).

(v) *Physical (biological) factors*: Participants were asked to rate how strongly they agreed or disagreed with six statements referring to physical criteria (e.g., 'I feel broody when around children', 'I want to be at my optimum health before starting a family'), how important five statements about the physical aspects of being a parent (e.g., 'feeding a baby', 'holding and cuddling a baby') including an extra two statements for women only ('giving birth to a baby' and 'feeling a baby kick and move inside me'). Biological scales were adapted from Wasser and Isenberg (1986).

(vi) Fertility knowledge: In this section participants were asked two questions about whether they believed fertility declined for men and women and if so, at what ages this started. Participants were also asked to indicate whether nine statements regarding risks to fertility were true or false ('a woman's age is an important consideration in being able to get pregnant', 'a man's age is an important consideration in being able to father a child', 'a pregnancy after the age of 35 would be more physically demanding for a woman than a pregnancy before the age of 35', 'a pregnancy after the age of 35 would be more emotionally demanding for a woman than a pregnancy before the age of 35', 'a pregnancy after the age of 35 is more likely to result in complications such as increased risk of Down Syndrome or premature birth', 'any decline in female fertility could be compensated by medical treatment (e.g., IVF or fertility drugs)', any decline in male

fertility could be compensated by medical treatment (e.g., IVF or fertility drugs)', 'a woman in her 40s has as much chance of getting pregnant as a woman in her 30s' and 'a woman in her 30s has as much chance of getting pregnant as a woman in her 20s'). Questions regarding fertility knowledge were adapted from Lampic, Skoog Svanberg, Karlstrom & Tyden (2006), Maheshwari, Porter, Shetty & Bhattacharya (2008) and Bretherick, Fairbrother, Avila, Harbord & Robinson (2010).

(vii) Where are you now?: In this section participants were asked to rate on a scale from 0% to 100% how far they felt they were along in achieving seven goals shown by previous research (e.g., Heaton et al., 1999; Barber, 2001; Berrington, 2004; Testa & Toulemon, 2006) to be some of the most important considerations when thinking about starting a family (finishing education/training, being in a good job/stable career, having financial security, being in a stable relationship, being with a partner who wants to start a family, feeling personally ready, feeling physically ready).

Procedure

The survey received ethical approval from the School of Psychology Ethics Committee, Cardiff University. Participants were recruited through Cardiff University (an announcement email sent to all staff and students) and local companies were approached via a gatekeeper letter (Appendix N). Both the announcement email and the gatekeeper letter contained a link to access the survey. By clicking on the link participants were directed to the survey's information page. The information page detailed the content of the survey and explained the inclusion criteria and informed participants that they could withdraw at any time or omit any questions they wished to. Participants had to click a

button confirming that they were over the age of 18 and that they consented to participate before they could continue. The survey took approximately 15 minutes to complete. Participants then saw the debrief form and were requested to click a button at the bottom of the screen in order to submit their data (see Appendix O for full questionnaire).

Data Analysis

A total of 1021 responses were downloaded from SurveyTracker into Excel and transferred into SPSS. In total 74 participants were excluded as they did not meet inclusion criteria (nine as they already had children, three were currently pregnant, six were currently trying to conceive and 59 did not intend to have children). One participant was removed as she was female, aged 49 years old and stated that she planned to start trying for her first child in ten years. Descriptive statistics, chi-square tests and ANOVAs were used to assess background characteristics.

All participants were categorised into one of five age groups; 18-21, 22-24, 25-27, 28-30 and 31 and above. This was to be able to try and assess within a relatively small timeframe at which age group intentions and desire for a child and different preconditions became more or less important. Factorial ANOVAs were conducted to investigate the differences in age groups and gender with regards to their desire to have a child and their intentions to have a child within the next two and five years.

To examine the extent to which respondents were aware of fertility decline in women along with the perceived thresholds of being an older mother, three variables were assessed; ‘At what age do you believe fertility declines in women’, ‘When the media refer

to older mothers, I think the media means older than (in years)' and ''When the media refer to older mothers, I think it means older than (in years)'.

Overall fertility knowledge was assessed by firstly transforming each of the nine knowledge questions into either one (has knowledge) if participants answered the question correctly or zero (no knowledge) if participants answered incorrectly or did not know. Two of the original nine fertility items were not included in the analysis ('a man's age is an important consideration in being able to father a child', 'a pregnancy after the age of 35 would be more emotionally demanding for a woman than a pregnancy before the age of 35') as they did not contribute to the reliability of the scale.

The seven remaining fertility knowledge items were grouped together in order to assess overall knowledge. Reliability analysis performed on the seven items revealed an alpha of .643. ('a woman's age is an important consideration in being able to get pregnant', 'a pregnancy after the age of 35 would be more physically demanding for a woman than a pregnancy before the age of 35', 'a pregnancy after the age of 35 is more likely to result in complications such as increased risk of Down Syndrome or premature birth', 'any decline in female fertility could be compensated by medical treatment (e.g., IVF or fertility drugs)', any decline in male fertility could be compensated by medical treatment (e.g., IVF or fertility drugs)', 'a woman in her 40s has as much chance of getting pregnant as a woman in her 30s' and 'a 'a woman in her 30s has as much chance of getting pregnant as a woman in her 20s'). A percentage score was then calculated for each participant from 0-100 where 0 equalled low knowledge, 50 equalled average knowledge and 100 equalled high knowledge. Factorial ANOVAs were conducted to investigate any differences between age groups with regards to perceived delay and overall fertility knowledge.

In reference to different preconditions, where appropriate scores were converted to standard scores and composite scales were created from means across all items measuring the same construct. Exploratory factor analysis was performed on the different scales with loadings above .30 considered as significant (Tabachnik & Fidel, 2001). Internal reliability was assessed using Cronbach alpha coefficient (α). Items were re-coded from negative to positive scales where appropriate. Six composite subscales were created from the sections of social factors, individual factors and physical (biological) factors investigating preconditions. Social factors revealed two precondition subscales: 'social benefits of childbearing' and 'social pressure and subjective norms'. Individual factors revealed two precondition subscales: 'importance of achieving personal and relational aspirations' and 'importance of achieving economic aspirations'. Finally, physical factors revealed two precondition subscales; 'feeling physically ready' and 'physical aspects of parenthood'. See Appendix P for full factor analysis and items in each subscale. Factorial ANOVAs were conducted to examine the differences between age groups and gender on the six precondition scales.

To assess social criteria a new variable was calculated so that participants were grouped into those who were aged 28 or 29 (met social childbearing age) or those who did not meet social childbearing age (all other ages).

To assess individual criteria a childbearing readiness scale was composed of the seven preconditions where participants had indicated on each how far along they were in achieving each of the seven items (finishing education/training, being in a good job/stable career, having financial security, being in a stable relationship, being with a partner who wants to start a family, feeling personally ready, feeling physically ready). Reliability analysis on the seven items revealed an alpha of .890. For the present analysis it was not

possible to create a new variable for biological criteria as only 16 participants were over the age of 35.

To examine attitudes, three subscales were created: 'positive feelings towards starting a family', 'concerns about parenthood' and 'parenthood aspirations'. Factorial ANOVAs were conducted to examine the differences between age groups and gender on the three attitude scales.

To assess whether individuals were older than their stated ideal age to have a first child, a discrepancy score (age difference) was calculated. This was achieved by subtracting the age participants indicated would be their ideal age to have a child from their actual age. This gave a positive number if the ideal age was younger than the age they were at. All other participants would have a negative score and would be considered non-delayers, as they had not yet reached the age they considered it to be ideal to have a first child. To assess participant's perceptions of what age constitutes an older mother ANOVAs were conducted to investigate the differences in age groups and gender as to what age participants felt the media meant by older mothers and the age at which participants felt a woman becomes an older mother.

Planned timing of childbearing was assessed by totalling the months and years that participants had indicated that they planned to actively start trying for a family into one variable that measured planned timing of childbearing in years.

Multiple regressions were conducted to assess the relationship between life course variables (e.g., being in a relationship), preconditions, social and individual criteria and gender on the likelihood of being older than stated ideal age to have a first child and on planned timing of childbearing. Bivariate correlation analysis was employed to examine

multicollinearity between all independent and dependent variables using the threshold of .80 as specified by Tabachnick and Fidell (2001).

Results

Overview

Results are presented in five sections. Section I shows the background characteristics of the total sample and the age-group sub-samples. Section II examines the desire to have a child and the intention to have a child in the next two and five years. Section III examines fertility knowledge, perceived age of fertility decline in women along with perceived thresholds of being an older mother and delay. Section IV examines social, individual and physical preconditions and the age at which these become more or less important to respondents. Section V examines the difference between age groups and gender with regards to the importance of attitudes towards childbearing. Finally section VI shows the association between life course variables, importance of and level of preconditions achieved and gender on the outcomes of being older than ideal age to have a first child and planned timing of childbearing.

Section I: Background characteristics

Table 5.1 shows the demographic characteristics of the sample. Overall the total sample was in their early twenties with 46.5% in the youngest age group (18-21). An independent *t*-test revealed a marginally significant difference in mean age between men and women with men being older than women ($t = 1.219$, $df = 943$, $p = .054$). The majority of the total sample were in a relationship (65%) and were students (67.9%) of which 17.1% indicated that they were postgraduate students.

Table 5.1

Background characteristics of sample

Variable	Total (*N*=945)	Age group					Gender	
		18-21 (*n* = 439)	22-24 (*n* = 180)	25-27 (*n* = 139)	28-30 (*n* = 95)	31 and over (*n* = 92)	Female (*n* = 760)	Male (*n* = 185)
	M (SD)	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***
Age	23.50 (4.6)	19.84 (1.0)	22.81 (0.8)	26.02 (0.9)	28.90 (0.8)	33.28 (2.5)	23.45(4.4)	23.90(5.1)
	N (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)
In a relationship (Yes)	614 (65.0)	245 (55.8)	121 (67.2)	105 (75.5)	82 (86.3)	61 (66.3)[a]	512(67.4)[1]	102(55.1)
If in a relationship – Do you live together (yes)	284 (30.1)	44 (10.0)	49 (27.2)	76 (54.7)	66 (69.5)	49 (53.3)[a]	236 (43.1)	48 (40.7)
	M (SD)	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***
Total time in relationship (years)	3.21 (2.8)	1.78 (1.4)[a]	2.77 (2.1)[b]	4.17 (2.8)[c]	5.19 (3.3)[d]	5.76 (3.9)[d]	3.26(2.8)[1]	3.02(2.9)
Total time living together (years)	2.55 (2.4)	0.75 (.06)[a]	1.76 (1.7)[a,b]	2.75 (1.8)[b]	3.13 (2.4)[b,c]	3.97 (3.3)[c]	2.60(2.4)	2.31(2.2)
Education	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)
At least university education	676 (71.5)	234 (53.3)	147 (81.7)	124 (89.2)	88 (92.6)	83 (90.2)	550 (72.4)[1]	126 (68.1)
Employment status	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)	***N*** (%)
Full-time employment	268 (28.4)	12 (2.7)	32 (17.8)	85 (61.2)	60 (63.2)	79 (85.9)	214 (28.2)	54(29.2)
Student	642 (67.9)	416 (94.8)	140 (77.8)	47 (33.8)	30 (31.6)	9 (9.8)	518 (68.2)	124(67.0)

Note. Numbers with different superscripts are significantly different. [1]Females significantly differ to males.

Chi-square tests on age group revealed that the highest percentage of women ($\chi 2$ (4) = 369.46, $P < .001$) and men ($\chi 2$ (4) = 73.84, $P < .001$) were in the 18-21 age group. Additionally the highest percentage of individuals in a relationship were in the 28-30 age group ($\chi 2$ (1) = 42.94, $P < .001$), while there was a significantly higher percentage of women in a relationship than men ($\chi 2$ (1) = 10.24, $P < .01$). Chi-square tests on the sub-sample of individuals who were in a relationship ($n = 614$) revealed that the highest percentage of individuals living together were in the 28-30 age group ($\chi 2$ (4) = 184.19, $P < .001$), while there was no significant difference between men and women ($\chi 2$ (1) = 0.88, $P = .913$).

Factorial ANOVAs were conducted to investigate whether there were differences between age groups and gender in the length of time they had been in a relationship and the length of time they had been living together. In reference to length of time in relationship there was a main effect of age group *(F* (4, 620) = 31.74, $p<.001$) and a marginally significant main effect of gender *(F* (1, 620) = 3.29, $p = .07$). The interaction between age group and gender was not significant *(F* (4, 620) = 1.43, $p = .224$). In reference to length of time living together there was a main effect of age group *(F* (4, 291) = 11.32, $p<.001$) but not gender *(F* (1, 291) = 0.56, $p = .457$). The interaction between age group and gender was not significant *(F* (4, 291) = 0.38, $p = .824$).

In reference to length of time in relationship, Tukey post hoc tests revealed that overall participants in the 31 and over age group had been in a relationship significantly longer than the 18-21 age group (*M.diff* = 3.98, $p<.05$), the 22-24 age group (*M.diff* = 2.99, $p<.05$) and the 25-27 age group (*M.diff* = 1.59, $p<.05$). The 28-30 age group had been in a relationship significantly longer than the 18-21 age group (*M.diff* = 3.41, $p<.05$), the 22-24 age group (*M.diff* = 2.41, $p<.05$) and the 25-27 age group (*M.diff* =

1.11, $p<.05$). Furthermore the 25-27 age group had been in a relationship significantly longer than the 18-21 age group (*M.diff* = 2.38, $p<.05$) and the 22-24 age group (*M.diff* = 1.39, $p<.05$) while the 22-24 age group had been in a relationship significantly longer than the 18-21 age group (*M.diff* = 0.99, $p<.05$). Women (*M* = 3.26, *SD* = 2.82) had been in a relationship significantly longer than men (*M* = 3.02, *SD* = 2.87).

In reference to length of time living together, Tukey post hoc tests revealed that the 31 and over age group had been living together significantly longer than the 18-21 age group (*M.diff* = 3.22, $p<.05$), the 22-24 age group (*M.diff* = 2.21, $p<.05$) and the 25-27 age group (*M.diff* = 1.22, $p<.05$). The 28-30 age group had been living together significantly longer than the 18-21 age group (*M.diff* = 2.38, $p<.05$) and the 22-24 age group (*M.diff* = 1.37, $p<.05$). Furthermore, the 25-27 age group had been living together significantly longer than the 18-21 age group (*M.diff* = 1.99, $p<.05$).

Chi-square tests revealed that the highest percentages of individuals with at least a university education were in the older age groups ($\chi2$ (8) = 149.11, $p < .001$). While there were no significant differences between men and women ($\chi2$ (1) = 1.97, $p = .373$). In reference to being in full-time employment, the highest percentage of individuals in full-time employment were in the 31 and over age group ($\chi2$ (1) = 440.64, $p <.001$) while there were no significant differences between men and women ($\chi2$ (2) = 2.10, $p = .352$). In reference to being a student, the highest percentage of individuals who were students were in the 18-21 age group ($\chi2$ (8) = 442.93, $p <.001$) while there were no significant differences between men and women ($\chi2$ (2) = 2.41, $p = .300$).

Section II. Desire and intentions to have a child

Factorial ANOVAs were conducted to investigate whether there were differences between age groups and gender in their desire to have a child, their intention to have a child within the next two years and the intention to have a child in the next five years. Table 5.2 shows the F-ratios for main effects and interactions for these analyses. As shown there was a main effect of age group and gender for all three variables but none of the interactions between age group and gender were significant.

Table 5.2

F-ratios for main effects of age-group and gender and their interaction on desire and intentions variables

Variable	**Main effects**		**Interaction**
	Age group	**Gender**	**Age group * Gender**
How strong is your desire to have a child?	4.58**	8.15 **	1.59
How strong is your intention to have a child in the next 2 years?	66.46***	7.23**	1.56
How strong is your intention to have a child in the next 5 years?	51.17***	13.615***	.47

Note. †P<.10, *P<.05, **P<.01, ***P<.001

Table 5.3 shows the means and standard deviations for each age group. Respondents in the 18-21 age group reported a significantly higher desire to have a child than the 28-30 age group (*M.diff* = 0.69, p <.05) and the 31 and over age group (*M.diff* = 0.69, p <.05). Furthermore the 22-24 age group reported a significantly higher desire than

the 31 and over age group (*M.diff* = 0.82, *p* <.05). Women reported a significantly higher desire (*M* = 9.04, *SD* = 2.2) than men (*M* = 9.04, *SD* = 2.2). The interaction between age and gender was not significant.

Table 5.3

Means (and standard deviations) for desire and intention variables according to age-group and gender

Variable	**Age group**					**Gender**	
	18-21 (*n* = 439)	**22-24 (*n* = 180)**	**25-27 (*n* = 139)**	**28-30 (*n* = 95)**	**31 and over (*n* = 92)**	**Female (*n* = 760)**	**Male (*n* = 185)**
How strong is your desire to have a child?	9.16 (2.2) [a]	9.14 (2.1) [a,c]	8.70 (2.3)	8.50(2.4) [b,c]	8.32 (2.2) [b]	9.01(2.2) [1]	8.10(2.2)
How strong is your intention to have a child in the next 2 years?	1.81 (1.7) [a]	2.41 (2.6) [a]	4.80 (3.4) [b]	5.8 0(3.4) [c,d]	6.8 (3.6) [d]	3.30(3.2) [1]	3.03(3.0)
How strong is your intention to have a child in the next 5 years?	5.11 (3.21) [a]	6.80 (3.2) [b]	8.74 (2.6) [c,d]	9.17 (2.5) [d]	9.03 (2.4) [d]	6.96(3.3) [1]	5.95(3.7)

Note. All variables assessed on an 11-point scale where higher scores indicated a higher strength of desire or intention. Numbers with different superscripts are significantly different. [1]Females significantly differ to males.

In reference to the intention to have a child in the next two years the 31 and over age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 4.94, *p* <.001), the 22-24 age group (*M.diff* = 4.34, *p* <.001) and the 25-27 age group (*M.diff* = 1.97, *p* <.001). Additionally, the 28-30 age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 4.02, *p* <.001), the 22-24 age group (*M.diff*

= 3.42, p <.001) and the 25-27 age group (*M.diff* = 1.06, p <.05). Furthermore the 25-27 age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 2.97, p <.001) and the 22-24 age group (*M.diff* = 2.36, p <.001). Women reported a significantly higher intention (M = 3.30, SD = 3.2) than men (M = 3.03, SD = 3.0). The interaction between age and gender was not significant.

In reference to the intention to have a child in the next five years the 31 and over age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 3.92, p <.001) and the 22-24 age group (*M.diff* = 2.23, p <.001). The 28-30 age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 4.06, p <.001) and the 22-24 age group (*M.diff* = 2.36, p <.001). The 25-27 age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 1.69, p <.001) and the 22-24 age group (*M.diff* = 1.93, p <.001). Furthermore the 22-24 age group reported significantly higher intentions than the 18-21 age group (*M.diff* = 1.69, p <.001). Women reported significantly higher intentions (M = 6.96, SD = 3.3) than men (M = 5.95, SD = 3.7). The interaction between age and gender was not significant.

Summary

With regards to desire for a child, women reported higher desire for a child than men while overall the younger age groups reported a stronger desire than the older age groups. With regards to intention to have a child in the next two and five years women reported higher intentions than men while overall as age increased so did intentions with the youngest two age groups (18-21 and 22-24) indicated significantly lower intentions to have a child in the next two years while the youngest age group (18-21) reported significantly lower intentions than all other age groups in reference to intention to have a child in the next five years.

Section III: Defining age-related fertility decline in women and knowledge

Factorial ANOVAs were conducted to investigate whether there were differences between age groups and gender as to the age at which respondents considered women's fertility to decline and the perceived threshold for being an older mother.

Table 5.4 shows the main effects and interactions. As shown, in reference to age at which fertility declines in women there was a main effect of age group and gender. In reference to media perception there was a main effect of age group and in reference to personal perception there was a main effect of age group.

Table 5.4

F-ratios for main effects of age-group and gender and their interaction on age-related fertility decline and fertility knowledge variables

Variable	**Main effects**		**Interaction**
	Age group	**Gender**	**Age group*Gender**
At what age do you believe fertility declines in women	3.47**	19.79***	0.55
When the media refers to 'older' mother, I think the **media** means older than (in years)	5.39***	1.52	1.08
When the media refers to 'older' mother**, I** think it means older than (in years)	3.65**	0.83	.082
Fertility knowledge (0-100)	2.75*	26.49**	0.71

†P<.10, *P<.05, **P<.01, ***P<.001

Table 5.5 shows the means and standard deviations for each age group. ANOVAs revealed that respondents in the 18-21 age group reported a significantly older age at for fertility decline than the 22-24 age group (*M.diff* = 2.23, *p* <.01), the 25-27 age group (*M.diff* = 2.85, *p* <.001), the 28-30 age group (*M.diff* = 2.00, *p* <.05) and the age 31 and over age group (*M.diff* = 2.00, *p* <.05). Men indicated a reported a significantly older age (*M* = 35.71, *SD* = 5.9) than women (*M* = 32.98, *SD* = 5.8). The interaction between age and gender was not significant.

Table 5.5

Means (and standard deviations) for age-related fertility decline and fertility knowledge variables according to age-group and gender

	Age group					Gender	
Variable	18-21 (*n* = 439)	22-24 (*n* = 180)	25-27 (*n* = 139)	28-30 (*n* = 95)	31 and over (*n* = 92)	Female (*n* = 760)	Male (*n* = 185)
At what age does fertility decline for women	35.32 (6.5) [a]	33.09 (6.2) [b]	32.47 (5.9) [b]	33.31 (5.1) [b]	33.19 (5.5) [b]	33.61(6.0) [1]	36.07(6.9)
When the media refers to 'older' mother, I think the **media** means older than.	39.09 (6.0) [a,c]	37.27 (4.8) [b]	39.68 (6.0) [c]	35.75 (5.2) [b]	36.53 (5.1) [b]	38.24(5.7)	38.27(6.0)
When the media refers to 'older' mother, **I** think it means older than.	39.51 (5.1) [a,c]	38.26 (4.8) [b]	40.37 (5.2) [c]	37.72 (4.4) [b]	39.12 (4.1)	39.31(4.8)	38.66(5.5)
Fertility knowledge (0-100)	67.05 (23.0) [a]	72.47 (21.7) [b]	74.20 (22.4) [b]	70.97 (21.5)	75.04 (22.5) [b]	72.11(22.0) [1]	62.79(23.7)

Note. Numbers with different superscripts are significantly different. [1]Females significantly differ to males.

In reference to media perceptions respondents in the 25-27 age group indicated a significantly higher age as to the age they thought the media perceived older mothers to be than the 22-24 age group (*M.diff* = 2.41, *p* <.01), the 28-30 age group (*M.diff* = 3.93, *p* <.001) and the 31 and over age group (*M.diff* = 3.15, *p* <.01). Furthermore the 18-21 age group indicated a significantly higher age than the 22-24 age group (*M.diff* = 1.82, *p* <.01), the 28-30 age group (*M.diff* = 3.331, *p* <.001) and the 31 and over age group (*M.diff* = 2.56, *p* <.01).

In reference to individual perceptions as to the age respondents perceived older mothers to be, respondents in the 18-21 age group indicated a significantly higher age that they thought was meant by older mothers than the 22-24 age group (*M.diff* = 1.25, *p* <.05) and the 28-30 age group (*M.diff* = 1.79, *p* <.05). Furthermore the 25-27 age group indicated a significantly higher age than the 22-24 age group (*M.diff* = 2.12, *p* <.001) and the 28-30 age group (*M.diff* = 2.66, *p* <.01).

A factorial ANOVA was also conducted to investigate level of fertility knowledge amongst the different age groups. There was a main effect of gender with women having significantly higher knowledge (*M* = 74.12, *SD* = 1.881) than men (*M* = 63.26, *SD* = .957). There was also a main effect of age group. Tukey post hoc test revealed that the 18-21 age group had significantly lower knowledge than the 22-24 age group (*M.diff* = -5.42, *p* <.05), the 25-27 age group (*M.diff* = -7.16, *p* <.01) and the 31 and over age group (*M.diff* = -7.99, *p* <.05). The interaction between age group and gender was not significant.

Being older than stated ideal age to have first child

Factorial ANOVAs and Chi-square tests were conducted to investigate whether there were differences between age groups and gender in the percentage of individuals who were older than their stated ideal age to have a first child.

Table 5.6 shows the means (and standard deviations) of the difference between respondents actual age and the age at which they indicated would be their ideal age to have their first child along with the number (percentage) of respondents who were older than their stated ideal age) in each age group. Overall 9.3% (*n* = 88) of respondents were older than their stated ideal age to have a first child.

Table 5.6

Means (and standard deviations) for difference between actual and ideal age to have a first child and number (and percentage) of individuals older than stated ideal age to have a first child in each age group

	Age group					**Gender**	
	18-21 (*n* = 439)	**22-24 (*n* = 180)**	**25-27 (*n* = 139)**	**28-30 (*n* = 95)**	**31 and over (*n* = 92)**	**Female (*n* = 760)**	**Male (*n* = 185)**
	M (SD)	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***	***M (SD)***
Difference between actual age and ideal age to have first child	-7.23 (2.7)[a]	-5.17 (2.1)[b]	-3.24 (2.3)[c]	-1.99 (2.7)[d]	0.91 (4.0)[e]	-4.79(3.6)[1]	-5.54 (4.6)
	***n* (%)**	***n* (%)**	***n* (%)**	***n* (%)**	***n* (%)**	***n* (%)**	***n* (%)**
Number of individuals older than ideal age	1 (1.1)	0 (0)	12 (13.6)	22 (25.0)	53 (60.0)	70 (79.5)	18 (20.5)

Note. Numbers with different superscripts are significantly different. [1]Females significantly differ to males.

Table 5.6 shows that the only age group to have a positive value in regards to the difference between actual age and ideal age to have a first child (i.e., older than stated ideal age to have a first child) was the 31 and over age group.

A Factorial ANOVA conducted on the difference between individuals actual age and stated ideal age to have a first child revealed that there was a main effect of age group (F (4, 933) = 174.17, p <.001) and gender (F (1, 933) = 7.82, p <.01). The interaction between age group and gender was not significant (F (4, 933) = 1.87, p = .113).

Tukey post hoc tests revealed that the 31 and over age group were significantly closer in age to their ideal age than the 18-21 age group (*M.diff* = 8.15, p <.05), the 22-24 age group (*M.diff* = 6.08, p <.05), the 25-27 age group (*M.diff* = 4.15, p <.05) and the 28-30 age group (*M.diff* = 2.90, p <.05). The 28-30 age group were significantly closer in age to their ideal age than the 18-21 age group (*M.diff* = 5.25, p <.05), the 22-24 age group (*M.diff* = 3.18, p <.05) and the 25-27 age group (*M.diff* = 1.25, p <.05). Furthermore, the 25-27 age group were significantly closer in age to their ideal age than the 18-21 age group (*M.diff* = 3.99, p <.05) and the 22-24 age group (*M.diff* = 1.93, p <.05), while the 22-24 age group were significantly closer than the 18-21 age group (*M.diff* = 2.07, p <.05). Women were significantly closer in age to their ideal age than men.

Chi-square test revealed that among women there were significantly more individuals older than their stated ideal age in the 31 and over age group ($\chi 2$ (8) = 217.53, p<.001). The same result was found among men ($\chi 2$ (8) = 81.06, p<.001). There were significantly more women than men who were older than their stated ideal age to have a first child ($\chi 2$ (1) = 30.73, p<.001).

Summary

In reference to the age at which fertility declines for women, the youngest age group (18-21) reported a significantly older age than all other age groups while men reported a significantly older age than women. With regards to both media perceptions and individual perceptions of the perceived threshold for being an older mother, the age groups 18-21 and 25-27 reported significantly older ages than the other three groups. In reference to overall fertility knowledge, the youngest age group (18-21) had the lowest knowledge while women had significantly higher knowledge than men. In reference to the difference between actual age and ideal age to have a first child, the 31 and over age group were, overall, older than their stated ideal age to have a first child, while the youngest age group (18-21) had the largest difference (in years) between actual age and ideal age to have a first child. Women were closer in actual age to their ideal age to have a first child than men. With regards to the numbers of individuals in each age group who were older than their ideal age to have a first child, the majority were in the oldest age group (31 and over) while there were more women than men overall who were older than their stated ideal age to have a first child.

Section IV: At what age do different preconditions become important?

Factorial ANOVAS were conducted to investigate the importance different age groups place on the social, individual and physical preconditions and also to examine whether there were any gender differences.

Table 5.7 shows the main effects and interactions. All but one variable showed a main effect of age group, which was the social benefit of childbearing variable. Three

variables showed a main effect of gender: social benefits of childbearing, childbearing readiness score and physical aspects of parenthood. There was a marginally significant interaction between age group and gender for personal and relational preconditions and for the childbearing readiness scale. Table 5.8 shows the means and standard deviations for each age group on each precondition.

Table 5.7

F-ratios for main effects of age-group and gender and their interaction on precondition subscales

Precondition Subscale	**Main effects**		**Interaction**
	Age group	**Gender**	**Age group*Gender**
Social preconditions			
Social benefits of childbearing	1.12	5.22*	1.39
Social pressure and subjective norms	3.94**	.421	.489
Personal preconditions			
Personal/relational preconditions	3.14*	2.09	2.29†
Economic preconditions	7.18***	0.12	1.48
Childbearing readiness scale	49.766***	60.279†	46.393†
Physical preconditions			
Feeling physically ready	4.54**	1.84	2.10†
Physical aspects of parenthood	10.17***	8.44*	1.62

†P<.10, *P<.05, **P<.01, ***P<.001

Table 5.8

Means (and standard deviations) for precondition variables according to age-group and genders

Precondition	Age group					Gender	
	18-21 (*n* = 439)	**22-24 (*n* = 180)**	**25-27 (*n* = 139)**	**28-30 (*n* = 95)**	**31 and over (*n* = 92)**	**Female (*n* = 760)**	**Male (*n* = 185)**
Social preconditions							
Social benefits	3.41 (.78)	3.22 (.87)	3.29 (.84)	3.32 (.72)	3.31 (.79)	3.36(.81)	3.21(.78)
Social pressure	2.16 (.59) [a]	2.18 (.67) [a,b]	2.22 (.66) [a,b]	2.37 (.66) [b,c]	2.52 (.72) [c]	2.23(.65)	2.22(.61)
Personal preconditions							
Personal/ relational preconditions	4.61 (.48) [a]	4.58 (.49) [a]	4.56 (.51) [a]	4.56 (.38) [a]	4.31 (.66) [b]	4.59(.51) [1]	4.50(.55)
Economic preconditions	4.10 (.65) [a]	4.13 (.63) [a]	4.03 (.72) [a]	3.99 (.66) [a]	3.60 (.79) [b]	4.10(.69)	3.96(.69)
Childbearing readiness scale[2]	7.88 (4.7)	10.14 (4.9)	13.42 (4.7)	14.39 (4.3)	15.24 (4.3)	10.52(5.4)[1]	10.38(5.6)
Physical preconditions							
Feeling physically ready	4.25 (.62) [a]	4.20 (.62) [a]	4.13 (.70) [a,b]	3.90 (.71) [b,c]	3.87 (.74) [c]	4.18(.66) [1]	4.02(.70)
Physical aspects of parenthood	3.64 (.83) [a]	3.56 (.89) [a]	3.54 (.88) [a]	3.00 (.90) [b,c]	3.07 (.88) [c]	3.55(.88)	3.25(.90)

Note. All variables assessed on a 5-point scale (except childbearing readiness scale) where higher scores indicate more importance. Numbers with different superscripts are significantly different. [1]Females significantly differ to males. Mean score of 7 items assessing level of already achieved (21 point scale) where higher scores indicate higher level achieved.

Social preconditions

Factorial ANOVAs revealed that for social benefits of childbearing there was a main effect of gender with women agreeing significantly more than men that social

benefits of childbearing (e.g., starting a family would bring me closer to friends who already have children) were important. There was no main effect of age group and no interaction between age group and gender.

For social pressure and subjective norms (e.g., I feel under social pressure to start trying for a family) there was a main effect of age group. Tukey post hoc tests revealed that the age group 31 and over rated social pressure and subjective norms of having children as a significantly more important consideration than the 18-21 age group (*M.diff* = 0.35, p <.001), the 22-24 age group (*M.diff* = 0.34, p <.001) and the 25-27 age group (*M.diff* = 0.30, p <.01). Furthermore, the 28-30 age group rated social pressure and subjective norms significantly higher than the 18-21 age group (*M.diff* = 0.20, p <.05).

Chi-square tests were employed to examine whether there were differences in the number of men (8.6%) or women (6.6%) meeting social age criteria (i.e., being aged 28 or 29) and revealed no significant difference ($\chi 2$ (1) = 0.981, p = *.335*).

Individual preconditions

Factorial ANOVAs revealed that for achieving personal and relational preconditions (e.g., being with a suitable partner), there was a main effect of age group. As shown in Table 5.8 Tukey post hoc tests revealed that the 31 and over age group rated achieving personal and relational preconditions as significantly less important than the 18-21 age group (*M.diff* = -0.30, p <.001), the 22-24 age group (*M.diff* = -0.27, p <.01), the 25-27 age group (*M.diff* = -0.25, p <.01), and the 28-30 age group (*M.diff* = -0.25, p <.01). Simple effects tests revealed that women rated achieving personal and relational preconditions as significantly more important than men in the 18-21 age group (p <.001)

and the 22-24 age group (p <.01) while men rated achieving personal and relational preconditions as significantly more important in the 31 and over age group (p <.05). There were no significant differences in the 25-27 age group (p = .342) or the 28-30 age group (p = .865).

For achieving economic preconditions (e.g., being in permanent employment), there was a main effect of age group. Tukey post hoc tests revealed that the 31 and over age group rated achieving economic preconditions as significantly less important than the 18-21 age group (*M.diff* = -0.50, p <.001), the 22-24 age group (*M.diff* = -0.54, p <.001), the 25-27 age group (*M.diff* = -0.44, p <.001), and the 28-30 age group (*M.diff* = -0.39, p <.01) (see Table 5.8 for means and standard deviations).

For the childbearing readiness score there was a main effect of age group and gender and an interaction between age group and gender. Tukey post hoc tests revealed that the 31 and over age group indicated that they had achieved a higher level than the 18-21 age group (*M.diff* = 7.36, p <.001), the 22-24 age group (*M.diff* = 5.10, p <.001) and the 25-27 age group (*M.diff* = 1.82, p <.05). The 28-30 age group indicated achieving a higher level than the 18-21 age group (*M.diff* = 6.51, p <.001) and the 22-24 age group (*M.diff* = 4.25, p <.001). The 25-27 age group indicated achieving a higher level than the 18-21 age group (*M.diff* = 5.54, p <.001) and the 22-24 age group (*M.diff* = 3.28, p <.001). Furthermore the 22-24 age group indicated achieving a higher level than the 18-21 age group (*M.diff* = 2.26, p <.001). There was also a marginally significant main effect of gender with women (*M* = 10.52, *SD* = 5.4) indicating having achieved a higher level than men (*M* = 10.38, *SD* = 5.6). Simple effect tests revealed that within the 18-21 age group men indicated having achieved a significantly higher level than women (p <.001). There was no difference in the 22-24 age group (p = .343) while for the 25-27 age group

(p <.001), the 28-29 age group (p <.001) and the 31 and over age group (p <.001) women indicated having achieved a higher level on the childbearing readiness scale than men.

Physical preconditions

Factorial ANOVAs revealed that for feeling physically ready (e.g., I want to feel at optimum health before I start trying for a family) there was a significant main effect of age group. Tukey post hoc tests revealed that the 31 and over age group rated feeling physically ready as significantly less important than the 18-21 age group (*M.diff* = -0.38, p <.001), the 22-24 age group (*M.diff* = -0.33, p <.01) and the 25-27 age group (*M.diff* = -0.26, p <.05). Furthermore, the 28-30 age group rated feeling physically ready significantly less important than the 18-21 age group (*M.diff* = -0.35, p <.001) and the 22-24 age group (*M.diff* = -0.29, p <.01). There was no main effect of gender. There was a significant interaction between age group and gender with simple effect tests revealing that women rated being physically ready significantly more important than men in the 18-21 age group (p <.001) and the 22-24 age group (p <.05), while men rated feeling physically ready significantly more important in the 28-30 age group than women (p <.01). There were no significant differences in the 25-27 age group (p = .652) or the 31 and over age group (p = .459).

Physical aspects of parenthood (e.g., holding and cuddling a baby) revealed significant main effects of age group and gender. Women rated physical aspects of parenthood (e.g., holding or feeding a baby) significantly more important than men. Tukey post hoc tests revealed that the 31 and over age group rated physical aspects of parenthood significantly less important than lower than the 18-21 age group (*M.diff* = -

0.57, p <.001), the 22-24 age group (*M.diff* = -0.49, p <.01) and the 25-27 age group (*M.diff* = -0.48, p <.001). Furthermore the 28-30 age group rated physical aspects of parenthood significantly less important than the 18-21 age group (*M.diff* = -0.64, p <.001), the 22-24 age group (*M.diff* = -0.56, p <.01) and the 25-27 age group (*M.diff* = -0.54, p <.001).

Summary

With regards to social constructs, women agreed more than men that social benefits of childbearing were more important while the older age groups agreed more strongly that social pressures and subjective norms were important reasons in thinking about starting a family. There were no differences within the percentages of men of women who were of social age to have a child (i.e., 28 or 29). Individual constructs were regarded as more important to the younger age groups. In reference to the childbearing readiness scale, it was the oldest age groups who indicated having already achieved a higher level while women indicated a higher level achieved than men. Gender interactions were found in two preconditions. With regards to personal and relational readiness, women in the youngest two age groups (18-21 and 22-24) rated these factors significantly more important than men while in the oldest age group (31 and over) the reverse was true and men rated these as significantly more important than women. An interaction was also found for the childbearing readiness score, the oldest age groups had achieved a higher level while women had achieved more than men in the three older age groups (25-27, 28-29 and 31 and over) while men indicated a higher level achieved in the youngest age group (18-21). Physical aspects of childbearing were rated as more important by the younger age groups while there was a gender interaction for feeling physically ready with women in the youngest age groups (18-21 and 22-24) rating this

significantly more important than men while men in the 28-30 age group rated this significantly more important than women.

Overall, with the exception of one social precondition (social pressure and subjective norms) all others were rated as significantly more important to the younger age groups while women in the older age groups had achieved a higher level on the childbearing readiness scale. Gender differences were only found in one of the social preconditions and one physical along with the childbearing readiness scale.

Section V. Attitudes towards starting a family

Factorial ANOVAs were conducted to investigate the differences between age groups and gender on attitudes towards childbearing.

Table 5.9 shows the main effects and interactions. All three attitude scales showed a main effect of age group but not of gender. There was an interaction between age group and gender for positive feelings towards starting a family. Table 5.10 shows the means and standard deviations for each age group on each attitude scale.

Table 5.9

F-ratios for main effects of age-group and gender and their interaction on attitudes towards childbearing

Attitude scale	**Main effects**		**Interaction**
	Age group	**Gender**	**Age group*Gender**
Positive feelings towards starting a family	61.86***	.517	2.48*
Parenthood aspirations	2.85*	2.71	.750
Concerns about parenthood	34.07***	0.59	1.37

†P<.10, *P<.05, **P<.01, ***P<.001

Table 5.10

Means (and standard deviations) for attitude scales according to age-group and genders

Attitude scale	Age group					Gender	
	18-21 (*n* = 439)	**22-24 (*n* = 180)**	**25-27 (*n* = 139)**	**28-30 (*n* = 95)**	**31 and over (*n* = 92)**	**Female (*n* = 760)**	**Male (*n* = 185)**
Positive feelings towards starting a family	1.99 (.70) [a]	2.22 (.81) [b,d]	2.67 (.90) [c]	2.94 (.78) [a,b,c]	3.37 (.89) [d]	2.37(.89) [1]	2.34(.98)
Parenthood aspirations	4.23 (.68) [a]	4.17 (.71) [a,c]	4.17 (.73) [a,c]	3.91 (.76) [c]	3.98 (.66) [c]	4.19(.70)	4.02(.72)
Concerns about parenthood	4.13 (.71) [a]	4.01 (.80) [a]	3.68 (.81) [b,c]	3.50 (.69) [c]	3.16 (.80) [d]	3.89(.79)	3.85(.90)

Note. All variables assessed on a 5-point scale where higher scores indicated more importance. Numbers with different superscripts are significantly different. [1]Females significantly differ to males.

Factorial ANOVAs revealed that for positive feelings towards starting a family (e.g., starting a family now would be good for me) there was a main effect of age group and also an interaction between age group and gender. As shown in Table 5.10, Tukey post hoc tests revealed that the 31 and over age group rated positive feelings towards starting a family as significantly more important than the 18-21 age group (*M.diff* = 1.38, $p < .001$), the 22-24 age group (*M.diff* = 1.15, $p < .001$, the 25-27 age group (*M.diff* = 0.71, $p < .001$), and the 28-30 age group (*M.diff* = 0.43, $p < .01$). Furthermore, the 25-27 age group rated positive feelings towards starting a family as significantly more important than the 18-21 age group (*M.diff* = 0.68, $p < .001$) and the 22-24 age group (*M.diff* = 0.45, $p < .001$). The 22-24 age group rated positive feelings towards starting a family as significantly more important than the 18-21 age group (*M.diff* = 0.23, $p < .01$). Simple effects tests revealed that women rated positive feelings towards starting a family as significantly more important in the 18-21 age group ($p < .001$), the 25-27 age group (p

<.001) and the 28-30 age group (p <.001). Men rated positive feelings towards starting a family significantly more important in the 31 and over age group (p <.001). There was no significant gender difference in the 22-24 age group (p = .557).

Parenthood aspirations (e.g., becoming a father/mother would make me feel more fulfilled) revealed a main effect of age group. Tukey post hoc tests revealed that the 31 and over age group rated parenthood aspirations as significantly less important than the 18-21 age group (*M.diff* = -0.25, p <.05), while the 28-30 age group rated parenthood aspirations as significantly less important than the 18-21 age group (*M.diff* = -0.32, p <.01), the 22-24 age group (*M.diff* = -0.26, p <.05) and the 25-27 age group (*M.diff* = -0.26, p <.05).

Concerns about parenthood (e.g., I cannot see myself being a very good father/mother) revealed a main effect of age group. Tukey post hoc tests revealed that the 31 and over age group rated concerns about parenthood as significantly less important than the 18-21 age group (*M.diff* = -0.97, p <.001), the 22-24 age group (*M.diff* = -0.28, p <.001), the 25-27 age group (*M.diff* = -0.51, p <.001), and the 28-30 age group (*M.diff* = -0.34, p <.05). Furthermore the 28-30 age group rated concerns about parenthood significantly less important than the 18-21 age group (*M.diff* = -0.63, p <.001) and the 22-24 age group (*M.diff* = -0.51, p <.001) while the 25-27 age group rated concerns about parenthood significantly less important than the 18-21 age group (*M.diff* = -0.45, p <.001) and the 22-24 age group (*M.diff* = -0.33, p <.01).

Summary

With regards to positive feelings towards starting a family, the oldest age group (31 and over) agreed that this was more important while for the other two attitude scales

it was the youngest age groups (18-21 and 22-24) who rated these as more important. There were no gender differences. There was an interaction between age group and gender for positive feelings towards starting a family which was rated significantly more important by men in the oldest age group (31 and over), whilst in all other age groups apart from the 22-24 age group, women rated this significantly higher.

Section VI. Association between life course variables, preconditions and gender on the outcomes of being older than ideal age for first child and timing of childbearing.

In this section multiple regression analysis was used to identify the factors associated with being older than personal stated ideal age to have a first child and also the factors associated with timing of childbearing. The first step of the regression model included the focal variable (age), *fertility knowledge variables* (fertility knowledge score and at what age do you believe fertility declines for women) and *attitudes towards childbearing* (concerns about becoming a parent, positive feelings towards parenthood, parenthood aspirations)the second step included nine main effect variables consisting of currently in a relationship, and importance of *preconditions* (social benefits, social pressures and subjective norms, personal and relational, economic, physical readiness, physical aspects of parenthood). Preconditions also included two variables examining the childbearing readiness scale and being of social childbearing age. Finally the interactions were entered (all variables interacted with gender).

Preliminary analyses

Preliminary correlation analysis revealed that there were no correlations between the independent variables above .80 (Tabachnick & Fidell, 2001). However, two of the

social precondition subscales (concerns about becoming a parent and positive attitudes towards starting a family) were highly negatively correlated (r = -.705). In reference to the dependent variables, being older than ideal age was highly and positively correlated with age (r = .736) and being of social childbearing age (r = .736) while the dependent variable timing of childbearing was highly and negatively correlated with the dependent variable of being older than stated ideal age to have a first child (r = -.845). Table 5.11 shows the Pearson correlation matrix for all independent and dependent variables.

Table 5.11

Pearson Correlation Matrix among all independent variables and dependent variables in the multiple regressions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	M (SD)
1																	23.54 (4.6)
2	.103**																70.30 (22.7)
3	-.134**	-.395**															34.06 (6.2)
4	-.394**	-.009	.040														3.89 (0.8)
5	.523**	.099**	-.134**	-.705**													2.36 (0.9)
6	-.132**	.077*	-.064	-.195**	.183**												4.15 (0.7)
7	-.054	.015	-.014	.031	.051	.223**											3.33 (0.8)
8	.141**	.018	.007	-.068*	.216**	.113**	.355**										2.23 (0.6)
9	.292**	-.018	-.014	-.117**	.153**	-.091**	-.026	.063									0.07 (0.3)
10	.153**	.023	-.121**	-.127**	.203**	.037	-.006	-.006	.122**								0.7 (0.3)
11	-.155**	-.003	.014	.063	-.106**	.182**	.036	-.099**	.015	.126**							4.57 (0.5)
12	-.193**	-.107**	.063	.261**	-.283**	.007	.040	-.030	.030	.133**	.282**						4.03 (0.7)
13	.506**	.067*	-.148**	-.506**	.598**	.167**	.069*	.101**	.183**	.497**	.009	-.081*					10.49 (5.5)
14	-.212**	-.040	.078*	.199**	-.213**	.088**	.097**	-.021	-.106**	.056	.379**	.284**	-.085**				4.15 (0.7)
15	-.238**	-.023	.040	-.028	.022	.488**	.269**	.168**	-.160**	-.031	.257**	.090**	.044	.238**			3.49 (0.9)
16	.736**	.142**	-.181**	-.504**	.612**	.070*	.006	.184**	.195**	.178**	-.125**	-.270**	.541**	-.174**	-.057		-4.94 (3.8)
17	-.626**	-.130**	.181**	.526**	-.646**	-.147**	-.038	-.194**	-.188**	-.305**	.054	.213**	-.633**	.119**	-.031	-.845**	5.04 (2.7)

Note. 1 Age, 2 Fertility knowledge, 3 Age fertility declines for women, 4 concerns about parenthood, 5 Positive attitudes towards starting a family, 6 Aspirations towards parenthood, 7 Social benefits of starting a family, 8 Social pressures and subjective norms, 9 Social criteria (being aged 28 or 29),10 Are you currently in a relationship, Personal and relational preconditions, 12 Economic preconditions, 13 Childbearing readiness scale, 14 Physical readiness , 15Physical aspects of parenthood , 16 Being older than ideal age (DV), 17 time until plan to start childbearing (DV). M (SD) show means and standard deviations for each variable

Being older than stated ideal age to have a first child.

The overall model for being older than stated ideal age was significant *(F* (23, 874) = 75.673, p <.001 *RES* = 4.940, R^2 = .67). Of the control variables (step 1), older age, having higher fertility knowledge, having more positive feelings towards starting a family and having higher parenthood aspirations were positively associated with being older than stated ideal age to have a first child. Believing that a woman's fertility declines at a younger age and having concerns about starting a family were negatively associated with being older than stated ideal age to have a first child.

Main effects (step 2) revealed that placing higher importance on social pressure and subjective norms, physical aspects of childbearing and scoring higher on the childbearing readiness score were positively associated with being older than ideal age to have a first child while placing higher importance on achieving economic preconditions was negatively associated.

A 2-way interaction (step 3) was found between being in a relationship and gender with simple slope analysis revealing that being in a relationship was associated with being older than stated ideal age for first child for women (B = 1.32, p <.001) but not for men (B = -.10, p = .613) (Figure 5.5). A further 2-way interaction was found between importance of personal and relational preconditions and gender with slope analysis revealing that among women, placing higher importance on personal and relational preconditions was negatively associated with being older than ideal age for first child (B = -.902, p <.05) while this was not significant for men (B = .033, p = .731) (Figure 5.6). Table 5.12 provides a summary of coefficients.

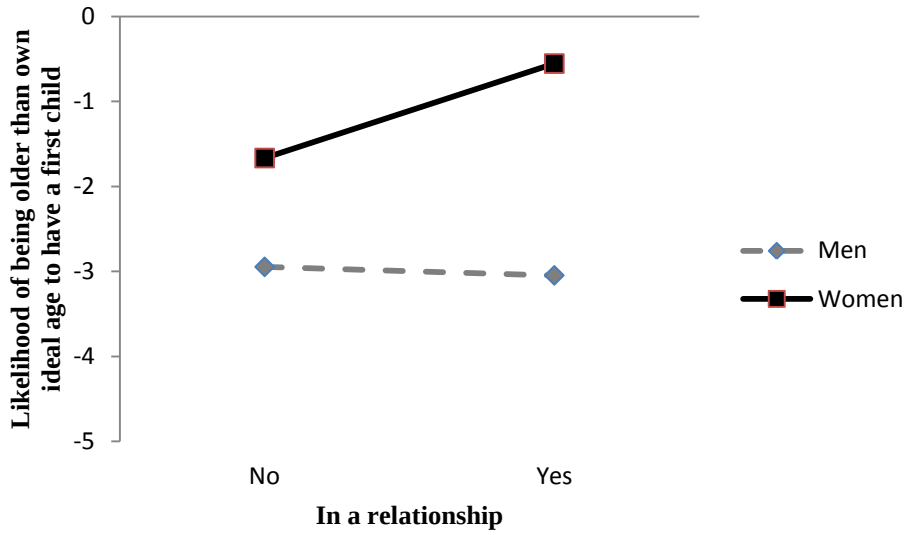

Figure 5.5. 2-way interaction between being in a relationship and gender on the outcome of being older than ideal age to have first child.

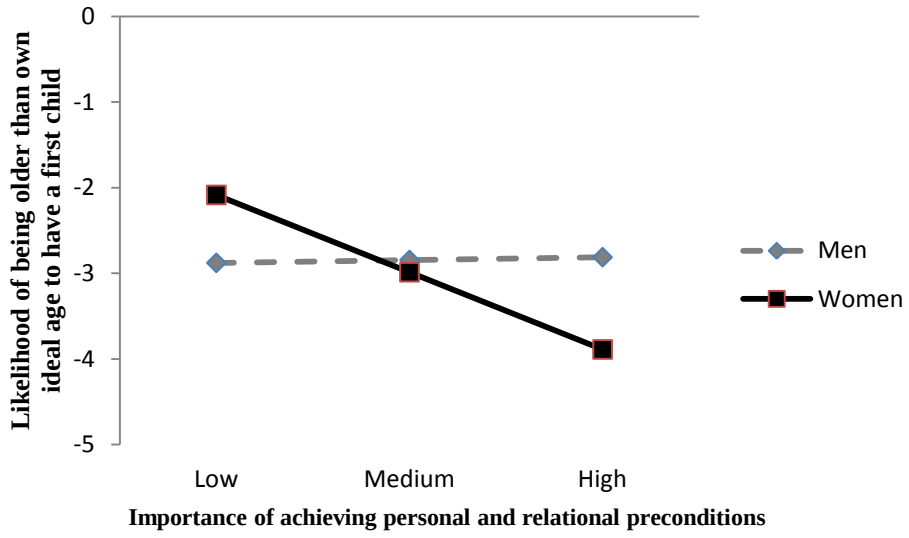

Figure 5.6. 2-way interaction between importance of achieving personal and relational preconditions and gender on the outcome of being older than ideal age to have first child.

Timing of childbearing.

The overall model was significant *(F* (23, 835) = 61.92, *p* <.001 *RES* = 2.79, R^2 = .63). Of the control variables (step 1) being older, having more positive feelings towards starting a family and having higher parenthood aspirations were associated with planning to starting childbearing sooner while believing that fertility starts to decline in women at an older age and having more concerns about starting a family were associated with planning to start childbearing later.

Main effects (step 2) revealed that being in a relationship, placing higher importance on social pressure and subjective norms, rating physical aspects of parenting as more important and scoring higher on the childbearing readiness scale were associated with planning on starting childbearing sooner, while placing higher importance on achieving economic preconditions were associated with planning on starting childbearing later.

A 2-way interaction (step 3) was found between being in a relationship and gender with slope analysis revealing that while being in a relationship was associated with planning on starting childbearing sooner this was only significant for women (*B* = -1.36, *p* <.001) and not for men (*B* = -0.22, *p* = .151) (Figure 5.7).

A further interaction was found between placing more importance on the social benefits of childbearing and gender with simple slope analysis revealing that for women, placing higher importance on social benefits was associated with planning to start childbearing later, although this was not significant (*B* = 0.470, *p* = .112). For men the association was negative but not significant (*B* = -0.05, *p* = .472) (Figure 5.8).

A final interaction was found between being at social childbearing age (i.e., being aged 28 or 29 years old) and gender with slope analysis revealing that meeting social criteria was associated with planning on starting childbearing sooner for women but this was not significant (B = -.1.64, p = .116) while the association was positive but not significant for men (B = 0.17, p = .495) (Figure 5.9). Table 5.12 provides a summary of coefficients.

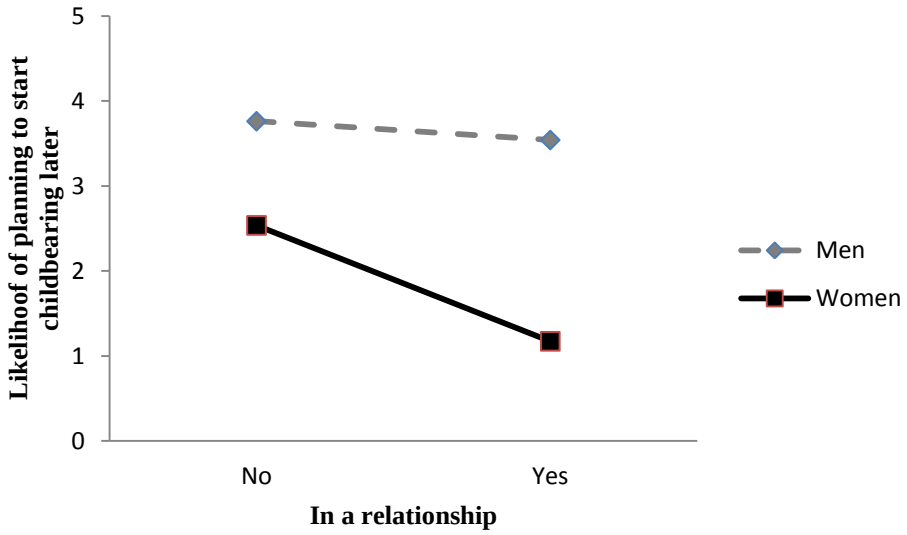

Figure 5.7. 2-way interaction between being in a relationship and gender on the outcome of timing of childbearing.

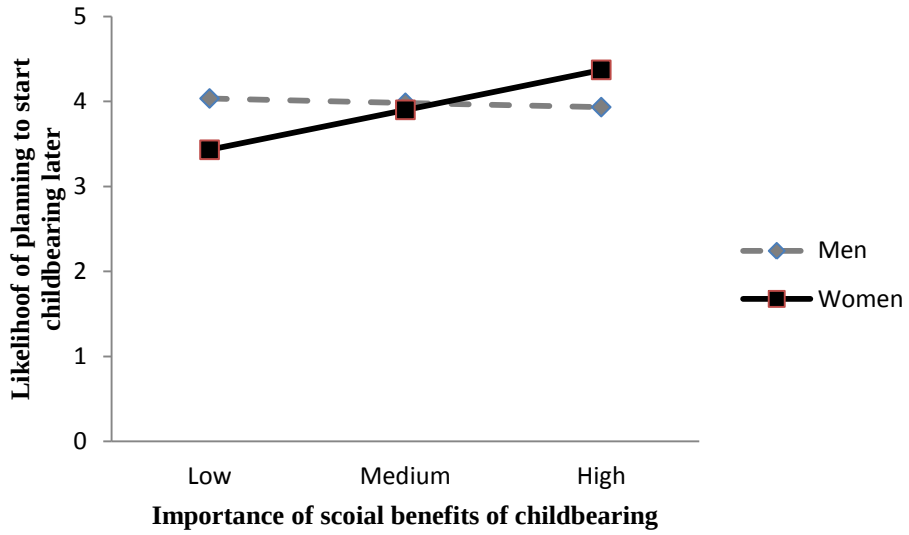

Figure 5.8. 2-way interaction between importance of social benefits of childbearing and gender on the outcome of timing of childbearing.

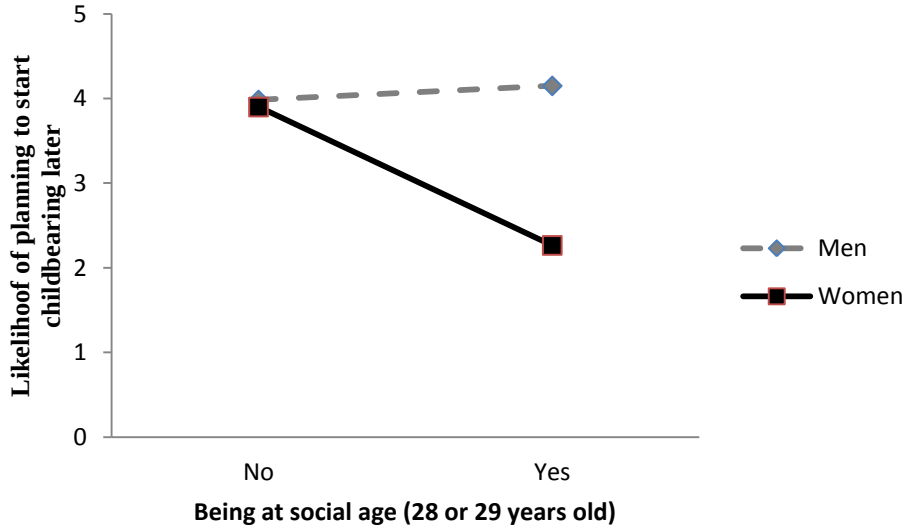

Figure 5.9. 2-way interaction between being at social childbearing age and gender on the outcome of timing of childbearing.

Summary

Older age, having more positive feelings towards starting a family and having higher parenthood aspirations had an effect on both outcomes being associated with being older than ideal age for having a first child and sooner planned childbearing timing. Having higher fertility knowledge was positively associated with being older than ideal age for first child while believing that fertility starts to decline in women at a later age and having more concerns about starting a family were negatively associated with being older than ideal age and associated with later planned childbearing timing.

Placing more importance on social pressure and subjective norms and physical aspects of parenthood were all associated with being older than ideal age for first child. Additionally scoring higher on the childbearing readiness score was also associated with being older than ideal age for first child. Interactions showed that being in a relationship was associated with being older than ideal age for women but not for men.

In reference to timing of childbearing, placing higher importance on economic preconditions was associated with planning to start childbearing later while placing higher importance on social pressure and subjective norms, physical aspects of parenting and scoring higher on the childbearing readiness scale were associated with planning to start sooner. The interaction between being in a relationship and gender showed that being in a relationship was significantly associated with planning on starting childbearing sooner for women but not men while placing higher importance on social benefits of childbearing was associated with planning to start childbearing later for women but not for men.

Table 5.12

Summary of regressions for variables predicting whether respondents will pass personal ideal age for first child and timing of childbearing

	Being older than stated ideal age			Plan to start trying to conceive		
Variable	***B***	***SE B***	***β***	***B***	***SE B***	***β***
Step 1: Control variable						
Actual age (How old are you)	2.271***	.098	.581	-1.225***	..080	-.426
Fertility knowledge (score 0-100)	.180*	.087	.046	-.088	.069	-.031
What age do you believe fertility starts to decline for women	-.176*	.084	-.046	.161*	.068	.059
Concerns about becoming a parent	-.447***	.110	-.118	.342***	.088	.125
Positive feelings towards parenthood	.757***	.121	.199	-.833***	.097	-.305
Parenthood aspirations	.350***	.084	.090	-.335***	.068	-.119
Step 2: Main effects						
Social						
Social benefits of starting a family	-.012	.083	-.003	-.002	.064	.000
Social pressures and subjective norms	.184*	.084	.049	-.118*	.066	-.043
Social criteria: aged 28 or 29	-.089	.314	-.006	.071	.242	.007
Individual						
Are you currently in a relationship	.170	.193	.021	-.401**	.150	-.069
Personal & relational preconditions	-.062	.087	-.016	.019	.067	.007
Economic preconditions	-.540***	.124	-.098	.318**	.096	.079
Individual criteria: childbearing readiness score	.311**	.119	.081	-.567***	.091	-.209
Physical (biological)						
Physical readiness	.104	.086	.027	-.078	.067	-.028
Physical aspects of parenthood	.368*	.173	.044	-.413**	.134	-.068

Note. [a] Only significant results presented. *P<.05, **P<.01, ***P<.001.

Table 5.12

Summary of regressions for variables predicting whether respondents will pass personal ideal age for first child and timing of childbearing (continued)

	Being older than stated ideal age			Plan to start trying to conceive		
Variable	***B***	***SE B***	***β***	***B***	***SE B***	***β***
Step 3: Interactions[a]						
Currently in a relationship * Gender	-.653***	.149	-.103	.445***	.116	.097
Personal & relational preconditions * Gender	-.469*	.212	-.054			
Social benefits * Gender				.307*	.159	.047
Social criteria: aged 28 or 29 * Gender				1.087*	.487	.062

Note. [a] Only significant results presented. *P<.05, **P<.01, ***P<.001.

Discussion

It would appear from the present research that individual factors (e.g., being in a relationship and importance of economic preconditions) may be the most important when considering childbearing, especially among the younger age groups. This would suggest that as individuals become older, their priorities may change.

While, unsurprisingly, the older age groups indicated a significantly higher intention to have a child in the next two or five years it was the youngest age groups who indicated the strongest desire for a child. The average age of childbirth in the UK is currently 29 years old (ONS, 2010) and this is reflected in the older age groups indicating a higher intention to have a child in the next two and five years than the younger age groups. It could be expected that individuals in these older age groups may have already achieved other preconditions and life course variables such as being in secure employment and having a partner and so feel more able to start their childbearing sooner. Even though intention to have a child in the next two or five years was higher in the older age groups, desire for a child was strongest in the youngest two age groups and this may be due to older age groups re-evaluating their desire for a child in relation to other life goals. Those who have the life they already desire in terms of economic, relational and career preconditions may place less importance on having a child as they feel that they have already achieved other important life goals. Desire, along with intentions, was also higher among women than men which is reflected by previous research which posits that men are more concerned with the economic burden and stress of having a child than women (Kaufman, 1997) and rate having children as less important than women (Lampic et al., 2006). Furthermore, while it is widely documented that as women age they may feel the ticking of the biological clock (e.g., Tough et al., 2007; Cooke, Mills & Lavender,

2011) this may not be the case for men and so they may not feel the same time pressures as women to start their childbearing within the next few years.

Overall, the sample had good knowledge about when fertility begins to decline for women and the perceived thresholds for being an older mother, both for media perceptions and individual perceptions. However, with the exception of media perceptions, it was the younger age group and men who indicated higher ages. This may be a reflection of the fact that men's fertility is not as defined as women's and so they may not realise that women's fertility actually begins to decline at an earlier age with previous research revealing that women have a more accurate perception of age-related fertility issues than men (Lampic et al., 2006). In addition to this, the younger age groups may not feel that age decline is not personally relevant to them and may not pay as much attention to it as the older age groups might.

With regards to overall fertility knowledge, the oldest age group had the highest score. Although none of the present sample were trying to conceive it would make sense that older individuals may be more aware of their fertility than the younger individuals who may not yet be thinking about their childbearing plans and so may not have sought out information regarding this. Additionally, those in the older age groups may be more likely to have close friends who have already started childbearing so may be more knowledgeable. Women's knowledge was significantly higher than men's which again reflects previous research (Lampic et al., 2006) especially as childbearing is still thought to be predominately a female area.

Women were also more likely to be older than their ideal age to have a child than men with 75.5% of the individuals who had indicated an ideal age to have a child that was younger than their actual age being women. The sample as a whole was highly educated

with 71.5% having at least a university education. There has been much research indicating that women with a high education (e.g., Heaton et al., 1999; Barber, 2001) and those who are more career orientated (e.g., Hakim, 2003; Liefbroer, 2005) are more likely to postpone childbearing which may explain why there is a far higher number of women past their ideal age in the current sample. Those who were older than their ideal age were more likely to have placed more importance on social pressure and subjective norms. If individuals are older than they intended to be for their first birth it might make sense that they feel more social pressure to start trying for a family especially if friends or close family around them have already had children. It has been shown in previous research that social interactions can influence decision making about childbearing (Bernadi, 2003). Those older than their own stated ideal age also placed more importance on the physical aspects of parenting. Although the present study was unable to specify biological criteria according to age (i.e., over the age of 35) due to only a small number of the sample meeting the criteria, the ticking of the biological clock may manifest itself in different ways. That is, it may not just be the feeling of getting older but the desire to hold, cuddle or feed a baby may be related which may help explain the high importance placed on physical aspects of parenting by those older than their ideal age. Understandably those older than their stated ideal age had indicated a higher score on the childbearing readiness score meaning that they were further along in already having achieved some of the preconditions associated with being important when considering starting childbearing. This may reveal that achieving the level of preconditions deemed necessary before starting childbearing results in delaying childbearing past the ideal age. This is reflected by previous research which states that people want certain preconditions for example, finishing education, being in a stable relationship, having financial security, in place

before starting a family (Heaton & Jacobson, 1999; Barber, 2001; Berrington, 2004; Testa & Toulemon, 2006).

Being in a relationship was also associated with being older than stated ideal age to have a first child for women but not for men. Previous research has revealed that being in a stable relationship is one of the most important considerations when considering when to start planning a family. Although being in a relationship was associated with being older than stated ideal age to have a fist child, this suggests that simply being in a relationship is not enough. The relationship may need to be considered very stable and people may have needed to be in a stable relationship for many years before considering it to be the right time to start trying for a family. Furthermore, both partner's desires and intentions need to be taken into account. Although being in a stable relationship may be a major factor in most individuals decision to start childbearing, if one of the couple has very low desires or intentions to have a child then this may influence the other partner. There are similarities when examining when respondents plan to start trying for a family in that those placing higher importance on social pressure and subjective norms and physical aspects of parenting along with higher scores on the childbearing readiness scale aimed to start trying sooner. Additionally being in a relationship was also associated with planning to start sooner for women, suggesting that life course variables are important in that being in a secure relationship may facilitate earlier planned childbearing. This is in line with previous research, which has shown that being in a relationship (e.g., Taris, 1998) is one of the most important factors when considering childbearing along with the fact that cohabiting facilitates earlier childbearing (e.g., Heaton et al., 1999). This is in line with life-span theory, which states that opportunities and challenges encountered throughout life will impact on personal goals (Salmela-Aro et al., 2007). Individuals will

want and need to achieve other goals before planning to start a family. If these goals are achieved at an earlier age then planning to start a family may start sooner than for individuals who have not yet achieved these goals.

When examining whether different social, individual or biological preconditions were more or less important to the different age groups it was discovered that in reference to social preconditions, only social pressure and subjective norms emerged as being more important to the oldest two age groups. As the average age for childbirth, as stated previously, is 29 those below this age may not feel the same pressure to start childbearing as they are below this age. Those over this age may feel more social pressure especially if close friends and family already have children. As Social Cognitive Theory (Bandura, 1998) posits, people learn by watching those around them. Therefore, if an individual is surrounded by friends and family who already have or are planning to have children this may influence their own decision to start a family. Similarly, the Diffusions of Innovations Theory explains that a new concept (e.g., delaying of childbearing until a later age) may spread through populations when the new idea is adopted by a few people and will then spread through other people over time who may start to regard this concept as more beneficial to themselves. Therefore, those individuals who have friends and family or close social groups who are delaying childbearing may then adopt a more favourable attitude to waiting to start a family until a later age.

With regards to social benefits women rated this higher than men. As traditionally childbearing has been thought of as a woman's role it could be that women expect to form more friendships through activities such as playgroups while men may not deem this to be an important consideration in why they would have children.

Within the individual preconditions, all were rated as more important by the younger age groups. This may be due to the fact that as mentioned earlier, priorities change with age. As individuals age, they achieve a higher level of preconditions such as economic stability and personal readiness and so may not rate these preconditions as important as younger individuals do since they may feel that they have already achieved them. Those in the younger age groups who may not have achieved a high level of these preconditions may feel that it is vital to reach a certain stage before considering childbearing.

In reference to biological preconditions, again these were rated as more important by the younger age groups. Feeling physically ready may be a more important consideration to younger individuals as they may equate this to also being mature enough to cope with childbearing. The Reproduction Suppression Model (Wasser & Isenberg, 1986) states that if present conditions for reproduction are thought to be inadequate (e.g., physiological or environmental conditions) the individuals should delay childbearing until a better time when these conditions are met. Therefore if an individual does not feel physically, or even mentally mature enough or does not feel that their surroundings are ideal at the present time (e.g., not being with the right partner, not having financial stability) they may delay childbearing until such time these conditions improve. Older individuals may feel that they are old enough to cope with the demands of childbearing and that they are at an age where they feel physically ready so this may be rated as less important. Women also rated physical aspects of parenthood as more important than men. Such things as feeding a baby may be rated more important by women may be due to the fact that this is a more prominent feature of childbearing for women. Also women incur

the more physical demands of childbearing (e.g., breastfeeding) than men (Thomson & Hoem, 1998).

Overall, preconditions revealed more differences between age groups than between gender suggesting that importance of achieving social, individual and biological preconditions may be considered more of a life course variable with younger individuals in general placing higher importance on achieving preconditions. It may be that younger individual's have a more romanticised view of the perfect life with the right career and partner before beginning childbearing. However, this may change with age as the desire to become a parent becomes more important than having the perfect career, especially in women who may feel the ticking of the biological clock.

The importance individuals place on different preconditions at different ages may assist in considering whether there may be an optimum time to educate people regarding their fertility so that they can realise their childbearing intentions before it may be too. It has already been established that educating women in their early 20s may be too early (chapter 4) and that after a certain age (e.g., 34) knowledge of fertility issues does not always encourage help-seeking (chapter 3). Therefore from the present research it might be concluded that a window of opportunity for education might occur between the ages of 25-27. At this age there is still a high importance placed on all preconditions and it may be useful to encourage people at this age to also be thinking about their fertility in terms of how long they realistically have left in order to realise their childbearing goals along with their other life goals.

Although the present study had a relatively large sample size, the majority of the sample was recruited from Cardiff University with a high percentage of the sample being female. Additionally, the design was cross-sectional so it is not possible to infer causality.

It would be advantageous to follow-up the sample to investigate whether being encouraged to think about their childbearing plans by way of a questionnaire may have an influence on their future childbearing plans (e.g., plan to start sooner). Additionally, as the present study, along with other studies in the area, has shown that being in a relationship is an important factor in the decision to begin childbearing it may be useful to examine both partners in couples when conducting this type of research in the future in order to obtain a clearer picture of how each of the couples desires and intentions may influence their partner's in the decision to start a family. Furthermore, future studies into this area may also wish to further examine individual's actual perceptions of what they may class to be a stable relationship along with how long they would need to be in a relationship before considering childbearing as this may vary greatly between individuals.

The present research has identified that as people age their ideals on which preconditions may be more or less important to them appear to change over time. Thus timely education regarding fertility and the consequences of delaying childbearing too long is vital in order to enable people to make more informed choices about their childbearing plans in the context of other important life goals.

Chapter 6: General discussion

The aim of the present thesis was to firstly attempt to better understand the factors that are associated with why people may delay childbearing and secondly examine knowledge about risk factors associated with reduced fertility and whether this knowledge encouraged people to engage in fertility optimizing behaviours. Further the thesis attempted to examine how different preconditions deemed to be important to decision making about childbearing differed in importance according to different age groups and gender.

This thesis has firstly demonstrated that there is a lack of research concentrating on precisely what is meant by delaying childbearing along with a lack of comprehensive factors underlying the decision to delay. The complexity of the factors identified by previous literature (e.g., being in a stable relationship, achieving economic security, finishing education) reveals that decisions about whether and when to have a child may depend on meeting many other life goals (Chapter 2). This poses a problem to those wishing to achieve other life goals (e.g., finish education) before starting parenthood. The competing alternatives to childbearing may therefore be causing individuals to delay childbearing until such a time that their fertility may be compromised. This finding suggests that more education and awareness is needed so that people may achieve their childbearing goals in addition to other life plans.

There are many risk factors that are associated with reduced or compromised fertility. These include lifestyle factors (e.g., smoking more than 10 cigarettes per day, drinking more than 14 units of alcohol per week, having a BMI over 25) and reproductive

factors (e.g., menstrual cycle irregularities, endometriosis). Furthermore while a woman's age (i.e., >34) is associated with impaired fertility, it may also interact with these factors compounding the biological effect of older age. Therefore, in addition to examining the risk factors, one must also consider age and the effect this has. The percentage of women over the age of 35 having children has risen by 50% in the past 30 years (chapter 3) revealing that not all women may have the knowledge or awareness of the problems associated with fertility that may arise with advancing age. Thus one might expect that when people do have knowledge of the risk factors associated with reduced fertility, this would result in higher likelihood of fertility optimizing behaviours such as seeking medical advice or changing lifestyle. Additionally, it may be expected that those aware of the risks, especially that of older age, may seek to begin their childbearing plans sooner.

Evidence in the present thesis has shown having higher knowledge of fertility risk factors is associated with a higher likelihood of fertility optimizing behaviours (i.e., seeking medical or non-medical help and advice or changing lifestyle) illustrating the importance of knowledge (chapter 3). Additionally when people feel susceptible to fertility problems (i.e., they suspect that they have a problem or they perceive their own fertility to be low) this is also associated with a higher likelihood of fertility optimizing behaviours. These findings are supported by the Health belief Model (Rosenstock, 1990), which posits that perceived susceptibility to an illness or health condition is an important consideration when taking into account health-related actions (such as changing lifestyle). Therefore, if an individual does not feel susceptible to fertility problems they may not take action even if they engage in behaviours deemed risky. Findings from chapter 4 show support for this in that even when information about fertility risks were made salient by personalizing the information so that it referred to the individual, no action was taken

in modifying risky behaviours. This may be due to individuals being of an age where their fertility is not yet a concern and so they may not perceive themselves to be at any risk of future problems. Yet again, this highlights the need for more education regarding the risks associated with delaying childbearing and engaging in unhealthy lifestyles. Education would allow individuals to consider their behaviours and lifestyle and how these may impact on their future ability to conceive. Furthermore educating individuals about the impact delaying childbearing can have on the health of both the mother and child may also lead to fewer numbers requiring assisted reproduction and thereby reduce the stress associated with it.

The findings from chapter 3 and 4 suggest that individuals may only think about their fertility when they are actually trying to conceive or when it is personally relevant (e.g., if they are at a life stage where thinking about their fertility is more prominent). The sample in chapter 3 were all trying to conceive, while the sample from chapter 4 was a University sample, of which none indicated that they were presently trying. This indicates that people need to be made more aware of the risks and the impact they may have at an earlier age so that they can make informed decisions about lifestyle choices that may affect future childbearing plans. Notwithstanding this, educating or highlighting the risks at too young an age may have little or no effect on behaviour change as shown in chapter 4. Although younger individuals may be less likely to change their behaviour this may be due to their current life stage and thus the true effect of education or heightened awareness about the risks cannot be ascertained from the current research. While presenting individuals with information may resonate with them, this information may not be personally used until they are personally ready to start trying for a child.

As shown in chapter 2, there are many preconditions that individual's want in place before they start trying to conceive. This was reflected in chapter 5 which showed the importance of preconditions to different age groups with younger age groups placing a higher importance on achieving most of the preconditions. Again this may suggest that younger people are not yet thinking about their fertility and childbearing plans and are focusing on achieving other life goals first. As people get older it would appear that the importance they place on achieving all of these preconditions changes with less importance placed on the majority of preconditions compared to younger individuals. This can be seen in those who were older than their stated ideal age to have a first child. Individuals who had progresses beyond their own ideal age to have a first child only rated social pressure and subjective norms along with the physical aspects of parenting as being important with regards to deciding to begin parenthood. This was in contrast to younger individuals who rated all other preconditions as more important. This may reveal that although so many preconditions seem important when an individual is younger, these may become less important as the idea that time may be running out to have a child becomes more apparent. The fact that individuals place such high importance on achieving other life preconditions before starting parenthood would suggest that delaying parenthood may be more associated with circumstance than the actual choice to delay. Chapter 5 also revealed that among the different ages, preconditions along with desire for a child became more or less important throughout the age groups. Positive attitudes towards childbearing will increase the likelihood of childbearing while positive attitudes towards career or education may reduce childbearing behaviour. Cognitive dissonance may occur when an individual has positive attitudes towards both childbearing and a career or further education. In order to achieve cognitive consistency the individual may start to take a less positive attitude to, for example, childbearing and become more

focused on their career explaining why people may express lower desires as they become older. As an individual becomes older, even though they desire both a career and a child they may feel the need to concentrate on one or the other to achieve cognitive consistency. This may be especially true if they feel that they are not at a stage where they are able to have a child (e.g., financially or not in a stable relationship) so they may focus their energy on other pathways.

Throughout the present thesis it has emerged that knowledge about fertility issues, such as risk factors for reduced fertility, is an important consideration when investigating why people may delay childbearing. This knowledge may be vital to those who delay childbearing whilst being unaware of the risks posed to their ability to conceive brought about by older age. Particularly, chapter 3 revealed that increased knowledge regarding fertility risk factors was associated with a higher likelihood of fertility optimising behaviours such as seeking medical or non- medical help or advice or changing lifestyle. As there may be limited knowledge about these risk factors in some populations it is important to consider this and examine ways in which this knowledge can be disseminated. The Health Belief Model (Rosenstock, 1966) states that an individual will take action when threatened by a perceived threat that they believe may have consequences for them. Therefore, according to this model, if a person is unaware of any threat posed by age or other lifestyle factors (such as obesity, smoking or drinking over 14 units of alcohol per week) on their fertility then the individual may not take steps to modify their behaviour (or in the case of age think about seeking help or advice) in order to counteract the threat. Consequently, if there is no education available regarding these risks factors then people may only discover when it is too late that they may be compromising their own fertility. Similarly, according to the Transtheoretical Model of

Change (Prochaska, DiClemente & Norcross, 1992) if an individual is unaware of any risks that their behaviour may have to their future fertility then they may remain in the precontemplation stage which involves the individual having no intention of changing their behaviour in the near future. To successfully move through the other stages of the model (contemplation, preparation and motivation) the individual would need to have some knowledge that certain factors or lifestyles could actually compromise their future fertility.

From the current research it has become evident that although parenthood is a goal desired by the majority of people (Kemkes-Grottenthaler, 2003; Lampic, Svanberg, Karlström, & Tydén, 2006; Skoog Svanberg, Lampic, Karlstöm, & Tydén, 2006) it is also a goal that appears to be considered only when other life goals are realised. This is reflected by the opportunities women now have in terms of education and career. More women now concentrate on their education and careers before childbearing which may contribute to the advancing age of first birth we see today. Traditionally, it was women who were expected to think about childbearing but with the change in gender roles from the more traditionally to the more egalitarian (e.g., Mahaffy & Ward, 2002) we are witnessing a change as women want to achieve more in life before beginning childbearing. Hakim (2003) has explained this by categorizing women into those who are work centered (i.e., concentrate on career) and those who are home centered (i.e., concentrate on starting a family). With more opportunities for education and career, women appear to be becoming more work centered and thinking about childbearing only when other ambitions have been achieved. This is problematic as fertility declines with age and there are other risk factors associated with reduced fertility that individuals need to consider. Specifically, lifestyle risk factors that could be modified to ensure the best

chance possible of future conception and factoring age into plans for future fertility. Additionally, the way in which individuals may support either traditional or non-traditional gender roles may account for differences among these results especially among women. According to Seecombe (1991), those who consider themselves to be non-traditional approve of a wider range of social roles and therefore may perceive greater costs from parenthood as it may limit their number of options. That is, women who are more career focused may perceive starting a family as a barrier to their career development and choose to delay or forego it in order to achieve their goals. Additionally, those who endorse more non-traditional gender roles may not wish to have larger families and therefore may not feel the need to start childbearing at an earlier age. In contemporary society we are witnessing an ever-increasing shift in gender role attitudes with more and more men and women approving of wives and mothers working along with the idea that men should help out around the home (Kaufman, 2000) and thus shifting to a more non-traditional attitude towards family life. This shift in gender role attitude may help explain why there has been a shift in contemporary society to older age at first marriage and childbearing along with smaller family sizes with more women concentrating on education and careers ahead of marriage and family life. Furthermore, and perhaps most crucially, the present thesis highlights that there may be a critical window of opportunity in which to educate people about their fertility and the risks associated with reduced or compromised fertility. Education at too young an age may not be processed sufficiently as the individuals are not concerned with their fertility. Conversely education too late may not have the desired effect as individuals may think that it is too late to modify or change factors enough to optimize their fertility. Research has shown that when investigating awareness of issues surrounding delay, women held the belief that information regarding the implications of delay should be imparted at

earlier ages (Maheshwari, Porter, Shetty and Bhattacharya, 2008) while among women using donor oocytes to conceive, it was recognized that earlier education regarding the risks of delay would be far preferable to undergoing the stresses associated with infertility treatment (Friese et al., 2006).

Individuals need to be able to make informed choices about their fertility and childbearing plans and in order to do this must have access to available knowledge and be aware of all risks associated with fertility. This may only be achieved with timely and appropriate education. From the results in the present thesis this may be assisted by incorporating the Health Belief Model into future studies and education. If, as according to the model, people will not change their behaviour unless they believe they are at risk it would be unfeasible to expect behaviour change or modification in those who do not have the knowledge about how delaying childbearing until a later age and harmful lifestyle factors may negatively impact on their future ability to conceive. An advantage of using the Health Belief Model is the realism it employs in recognising that simply wanting to change behaviour may not be enough. The Health Belief Model also states that two elements of the model, cues to action and self-efficacy, are required to bring about change (Rosenstock, 1990). Cues to action refer to other, external information that may bring about a decision to make a change. This could be information from a health campaign or information provided at a GP surgery or health clinic about the risks factors associated with reduced fertility. Self-efficacy outlines how belief and confidence in one's own ability to take action in modifying or changing their behaviour. Having confidence in ones own ability to change something is a vital factor in actually making that change and

this could be encouraged through more information and support being provided by healthcare professionals and comprehensive education on the subject.

Methodological issues

In the present set of studies one of the main methodological weaknesses was that of sampling. Although in chapter 3 and chapter 5 sample size was large, in chapter 4 the sample size was relatively small. Additionally in chapter 4, due to recruiting within a University the sample was young and therefore not representative of the wider population. In future studies it would be beneficial to also recruit older samples in order to conduct further comparisons between age groups. Further as none of the sample in chapter 4 were planning on starting trying to conceive in the near future it was not possible to investigate differences between those planning to start trying earlier and those planning on starting later to establish whether this may have an impact on the way information is received. Although the sample was followed up over the three days following the study, this may not have been enough time to establish whether behaviour actually would have changed after more time. For example, the Theory of Planned Behaviour recommends that you have at least a one month interval in-between intervention and follow up to ensure you obtain a reliable measure of behaviour (Ajzen, 1996). Furthermore, the study did not match words used in the Stroop task in terms of length and frequency. This issue would need to be addressed in any future studies as not matching the words in this way may impact on the reaction times of the participants. Further piloting studies should also be conducted when using a sample who may not be familiar with words used in reference to infertility to examine whether some words are more or less familiar to the target population and it should be ensured that all materials used are relevant to the population studied. The advertisements used in chapter 4 were

American advertisements which may not have been appropriate for a British target population.

Both chapter 3 and chapter 5 used cross-sectional data so it is not possible to accurately establish cause and effect. In chapter 5 it would be useful to follow up those individuals who planned to have a child in the near future to examine firstly, whether this goal was realised and secondly, whether the importance of preconditions changed the closer they got to their goal of childbearing. Additionally, further examination of relationship factors would be useful in ascertaining how these fully impact on the delay of childbearing. Much research in this area has shown that being in a stable relationship is one of the most important factors in the decision to start a family so investigation into how individuals perceive this may help us to understand this further.

Although chapters 3 and 4 examined women only, chapter 5 investigated the differences in gender. One of the issues in this sample was the lack of male respondents. Although there is a growing emphasis on including men in reproductive research (e.g., Becker, 1996) and it has been found that men want more inclusion in issues relating to reproductive health (Lindberg, Lewis-Spruill & Crownover, 2006) there still remains a lack of research concentrating on men with regards to fertility (Kaufamn, 1997) while men remain extremely difficult to recruit (e.g., Bunting & Boivin, 2007). Additionally, the recruitment of older individuals proved challenging (chapter 5) meaning that it was not possible to investigate the preferences of those over the age of 35 compared to the younger age groups.

Sampling was also restricted by recruitment sources (Cardiff University Human Participant Panel, Cardiff University notice board, and internet). By utilising these resources, the final samples were, on the whole, highly educated and quite often currently

enrolled in education. In order to reduce potential biases (e.g., age, education) findings need to be generalizable to and representative of a wider population (Heiman, 1999). Although the internet offers the opportunity to recruit individuals at all ages, it may not be successful in reaching people of varying educational levels and may not reach people of different cultures. Overall the participants investigated in the present set of studies were well educated and mainly women, therefore not representing the general population. Different results may be obtained if examining varying cultures along with educational and socio-economical backgrounds.

Finally the survey used in chapter 5 included self-report measures, which may be considered as subjective. Results may be confounded due to individuals wishing to respond accurately in that they may wish to give answers that they consider to be more socially desirable. However, all measures used did have high reliability.

Future research

The present thesis has revealed several issues that require further investigation. Firstly, the need for a comprehensive and coherent account of the factors affecting the decision to delay childbearing; In particular a cohesive conceptualisation of precisely what is meant by delay is needed in order to establish if individuals understand the concept and whether they are actually delaying childbearing or whether they are simply unaware of the risks associated with delay. It needs to be fully established whether people are delaying childbearing simply due to other factors, such as career or relationships, or whether they are delaying childbearing due to not knowing that older age has a negative impact on fertility and believe that they can safely leave childbearing until an older age. Once more thorough investigation is conducted in this are there will be more potential to identify the levels of education and information needed in order to allow people to make

informed choices about optimising their own fertility. Secondly, to investigate the way information regarding fertility risks is presented needs to focus on examining differences between different age groups and among those planning to conceive in the near future compared to those who are planning on trying further down the line. This would enable one to achieve a more complete picture of whether the information would be more or less relevant at different life stages and in turn enable one to adapt the information so it can be made relevant to larger groups. People may not regard fertility information as applicable to them if they are not yet thinking about starting a family and therefore feel that it does not apply to them. Earlier and more targeted information that applies to different populations at different stages in their life is necessary in order to disseminate this information and publicise the importance of thinking about fertility at a younger age to ensure future plans for childbearing may be realised. For this reason, future research should also investigate optimum ways in which information and education concerning fertility issues should be targeted at populations at different life-stages. Only by investigating how this information is processed at different ages and different life-stages will it be possible to ascertain the best possible ways in which to educate people about these issues.

The findings in the present thesis point to the pressing need for more longitudinal research in this area. Future investigations would benefit from longitudinal design that might examine how an individual's environment and life experiences and ambitions might impact on the decision on when to start childbearing. For example, by exploring over a number of years how the changes in factors that may impact on the decision to start childbearing (e.g., relationship stability, career opportunities, financial stability)

along with societal influences (e.g., close friends having children) influence or dictate when childbearing begins. Only by conducting such research will it be possible to allow causal inferences regarding the factors that impact on childbearing and consequent delay.

Future research would also need to concentrate on men's perspectives regarding childbearing delay and the risks associated with delay. Although there is not conclusive evidence of exactly when men's fertility starts to decline (Bledsoe, Guyer & Lerner, 2000), men need to be aware that their own postponement of childbearing will impact on their partner's if they delay until a point where the woman's fertility is compromised. With the majority of research on childbearing focusing on women as being the main decision maker (e.g., Berrington, 2004; Miller & Pasta, 1994) little is known about the childbearing preferences and behaviours of men. Therefore, research also needs to establish what men know about the risks associated with reduced fertility. Furthermore, despite efforts in chapter 5 to target both men and women, the sample was predominately female which is reflected by previous research. Whereas in chapter 4, the analysis was concentrated on a subset of only female respondents the overall original sample consisted of both women and men. In total 10,045 individuals completed the International Fertility Decision Making Study (Bunting & Boivin, 2010). With one of its main aims being to recruit men the overall female to male ratio was 9:1. This reflects previous research that also shows male participation to be lower than female. This, in addition to the predominately female approach to the study of fertility, highlights the need to investigate ways in which research on reproductive matters can be made more attractive and applicable to men.

Implications

The present thesis has, overall, demonstrated a need for better awareness and education on the issues surrounding the risks associated with reduced or compromised fertility, in particular women's age. Although there is a great deal of research that informs us of the level of knowledge that individual's may have about the risks associated with reduced fertility there appears to be a lack of research that investigates exactly how this knowledge can help people optimise their future fertility. The present thesis has demonstrated that having a higher level of knowledge about these risks factors is actually associated with a higher likelihood that individuals will optimise their future fertility by engaging in behaviours such as seeking help and advice or changing their lifestyle habits, thus highlighting the need for education regarding this issue.

This, in turn, highlights the need for public health campaigns to begin concentrating on ways in which this information can be successfully disseminated. Professionals need to understand the complexity of issues and factors surrounding the decision of when to start childbearing and how these impact on individual's choices when it comes to their decisions. While much work regarding public health campaigns and education about fertility issues focus on such areas as preventing teenage pregnancies or sexually transmitted diseases there is a pressing need for a balance to be achieved so that issues regarding risks associated with certain lifestyle factors and delaying childbearing can be incorporated into current campaigns.

Additionally, the research has demonstrated that there may be a critical time threshold in which the information may be relevant to individuals. By examining different age groups and investigating how each age group rates the importance of various preconditions it may be possible to obtain a clearer picture of the fact that different types

of information and education is required for each age group due to them being at different life-stages. Health professionals may be able to disseminate information according to age range and raise awareness of the risk factors outlined in the present thesis by introducing and presenting information to individuals of not only childbearing age but also throughout a wide range of ages when, for example, prescribing contraception or being approached for sexual health matters.

By educating about the risk factors associated with delaying childbearing, along with other lifestyle and reproductive factors, the chances of natural conception would arguably be increased thus minimising the need for fertility treatments for preventative fertility problems. Even so, there will still be demand for treatment in those with problems thus education also needs to focus on how to go about seeking timely advice and help. This education needs to encompass both men and women at both the individual and the couple level while ensuring that it is not presented in a way which appears to be dictating when people should have children but rather presenting all the information available so that individuals may make informed choices about their own fertility.

Conclusions

With an ever-rising age at first birth and a society filled with competing alternatives to childbearing, this research demonstrates the increasing need to provide individuals with the information they need to make informed decisions about their childbearing plans. The research presented could provide fundamental groundwork to the study of delay and the implementation of health campaigns designed to raise awareness of the risks associated with lifestyle choices and age and their impact on future fertility. Overall, the research proposes the need for education and awareness and that this future education about fertility should focus on the provision of more widespread information

that provides individuals with the knowledge needed to make timely and informed choices.

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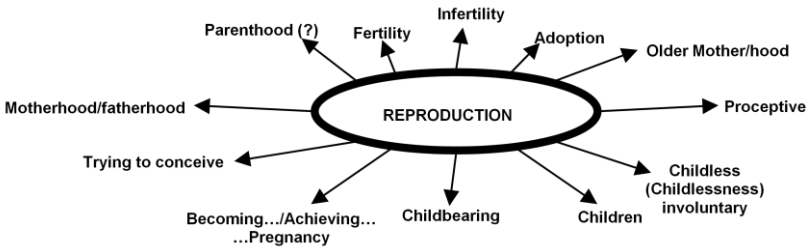
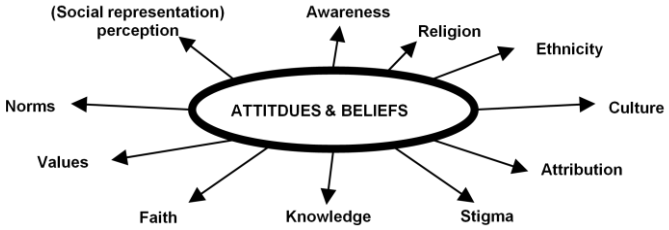
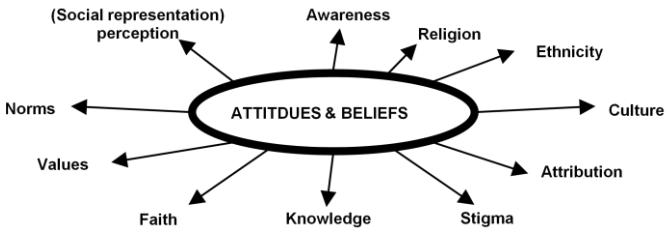
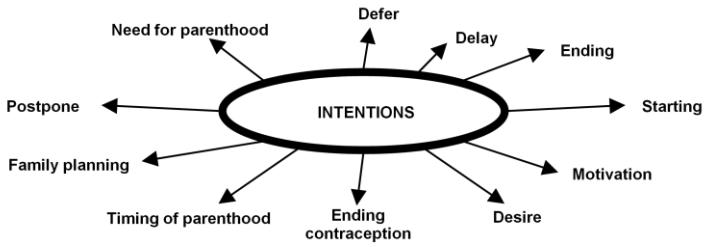
Appendices

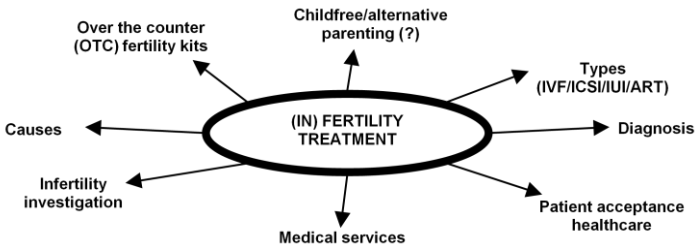
Appendix A: Search terms








Defer
Need for parenthood
Delay
Ending
Postpone
INTENTIONS
Starting
Family planning
Motivation
Timing of parenthood
Ending contraception
Desire


Childfree/alternative parenting (?)
Over the counter (OTC) fertility kits
Types (IVF/ICSI/IUI/ART)
Causes
(IN) FERTILITY TREATMENT
Diagnosis
Infertility investigation
Patient acceptance healthcare
Medical services

Appendix B: Search strategy

Medline

# ▲	**Searches**	Results
11	((parenthood or fatherhood or motherhood) adj2 (intent$ or start$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or costs or benefits or barrier$ or choos$ or choice$ or beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$ or optimal condition$1)).tw.	279
12	(Childbearing adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	276
13	(childbearing adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1)).ti,ab.	74
14	(Childless$ adj2 (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$ or costs or benefit$ or barrier$ or choose or choice)).ti,ab.	35
15	(childless$ adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1 or costs or benefit$ or barrier$ or choose or choice$)).ti,ab.	12
16	(becom$ pregnant adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	134
17	(Reproductive behavior/ or pregnancy/px) and (marriage/ or time factors/ or maternal age/ or paternal age/ or religion/ or career choice/ or "Costs and Cost Analysis"/)	218
18	(Reproductive behavio?r and (marriage or time factors or maternal age or paternal age or religion or career choice or Costs)).ti,ab.	144
19	reproductive behavior/ and (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$).tw.	137
20	reproductive decision$.ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	177

21	(voluntary childlessness or emerging adulthood).ti,ab.	107
22	intended childlessness.ti,ab.	0
23	conceiving time.ti,ab.	1
24	Intention to conceive.ti,ab.	6
25	Childbearing decision$.ti,ab.	31
26	Fertility timing.ti,ab.	20
27	((future or pursu$) adj parenthood).ti,ab.	14
28	((future or pursu$) adj motherhood).ti,ab.	4
29	((future or pursu$) adj fatherhood).ti,ab.	4
30	reproductive intention$.ti,ab.	50
31	Start$ a family.ti,ab.	52
32	((child$ or motherhood or fatherhood or parenthood) adj1 timing).ti,ab.	19
33	attaining motherhood.ti,ab.	2
34	attaining fatherhood.ti,ab.	0
35	attaining parenthood.ti,ab.	0
36	want$ children.ti,ab.	90
37	*reproductive behavior/	208
38	planning a family.ti,ab.	14
39	child planning.ti,ab.	5
40	Fertility decision making.ti,ab.	22
41	Try$ to get pregnant.ti,ab.	20
42	(try$ adj2 conceiv$).tw.	115
43	or/11-42	1943
44	(infertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	2309
45	(fertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or	1224

	concern$ or common or frequen$)).ti,ab.	
46	(fecundity adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	43
47	(fertil$ adj1 (problem$ or difficult$)).tw.	530
48	(infertil$ adj1 (problem$ or difficult$)).tw.	300
49	(ability to conceive or fail$3 to conceive).ti,ab.	471
50	able to conceive.tw.	50
51	conceiving time.ti,ab.	1
52	time to conception.tw.	97
53	time to pregnancy.tw.	291
54	childbearing ability.tw.	15
55	(try$ adj2 conceiv$).tw.	115
56	Try$ to get pregnant.tw.	20
57	or/44-56	5201
58	((consult$ adj2 doctor$1) or (consult$ adj2 GP$1)).tw.	1573
59	(helpseek$ or help seek$ or health seek$ or advice seek$ or decision$ or seek$ medic$ or consult$ doctor$1 or consult$ GP$1 or treatment$ seek$).tw.	130289
60	((detect$ or diagnose or diagnosis) adj2 (self or able or ability)).tw.	13353
61	(Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$).ti,ab.	1079985
62	Complementary Therapies/	10271
63	((complementary or alternative) adj therap$).tw.	6286
64	(fertilit$ adj2 kit$1).ti,ab.	4
65	58 or 59 or 60 or 61 or 62 or 63 or 64	1203219
66	57 and 65	696
67	Fertility Decision-Making.ti,ab.	22
68	inFertility Decision-Making.ti,ab.	1

69	(fertility/ or infertility/) and (attitudes/ or awareness/) and (pregnancy/ or reproduction/ or parents/)	163
70	(fertility/ or infertility/ or reproductive medicine/) and patient acceptance of healthcare/	286
71	66 or 67 or 68 or 69 or 70	1140
72	(fertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormon$ remed$ or hormon$ therap$)).ti,ab.	1798
73	(infertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormonal remedies)).ti,ab.	3087
74	alternative parenting.ti,ab.	1
75	IVF.ti,ab.	10911
76	ICSI.ti,ab.	3431
77	IUI.ti,ab.	794
78	assisted reprod$ technolog$.ti,ab.	2295
79	(assist$ adj2 (conceive or conception)).ti,ab.	688
80	in vitro fertilisation.ti,ab.	920
81	in vitro fertilization.ti,ab.	11666
82	infertility investigat$.ti,ab.	198
83	((fertil$ or infertil$) adj3 kit$1).ti,ab.	12
84	Infertility/th, rh, su [Therapy, Rehabilitation, Surgery]	2151
85	or/72-84	25629
86	Attitudes/ or attitude$.ti,ab.	87793
87	beliefs.ti,ab.	19408
88	Aware$.ti,ab.	76087
89	knowledg$.ti,ab.	225100
90	attitude$.ti,ab.	64492
91	perception$.ti,ab.	86598
92	religio$.ti,ab.	14711

93	ethnic$.ti,ab.	47941
94	attribution.ti,ab.	2767
95	stigma$.ti,ab.	9643
96	faith.ti,ab.	2564
97	norms.ti,ab.	10445
98	social represent$.ti,ab.	255
99	social influenc$.ti,ab.	1240
100	Decision making/	47524
101	deliberat$.ti,ab.	7977
102	cues to action.ti,ab.	71
103	optimal condition$.ti,ab.	7373
104	(advice adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	1259
105	(information adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	36156
106	Consumer Health Information/	244
107	or/86-106	597548
108	107 and 85	1387
109	43 or 71 or 108	4242
110	limit 109 to (humans and yr="1990 - 2009")	2828
111	((retrospective$ adj2 review$) or (case$ adj2 review$) or (patient$ adj2 review$) or (patient$ adj2 chart$) or (peer adj2 review$) or (chart adj2 review$) or (case$ adj2 report$) or (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep)).ti,ab,sh. or editorial.pt. or letter.pt.	5714606
112	110 not 111	2499
113	from 112 keep 1-2499	2499

Medline in Process

1	((parenthood or fatherhood or motherhood) adj2 (intent$ or start$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or costs or benefits or barrier$ or choos$ or choice$ or beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$ or optimal condition$1)).tw.	13
2	(Childbearing adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	9
3	(childbearing adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1)).ti,ab.	5
4	(Childless$ adj2 (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$ or costs or benefit$ or barrier$ or choose or choice)).ti,ab.	1
5	(childless$ adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1 or costs or benefit$ or barrier$ or choose or choice$)).ti,ab.	1
6	((becom$ pregnant adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)) and (reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$)).ti,ab.	2
7	(Reproductive behavio?r and (marriage or time factors or maternal age or paternal age or religion or career choice or Costs)).ti,ab.	0
8	(reproductive decision$ and (reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$)).ti,ab.	6
9	(voluntary childlessness or emerging adulthood).ti,ab.	9
10	intended childlessness.ti,ab.	0
11	conceiving time.ti,ab.	0
12	Intention to conceive.ti,ab.	0
13	Childbearing decision$.ti,ab.	1
14	Fertility timing.ti,ab.	0
15	((future or pursu$) adj parenthood).ti,ab.	0

16	((future or pursu$) adj motherhood).ti,ab.	0
17	((future or pursu$) adj fatherhood).ti,ab.	0
18	reproductive intention$.ti,ab.	5
19	Start$ a family.ti,ab.	3
20	((child$ or motherhood or fatherhood or parenthood) adj1 timing).ti,ab.	1
21	attaining motherhood.ti,ab.	0
22	attaining fatherhood.ti,ab.	0
23	attaining parenthood.ti,ab.	0
24	want$ children.ti,ab.	1
25	planning a family.ti,ab.	1
26	child planning.ti,ab.	0
27	Fertility decision making.ti,ab.	1
28	Try$ to get pregnant.ti,ab.	0
29	(try$ adj2 conceiv$).tw.	3
30	or/1-29	58
31	(infertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	59
32	(fertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	35
33	(fecundity adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	3
34	(fertil$ adj1 (problem$ or difficult$)).tw.	17
35	(infertil$ adj1 (problem$ or difficult$)).tw.	6
36	(ability to conceive or fail$3 to conceive).ti,ab.	14
37	able to conceive.tw.	2
38	conceiving time.ti,ab.	0
39	time to conception.tw.	2

40	time to pregnancy.tw.	8
41	childbearing ability.tw.	0
42	(try$ adj2 conceiv$).tw.	3
43	Try$ to get pregnant.tw.	0
44	or/31-43	145
45	((consult$ adj2 doctor$1) or (consult$ adj2 GP$1)).tw.	43
46	(helpseek$ or help seek$ or health seek$ or advice seek$ or decision$ or seek$ medic$ or consult$ doctor$1 or consult$ GP$1 or treatment$ seek$).tw.	6390
47	((detect$ or diagnose or diagnosis) adj2 (self or able or ability)).tw.	705
48	(Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$).ti,ab.	58392
49	((complementary or alternative) adj therap$).tw.	277
50	(fertilit$ adj2 kit$1).ti,ab.	0
51	or/45-50	63975
52	44 and 51	23
53	Fertility Decision-Making.ti,ab.	1
54	inFertility Decision-Making.ti,ab.	0
55	52 or 53 or 54	24
56	(fertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormon$ remed$ or hormon$ therap$)).ti,ab.	102
57	(infertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormonal remedies)).ti,ab.	82
58	alternative parenting.ti,ab.	0
59	IVF.ti,ab.	405
60	ICSI.ti,ab.	136
61	IUI.ti,ab.	29
62	assisted reprod$ technolog$.ti,ab.	116
63	(assist$ adj2 (conceive or conception)).ti,ab.	33

64	in vitro fertilisation.ti,ab.	24
65	in vitro fertilization.ti,ab.	369
66	infertility investigat$.ti,ab.	1
67	((fertil$ or infertil$) adj3 kit$1).ti,ab.	0
68	or/56-67	900
69	attitude$.ti,ab.	2401
70	beliefs.ti,ab.	945
71	Aware$.ti,ab.	3820
72	knowledg$.ti,ab.	13584
73	attitude$.ti,ab.	2401
74	perception$.ti,ab.	4061
75	religio$.ti,ab.	561
76	ethnic$.ti,ab.	2286
77	attribution.ti,ab.	188
78	stigma$.ti,ab.	588
79	faith.ti,ab.	126
80	norms.ti,ab.	499
81	social represent$.ti,ab.	28
82	social influenc$.ti,ab.	54
83	deliberat$.ti,ab.	444
84	cues to action.ti,ab.	3
85	optimal condition$.ti,ab.	630
86	(advice adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	49
87	(information adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	1887

88	or/69-87	28125
89	68 and 88	58
90	((retrospective$ adj2 review$) or (case$ adj2 review$) or (patient$ adj2 review$) or (patient$ adj2 chart$) or (peer adj2 review$) or (chart adj2 review$) or (case$ adj2 report$) or (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep)).ti,ab,sh. or editorial.pt. or letter.pt.	87172
91	30 or 55 or 89	129
92	91 not 90	115
93	from 92 keep 1-115	115

Psycinfo

1	((parenthood or fatherhood or motherhood) adj2 (intent$ or start$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or costs or benefits or barrier$ or choos$ or choice$ or beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$ or optimal condition$1)).tw.	556
2	(Childbearing adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	105
3	(childbearing adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1)).ti,ab.	62
4	(Childless$ adj2 (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$ or costs or benefit$ or barrier$ or choose or choice)).ti,ab.	59
5	(childless$ adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1 or costs or benefit$ or barrier$ or choose or choice$)).ti,ab.	42
6	(becom$ pregnant adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	18
7	(family planning/ or pregnancy/) and (marriage/ or time/ or religion/ or occupations/ or "costs and cost analysis"/)	160
8	(Reproductive behavio?r and (marriage or time factors or maternal age or paternal age or religion or career choice or Costs)).ti,ab.	48
9	family planning/ and (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$).tw.	825
10	reproductive decision$.ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	97
11	(voluntary childlessness or emerging adulthood).ti,ab.	278
12	intended childlessness.ti,ab.	1
13	conceiving time.ti,ab.	1

14	Intention to conceive.ti,ab.	2
15	Childbearing decision$.ti,ab.	31
16	Fertility timing.ti,ab.	5
17	((future or pursu$) adj parenthood).ti,ab.	6
18	((future or pursu$) adj motherhood).ti,ab.	4
19	((future or pursu$) adj fatherhood).ti,ab.	1
20	reproductive intention$.ti,ab.	13
21	Start$ a family.ti,ab.	36
22	((child$ or motherhood or fatherhood or parenthood) adj1 timing).ti,ab.	13
23	attaining motherhood.ti,ab.	2
24	attaining fatherhood.ti,ab.	0
25	attaining parenthood.ti,ab.	1
26	want$ children.ti,ab.	58
27	family planning/	914
28	planning a family.ti,ab.	6
29	child planning.ti,ab.	6
30	Fertility decision making.ti,ab.	17
31	Try$ to get pregnant.ti,ab.	6
32	(try$ adj2 conceiv$).tw.	31
33	or/1-32	2335
34	(infertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	101
35	(fertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	118
36	(fecundity adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	10
37	(fertil$ adj1 (problem$ or difficult$)).tw.	98

38	(infertil$ adj1 (problem$ or difficult$)).tw.	36
39	(ability to conceive or fail$3 to conceive).ti,ab.	46
40	able to conceive.tw.	21
41	conceiving time.ti,ab.	1
42	time to conception.tw.	5
43	time to pregnancy.tw.	7
44	childbearing ability.tw.	1
45	(try$ adj2 conceiv$).tw.	31
46	Try$ to get pregnant.tw.	6
47	or/34-46	456
48	((consult$ adj2 doctor$1) or (consult$ adj2 GP$1)).tw.	427
49	(helpseek$ or help seek$ or health seek$ or advice seek$ or decision$ or seek$ medic$ or consult$ doctor$1 or consult$ GP$1 or treatment$ seek$).tw.	93980
50	((detect$ or diagnose or diagnosis) adj2 (self or able or ability)).tw.	2351
51	(Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$).ti,ab.	570951
52	alternative medicine/	1925
53	((complementary or alternative) adj therap$).tw.	741
54	(fertilit$ adj2 kit$1).ti,ab.	0
55	48 or 49 or 50 or 51 or 52 or 53 or 54	638455
56	47 and 55	159
57	Fertility Decision-Making.ti,ab.	17
58	inFertility Decision-Making.ti,ab.	0
59	(fertility/ or infertility/) and (attitudes/ or awareness/) and (pregnancy/ or family planning/ or parents/)	2
60	(fertility/ or infertility/ or reproductive technology/) and (Help Seeking Behavior/ or Health Care Seeking Behavior/)	8

61	56 or 57 or 58 or 59 or 60	182
62	(fertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormon$ remed$ or hormon$ therap$)).ti,ab.	91
63	(infertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormonal remedies)).ti,ab.	253
64	alternative parenting.ti,ab.	7
65	IVF.ti,ab.	222
66	ICSI.ti,ab.	22
67	IUI.ti,ab.	9
68	assisted reprod$ technolog$.ti,ab.	123
69	(assist$ adj2 (conceive or conception)).ti,ab.	36
70	in vitro fertilisation.ti,ab.	36
71	in vitro fertilization.ti,ab.	274
72	infertility investigat$.ti,ab.	16
73	((fertil$ or infertil$) adj3 kit$1).ti,ab.	0
74	Infertility/	1166
75	or/62-74	1560
76	Attitudes/ or attitude$.ti,ab.	126077
77	beliefs.ti,ab.	40738
78	Aware$.ti,ab.	52043
79	knowledg$.ti,ab.	122147
80	attitude$.ti,ab.	118379
81	perception$.ti,ab.	139336
82	religio$.ti,ab.	36546
83	ethnic$.ti,ab.	36836
84	attribution.ti,ab.	9137
85	stigma$.ti,ab.	8379

86	faith.ti,ab.	5705
87	norms.ti,ab.	20003
88	social represent$.ti,ab.	1162
89	social influenc$.ti,ab.	3835
90	Decision making/	26743
91	deliberat$.ti,ab.	6919
92	cues to action.ti,ab.	60
93	optimal condition$.ti,ab.	362
94	(advice adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	427
95	(information adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	15921
96	or/76-95	531496
97	96 and 75	410
98	33 or 61 or 97	2795
99	limit 98 to (humans and yr="1990 - 2009") [Limit not valid in PsycINFO; records were retained]	1887
100	((retrospective$ adj2 review$) or (case$ adj2 review$) or (patient$ adj2 review$) or (patient$ adj2 chart$) or (peer adj2 review$) or (chart adj2 review$) or (case$ adj2 report$) or (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep)).ti,ab,sh. or editorial.pt. or letter.pt.	201891
101	99 not 100	1869

All EBM Cochrane Database of Systematic Reviews, CENTRAL, DARE , ACP)

1	((parenthood or fatherhood or motherhood) adj2 (intent$ or start$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or costs or benefits or barrier$ or choos$ or choice$ or beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$ or optimal condition$1)).tw.	9
2	(Childbearing adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or	5

	preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	
3	(childbearing adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1)).ti,ab.	5
4	(Childless$ adj2 (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$ or costs or benefit$ or barrier$ or choose or choice)).ti,ab.	1
5	(childless$ adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1 or costs or benefit$ or barrier$ or choose or choice$)).ti,ab.	0
6	(becom$ pregnant adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	2
7	(Reproductive behavior/ or pregnancy/px) and (marriage/ or time factors/ or maternal age/ or paternal age/ or religion/ or career choice/ or "Costs and Cost Analysis"/)	0
8	(Reproductive behavio?r and (marriage or time factors or maternal age or paternal age or religion or career choice or Costs)).ti,ab.	0
9	reproductive behavior/ and (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$).tw.	3
10	reproductive decision$.ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	1
11	(voluntary childlessness or emerging adulthood).ti,ab.	4
12	intended childlessness.ti,ab.	0
13	conceiving time.ti,ab.	0
14	Intention to conceive.ti,ab.	0
15	Childbearing decision$.ti,ab.	0
16	Fertility timing.ti,ab.	0
17	((future or pursu$) adj parenthood).ti,ab.	0
18	((future or pursu$) adj motherhood).ti,ab.	0
19	((future or pursu$) adj fatherhood).ti,ab.	0

20	reproductive intention$.ti,ab.	0
21	Start$ a family.ti,ab.	2
22	((child$ or motherhood or fatherhood or parenthood) adj1 timing).ti,ab.	2
23	attaining motherhood.ti,ab.	0
24	attaining fatherhood.ti,ab.	0
25	attaining parenthood.ti,ab.	0
26	want$ children.ti,ab.	3
27	*reproductive behavior/	1
28	planning a family.ti,ab.	1
29	child planning.ti,ab.	0
30	Fertility decision making.ti,ab.	0
31	Try$ to get pregnant.ti,ab.	1
32	(try$ adj2 conceiv$).tw.	25
33	or/1-32	61
34	(infertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	105
35	(fertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	36
36	(fecundity adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	1
37	(fertil$ adj1 (problem$ or difficult$)).tw.	35
38	(infertil$ adj1 (problem$ or difficult$)).tw.	18
39	(ability to conceive or fail$3 to conceive).ti,ab.	40
40	able to conceive.tw.	1
41	conceiving time.ti,ab.	0
42	time to conception.tw.	23
43	time to pregnancy.tw.	37

44	childbearing ability.tw.	0
45	(try$ adj2 conceiv$).tw.	25
46	Try$ to get pregnant.tw.	2
47	or/34-46	300
48	((consult$ adj2 doctor$1) or (consult$ adj2 GP$1)).tw.	293
49	(helpseek$ or help seek$ or health seek$ or advice seek$ or decision$ or seek$ medic$ or consult$ doctor$1 or consult$ GP$1 or treatment$ seek$).tw.	12941
50	((detect$ or diagnose or diagnosis) adj2 (self or able or ability)).tw.	724
51	(Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$).ti,ab.	52521
52	Complementary Therapies/	202
53	((complementary or alternative) adj therap$).tw.	1008
54	(fertilit$ adj2 kit$1).ti,ab.	0
55	48 or 49 or 50 or 51 or 52 or 53 or 54	65406
56	47 and 55	50
57	Fertility Decision-Making.ti,ab.	0
58	inFertility Decision-Making.ti,ab.	0
59	(fertility/ or infertility/) and (attitudes/ or awareness/) and (pregnancy/ or reproduction/ or parents/)	1
60	(fertility/ or infertility/ or reproductive medicine/) and patient acceptance of healthcare/	0
61	56 or 57 or 58 or 59 or 60	51
62	(fertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormon$ remed$ or hormon$ therap$)).ti,ab.	164
63	(infertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormonal remedies)).ti,ab.	321
64	alternative parenting.ti,ab.	0
65	IVF.ti,ab.	1648
66	ICSI.ti,ab.	557
67	IUI.ti,ab.	239

68	assisted reprod$ technolog$.ti,ab.	117
69	(assist$ adj2 (conceive or conception)).ti,ab.	59
70	in vitro fertilisation.ti,ab.	135
71	in vitro fertilization.ti,ab.	1123
72	infertility investigat$.ti,ab.	14
73	((fertil$ or infertil$) adj3 kit$1).ti,ab.	1
74	Infertility/th, rh, su [Therapy, Rehabilitation, Surgery]	156
75	or/62-74	3044
76	Attitudes/ or attitude$.ti,ab.	3477
77	beliefs.ti,ab.	995
78	Aware$.ti,ab.	2347
79	knowledg$.ti,ab.	6167
80	attitude$.ti,ab.	3088
81	perception$.ti,ab.	5298
82	religio$.ti,ab.	152
83	ethnic$.ti,ab.	1442
84	attribution.ti,ab.	167
85	stigma$.ti,ab.	239
86	faith.ti,ab.	38
87	norms.ti,ab.	391
88	social represent$.ti,ab.	3
89	social influenc$.ti,ab.	117
90	Decision making/	1207
91	deliberat$.ti,ab.	350
92	cues to action.ti,ab.	8

93	optimal condition$.ti,ab.	60
94	(advice adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	56
95	(information adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	1432
96	Consumer Health Information/	2
97	or/76-96	20366
98	97 and 75	31
99	33 or 61 or 98	135
100	limit 99 to (humans and yr="1990 - 2009") [Limit not valid in CDSR,ACP Journal Club,DARE,CCTR,CLCMR; records were retained]	127
101	((retrospective$ adj2 review$) or (case$ adj2 review$) or (patient$ adj2 review$) or (patient$ adj2 chart$) or (peer adj2 review$) or (chart adj2 review$) or (case$ adj2 report$) or (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep)).ti,ab,sh. or editorial.pt. or letter.pt.	20382
102	100 not 101	122
103	from 102 keep 1-122	122

HMIC

1	((parenthood or fatherhood or motherhood) adj2 (intent$ or start$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or costs or benefits or barrier$ or choos$ or choice$ or beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$ or optimal condition$1)).tw.	22
2	(Childbearing adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	4
3	(childbearing adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1)).ti,ab.	3

4	(Childless$ adj2 (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$ or costs or benefit$ or barrier$ or choose or choice)).ti,ab.	2
5	(childless$ adj2 (beliefs or Aware$ or knowledg$ or values or perception$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms or social represent$ or social influenc$ or attitude$1 or costs or benefit$ or barrier$ or choose or choice$)).ti,ab.	2
6	(becom$ pregnant adj2 (optimal condition$1 or costs or benefit$ or barrier$ or choose or choice$ or intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$)).ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	0
7	(family planning/ or pregnancy/) and (marriage/ or maternal age/ or religion/ or occupations/ or costs/)	17
8	(Reproductive behavio?r and (marriage or time factors or maternal age or paternal age or religion or career choice or Costs)).ti,ab.	0
9	family planning/ and (intent$ or start$ or plan$ or intend$ or achiev$ or attempt$ or pursu$ or desir$3 or need$3 or wish$3 or motivation$1 or postpon$ or delay$ or defer$ or timing or decision$ or reason$ or preference$).tw.	212
10	reproductive decision$.ti,ab. and ((reason$ or Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$ or religio$ or ethnic$ or attribution or stigma$ or faith or norms$ or preference$ or influenc$ or constraint$).ti,ab. or attitudes/)	8
11	(voluntary childlessness or emerging adulthood).ti,ab.	4
12	intended childlessness.ti,ab.	0
13	conceiving time.ti,ab.	1
14	Intention to conceive.ti,ab.	0
15	Childbearing decision$.ti,ab.	0
16	Fertility timing.ti,ab.	0
17	((future or pursu$) adj parenthood).ti,ab.	0
18	((future or pursu$) adj motherhood).ti,ab.	1
19	((future or pursu$) adj fatherhood).ti,ab.	0

20	reproductive intention$.ti,ab.	0
21	Start$ a family.ti,ab.	8
22	((child$ or motherhood or fatherhood or parenthood) adj1 timing).ti,ab.	3
23	attaining motherhood.ti,ab.	0
24	attaining fatherhood.ti,ab.	0
25	attaining parenthood.ti,ab.	0
26	want$ children.ti,ab.	9
27	family planning/	346
28	planning a family.ti,ab.	5
29	child planning.ti,ab.	1
30	Fertility decision making.ti,ab.	0
31	Try$ to get pregnant.ti,ab.	1
32	(try$ adj2 conceiv$).tw.	2
33	or/1-32	434
34	(infertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	14
35	(fertil$ adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	10
36	(fecundity adj2 (myths or risk factor$ or cause$ or prevalence$ or incidence$ or status$ or concern$ or common or frequen$)).ti,ab.	0
37	(fertil$ adj1 (problem$ or difficult$)).tw.	8
38	(infertil$ adj1 (problem$ or difficult$)).tw.	11
39	(ability to conceive or fail$3 to conceive).ti,ab.	4
40	able to conceive.tw.	1
41	conceiving time.ti,ab.	1
42	time to conception.tw.	17
43	time to pregnancy.tw.	8

44	childbearing ability.tw.	1
45	(try$ adj2 conceiv$).tw.	2
46	Try$ to get pregnant.tw.	1
47	or/34-46	72
48	((consult$ adj2 doctor$1) or (consult$ adj2 GP$1)).tw.	841
49	(helpseek$ or help seek$ or health seek$ or advice seek$ or decision$ or seek$ medic$ or consult$ doctor$1 or consult$ GP$1 or treatment$ seek$).tw.	10590
50	((detect$ or diagnose or diagnosis) adj2 (self or able or ability)).tw.	84
51	(Attitude$ or belief$ or Aware$ or knowledge or values or perception$ or perceive$ or expectation$ or believ$).ti,ab.	28740
52	alternative medicine/	397
53	((complementary or alternative) adj therap$).tw.	300
54	(fertilit$ adj2 kit$1).ti,ab.	0
55	48 or 49 or 50 or 51 or 52 or 53 or 54	37500
56	47 and 55	18
57	Fertility Decision-Making.ti,ab.	0
58	inFertility Decision-Making.ti,ab.	0
59	(human fertility/ or infertility/) and (attitudes/ or awareness/) and (pregnancy/ or family planning/ or parents/)	0
60	(human fertility/ or infertility/ or reproductive technology/) and Health Care Seeking Behavior/	0
61	56 or 57 or 58 or 59 or 60	18
62	(fertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormon$ remed$ or hormon$ therap$)).ti,ab.	45
63	(infertil$ adj2 (treat$ or therapies or therapy or medical monitoring or hormonal remedies)).ti,ab.	47
64	alternative parenting.ti,ab.	0
65	IVF.ti,ab.	70

66	ICSI.ti,ab.	8
67	IUI.ti,ab.	0
68	assisted reprod$ technolog$.ti,ab.	13
69	(assist$ adj2 (conceive or conception)).ti,ab.	37
70	in vitro fertilisation.ti,ab.	76
71	in vitro fertilization.ti,ab.	14
72	infertility investigat$.ti,ab.	0
73	((fertil$ or infertil$) adj3 kit$1).ti,ab.	0
74	Infertility/	185
75	or/62-74	346
76	Attitudes/ or attitude$.ti,ab.	7235
77	beliefs.ti,ab.	1205
78	Aware$.ti,ab.	4539
79	knowledg$.ti,ab.	7181
80	attitude$.ti,ab.	6215
81	perception$.ti,ab.	4282
82	religio$.ti,ab.	697
83	ethnic$.ti,ab.	4546
84	attribution.ti,ab.	79
85	stigma$.ti,ab.	555
86	faith.ti,ab.	251
87	norms.ti,ab.	393
88	social represent$.ti,ab.	7
89	social influenc$.ti,ab.	60
90	Decision making/	3490

91	deliberat$.ti,ab.	574
92	cues to action.ti,ab.	1
93	optimal condition$.ti,ab.	4
94	(advice adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	473
95	(information adj2 (avail$ or access$3 or seek$ or find$3 or locat$ or identif$ or helpseek$ or communic$ or source$)).ti,ab.	3700
96	consumer health information/	1444
97	or/76-96	32654
98	97 and 75	39
99	33 or 61 or 98	480
100	limit 99 to (humans and yr="1990 - 2009") [Limit not valid; records were retained]	344
101	((retrospective$ adj2 review$) or (case$ adj2 review$) or (patient$ adj2 review$) or (patient$ adj2 chart$) or (peer adj2 review$) or (chart adj2 review$) or (case$ adj2 report$) or (rat or rats or mouse or mice or hamster or hamsters or animal or animals or dog or dogs or cat or cats or bovine or sheep)).ti,ab,sh. or editorial.pt. or letter.pt.	4808
102	100 not 101	343

IBSS

infertil* or fertile* or fecundity

myths or risk factor* or cause* or prevalence* or incidence* or status* or concern* or common or frequen*

s1 and s2

fertil* N1 problem*

fertil* N1 difficult*

infertil* N1 problem*

infertil* N1 difficult*

“ability to conceive”

“fail* to conceive”

“able to conceive”

“conceiving time”

“time to conception”

“time to pregnancy”

“childbearing ability”

try* N2 conceiv*

“Try* to get pregnant”

s3 or s4 or s5 or s6 or s7 or s8 or s9 or s10 or s11 or s12 or s13 or s14 or s15 or s16

consult* N2 doctor*

consult* N2 GP*

helpseek* or help seek* or health seek* or advice seek* or decision* or seek* medic* or consult* doctor* or consult* GP* or treatment* seek*

detect* or diagnose or diagnosis

Attitude* or belief* or Aware* or knowledge or values or perception* or perceive* or expectation* or believ*

Complementary therap*

Alternative therap*

fertilit* N2 kit*

s18 or s19 or s20 or s21 or s22 or s23 or s24 or s25

s17 and s26

Fertility Decision-Making

inFertility Decision-Making

(ZU "FERTILITY AND FAMILY") or (ZU "FERTILITY AND MARRIAGE") or (ZU "FERTILITY AND RELIGION") or (ZU "FERTILITY ATTITUDES")

For All other search engines the following was used:

((((("fatherhood" or "motherhood" or "parenthood")) and(("attitudes" or "attributions" or "awareness" or "barriers" or "beliefs" or "choice" or "costs benefits" or "decision making" or "delay" or "desire" or "ethnicity" or "faith" or "intention" or "knowledge" or "motivation" or "norms" or "perception" or "postponement" or "reasons" or "religions" or "social influence" or "social representation" or "timing" or "values"))) or(("childbearing") and(("barriers" or "choice" or "costs benefits" or "decision making" or "delay" or "desire" or "motivation" or "planned pregnancy" or "postponement" or "timing")) and(("attitudes" or "attributions" or "awareness" or "beliefs" or "ethnicity" or "expectations" or "faith" or "knowledge" or "norms" or "perception" or "preferences" or "reasons" or "religions" or "social influence" or "values"))) or(("childlessness") and(("choice" or "barriers" or "costs benefits" or "decision making" or "delay" or "desire" or "intention" or "motivation" or "planned pregnancy" or "planning" or "postponement" or "preferences" or "reasons" or "timing"))) or((("attitudes" or "attributions" or "awareness" or "beliefs" or "ethnicity" or "expectations" or "faith" or "knowledge" or "norms" or "perception" or "preferences" or "reasons" or "religions" or "social influence" or "values")) and("childlessness")) or(("pregnancy" and "becoming")) or((("attitudes" or "attributions" or "awareness" or "barriers" or "beliefs" or "choice" or "costs benefits" or "decision making" or "delay" or "desire" or "ethnicity" or "faith" or "intention" or "knowledge" or "motivation" or "norms" or "perception" or "postponement" or "reasons" or "religions" or

"social influence" or "social representation" or "timing" or "values")) and(("attitudes" or "attributions" or "awareness" or "beliefs" or "ethnicity" or "expectations" or "faith" or "knowledge" or "norms" or "perception" or "preferences" or "reasons" or "religions" or "social influence" or "values")) and("pregnancy")) or((("pregnancy" or "reproductive behaviour")) and(("costs benefits" or "age" or "career choice" or "cost analysis" or "fatherhood" or "marriage" or "motherhood" or "parenthood" or "religions" or "time"))) or((("attitudes" or "attributions" or "awareness" or "barriers" or "beliefs" or "choice" or "costs benefits" or "decision making" or "delay" or "desire" or "ethnicity" or "faith" or "intention" or "knowledge" or "motivation" or "norms" or "perception" or "postponement" or "reasons" or "religions" or "social influence" or "social representation" or "timing" or "values")) and(("pregnancy" or "reproductive behaviour"))) or((("attitudes" or "attributions" or "awareness" or "beliefs" or "ethnicity" or "expectations" or "faith" or "knowledge" or "norms" or "perception" or "preferences" or "reasons" or "religions" or "social influence" or "values")) and(("decision making" and "reproduction"))) or(("childlessness" and "voluntary")) or(("timing" and "fertility")) or(("parenthood" and "future")) or(("parenthood" and "pursuit")) or(("motherhood") and(("pursuit" or "future"))) or((("pursuit" or "future")) and("fatherhood")) or((("parenthood" or "children" or "fatherhood" or "motherhood")) and("timing")) or((("parenthood" or "children" or "fatherhood" or "motherhood")) and("achievement")) or(("decision making" and "fertility"))) or((("decision making" and "fertility")) or((((("infertility") and(("causes" or "concerns" or "incidence" or "myths" or "prevalence" or "risk factors" or "status"))) or((("causes" or "concerns" or "incidence" or "myths" or "prevalence" or "risk factors" or "status")) and("fertility")) or(("fertility") and(("difficult" or "difficulty" or "problems"))) or(("infertility") and(("difficult" or "difficulty" or "problems"))) or(("timing") and("conception")) or(("timing") and("pregnancy")) or(("childbearing") and("ability"))) and((("treatment" or "advice" or "decision making" or "health" or "helpseeking")) or((("diagnosis" or "detection")) and(("ability" or "self"))) or(("beliefs" or "attitudes" or "awareness" or "expectations" or "knowledge" or "perception" or "perceptions" or "values")) or("alternative medicine") or(("alternative medicine") and("therapy")))) or(("infertility" and "decision making")) or((("fertility" or "infertility")) and(("awareness" or "attitudes")) and(("parents" or "pregnancy" or "reproduction"))) or(("health") and((("fertility" or "infertility")) or(("reproduction" and "medicine"))))) or((((("fertility") and(("hormones" or "monitoring" or "therapy" or "treatment"))) or((("hormones" or "monitoring" or "therapy" or "treatment")) and("infertility")) or(("parenting" and "alternative")) or("reproductive technologies") or("in vitro fertilization") or(("investigations" and "infertility")) or(("surgery" and "infertility" and "rehabilitation" and "therapy"))) and(("attitudes") or("beliefs") or("awareness") or("knowledge") or("perceptions") or("religions") or("ethnicity") or(("attributes" or "attributions")) or("faith") or("norms") or("social representation") or("social influence") or("decision making") or(("action" and "cues")) or(("advice") and(("sources" or "access" or "availability" or "communication" or "helpseeking" or "identification" or "identity" or "location"))) or((("sources" or "access" or "availability" or "communication" or "helpseeking" or "identification" or "identity" or "location")) and("information"))))

Appendix C: Initial exclusions

	Number of references	***(Removed)***
Original database	**17475**	
Removal of duplicates		4495
Removal of exclusions		
Unrelated to fertility/parenting (e.g., computing, communication){computer} OR {computing} NOT {fertility} OR {infertility} OR {Infertile} OR {parent} OR {reproduct} OR {health} OR {patient} OR {pregnancy}		165
Unrelated to fertility/parenting (e.g., communication){communicate} OR {communication} NOT {fertility} OR {infertility} OR {Infertile} OR {parent} OR {reproduct} OR {health} OR {patient} OR {pregnancy} OR {famil} OR {couple} OR {mother} OR {father} OR {decision} OR {child} OR {adult} OR {women} OR {men}		868
Unrelated to fertility/parenting (e.g., agricultural or horticultural){agricult} OR {horticul} NOT {fertility} OR {infertility} OR {Infertile} OR {parent} OR {reproduct} OR {health} OR {patient} OR {pregnancy} OR {famil} OR {couple} OR {mother} OR {father} OR {decision} OR {child} OR {adult} OR {women} OR {men}		16
Unrelated to fertility/parenting (e.g., environment or climate){ environment } OR { climate } NOT {fertility} OR {infertility} OR {Infertile} OR {parent} OR {reproduct} OR {health} OR {patient} OR {pregnancy} OR {famil} OR {couple} OR {mother} OR {father} OR {decision} OR {child} OR {adult} OR {women} OR {men}		21
{teach} OR {school} NOT {fertility} OR {infertility} OR {Infertile} OR {parent} OR {reproduct} OR {health} OR {patient} OR {pregnancy} OR {famil} OR {couple} OR {mother} OR {father} OR {decision} OR {adult} OR {women} OR {men}NB – Child removed from NOT list due to category searched for		49
Removal references without titles		185
Removal of education unrelated to fertility/reproduction		577
Removal of {energy} OR {conservation} OR {technolog} NOT {reproduct} OR {parent} OR {conceiv}		290
Removal of general irrelevant papers (all titles in database)		2211
Removal of more irrelevant papers through the main database (e.g., business, web, telecommunications)		2345
Database total after above	**6253**	
Removal of papers due to not meeting inclusion criteria		5409
Database total after above	**844**	

Appendix D: Example of a critical appraisal form

Study ref: First author/date/study number	Barber (2001)	
Review phase *(e.g. phase one, two or three)*	Phase 1	
Data extracted by [and checked by]:	NK	
Aim/hypothesis	To explore how attitudes towards childbearing and the competing behaviours of educational attainment career development and consumer spending affect childbearing behaviour	
Fertility Outcome *(i.e., type of fertility decision/intention being investigated)*	**Fertility outcome**	**Measure / definition**
	Pre-marital and marital Childbearing behaviour – First Birth	Longitudinal study of mother child pairs (how life factors effect childbearing behaviour)
Predictor *(e.g., age, marital status)*	**Predictor**	**Measure / definition**
	Attitudes towards childbearing	1(dislike) 10 (enjoy a great deal)
	Education attainment	
	Career	
	Early adulthood experiences School	Currently enrolled, not enrolled
	Cohabitation	Cohabiting or married (years)
	Employment	Full time, part time
	Adolescent experiences School success	Adding the number of A and Bs in their final semester of high school and dividing by the number of courses taken(measures range from.00 to 1.00)

	Dating Behaviours	Have you every gone steady? Affirmative answers coded as 1, negative coded as 0
	Controls	
	Family size	Number of children born by mother before 1977
	Mothers age at first birth	Years
	Average family income	Dollars (thousands)
	Parents education	Average of mothers and fathers
	Religious affiliation	Catholic, otherwise
	Marital status of parents	Series of dichotomous variables: Never divorced, divorced and remarried, divorced and not remarried
	Age	
	Gender	
Study design *(e.g. prospective longitudinal, cohort study. Cross-sectional study)*	Longitudinal - 833 Mother child pairs. Data from the Intergenerational panel study of parents and children (IPS) an eight-wave 31 year panel study. Focal children were interviewed at ages 18, 23 and 31.	
Length of follow-up (if applicable)	N/a	
Sample Size *(if the study reports it, note whether the study is*	833 Mother child pairs	

adequately powered)		
Sampling procedure	Original sample drawn from 1961 birth records in the Detroit Metropolitan area included married white mothers who had recently given birth.	
Country	America	
Eligibility criteria	White marred mothers who had recently given birth and their children	
Population studied (demographics)	**Location (Urban/ Rural/ Mixed Unknown)**	No information provided
	Gender (Male/ Female /Both)	Both
	Age	Focal children were interviewed at ages 18, 23 and 31.
	Socio-economic	Mean early income of parents $20,000, mean later income for parents $30,000
	Ethnicity	White married women, no detail about ethnicity of child
	Other details	
Data analysis	logistic regression reporting log odd ratios p values.	
Factors/confounders adjusted for		
Study response and attrition rate (if applicable)	85%	
Results *(Report direction of association with risk of childlessness, plus data reporting where possible odds ratio and CI, and whether results are statistically significant – p<0.05)*	Results for attitudes towards childbearing on hazard of first birth Significant Premarital Adolescent experiences Higher education attainment = ↓ monthly log-odd ratios of having a	

	premarital first birth (-.53, to -.60 p<.05) Went steady before 18 =↑ monthly log-odd ratios of having premarital first birth (.95, to .96, p<.001) Family Background Mothers total number of children children =↑ monthly log-odd ratio of having a premarital first birth (.27 to .28 p<.001) Family financial assets = ↓ monthly log-odd ratios of having a premarital first birth (-.70 to -.59 p<.01) Average Parents Education = ↓ monthly log-odd ratio of having a premarital first birth (-.14 p<.01 to -.11 p<.05) Mother Catholic = ↓ monthly log-odd ratio of having a premarital first birth (-55 p<.01) Non-significant: premarital Attitudes towards childbearing, mothers age at first childbirth, average early family income, average later family income, family income decline, mothers marital history, respondent is a woman <u>Results for attitudes towards competing alternatives to childbearing on hazard of first birth</u> <u>Significant: pre-marital</u> Positive Attitude towards career = ↓ monthly log-odd ratio of having a premarital first birth (-.39 to -.36 p<.01) Positive Attitude towards Luxury goods = ↓ monthly log-odd ratio of a premarital first birth (-.38 to -.33 p<.01) Adolescent experiences Went steady before 18 =↑ monthly log-odd ratio of having a premarital first birth (.92 to .90 p<.001) <u>Family Background</u> Mothers total number of children =↑monthly log odd ratios of having a

	premarital first birth (.27 to .26 p<.001) Family financial assets = ↓ monthly log odd ratio of having a premarital first birth (-.70 to -.65 p<.01) Mothers catholic = ↓ monthly log-odd ratio of having a premarital first birth (-.54 to -.53 p<.01) Non-significant: premarital Edcuation expectation, proportion of grades in high school, mothers age at first birth, average early family income, average later family income, family income decline, mothers marital history, respondent is a woman <u>Attitudes towards childbearing and competing alternatives</u> <u>Significant: premarital</u> Positive attitude towards career = ↓ monthly log-odd ratio of having a premarital first birth (-.34 p<.01) Positive attitude towards luxury goods= ↓ monthly log-odd ratio of having a premarital first birth (-.33 p<.05) Non-significant: premarital Attitudes towards childbearing, education expectation, Results for attitudes towards childbearing on hazard of first birth Significant: marital Adolescent experiences Attitudes towards activities with children =↑monthly log-odd ratio of having

	a marital first birth (.16 p<.01) Children cause worry = ↓ montly log-odd ratio of having a marital first birth (-.19 p<.01) Family size preference =↑ monthly log-odd ratio of having a marital first birth (.05 p<.001) Adolescent experiences Went steady before 18 =↑ monthly log-odd ratios of having premarital first birth (.80, to .82, p<.001) Family Background Mothers total number of children children =↑ monthly log-odd ratio of having a premarital first birth (.12 p<.001 to .09 p<.01) Family financial assets = ↓ monthly log-odd ratios of having a premarital first birth (-.20 to -.18 p<.05) Respondent is a woman monthly log-odd ratio of having a marital first birth (.29 to .30 p<.01) Non-Significant: marital Proportion of grades in high school, mothers age at first birth, average early family income, average later family income, family income decline, average parents education, mothers marital history <u>Results for attitudes towards competing alternatives to childbearing on hazard of first birth</u> <u>Significant: pre-marital</u> Positive Attitude towards career = ↓ monthly log-odd ratio of having a marital first birth (-.13 p<.05) Positive Attitude towards Luxury goods = ↓ monthly log-odd ratio of a marital first birth (-.21 to -.19 p<.05) Adolescent experiences Went steady before 18 =↑ monthly log-odd ratio of having a marital first birth (.77 to .79 p<.001)

	Family Background Mothers total number of children =↑monthly log odd ratios of having a marital l first birth (.12 p<.001) Respondent is a woman =↑monthly log-odd ratio of having a marital first birth (.40 to .39 p<.001) Non-Significant: marital Educational expectation, proportion of grades in high school, mothers age at first birth, average early family income, average later family income, family income decline, family financial assets average parents education, mother catholic, mothers marital history Attitudes towards childbearing and competing alternatives Significant: premarital Attitudes towards activities with children =↑ monthly log-odd ratio of marital first birth (.15 p<.01) Family size preferences =↑ monthly log-odd ratio of marital first birth (.04 p<.01) Belief that children casue worry and strain =↓ monthly log-odd ratio of having a premarital first birth (-.14 p<.05) Non-significant: marital Educational expectation, attitudes towards career, attitudes towards luxury goods
Authors conclusions	Positive attitudes towards childbearing lead to earlier childbearing among men and women. These effects however are stronger for marital childbearing. Attitudes towards childbearing have very little effect on premarital childbearing behaviour. This finding supports a contingent consistency model in which attitudes do not effect behaviour when that behaviour is not socially supported.

Data extractor comments *(statement on quality which will be informed by data extraction and critical appraisal)*	Large national sample. Results are considered with regards to family influences and individual socio-economic influences Provides a social psychological perspective White married mothers only, excluded never married respondents (cohabitation increasing within society) No gender ratio provided with regards to the focal children included in the study – consequently the main effect for women respondents may be misleading Gender differences are not presented or considered

Section 2. Critical appraisal

For each question answer: Yes [Y] / Can't tell [?] / No [N]; and add explanatory notes where necessary

A/ What is this paper about?

1. Does the paper address a clearly focused issue?	
in terms of … • The population studied?	Y
• (case-control study only) Is the case definition explicit and confirmed?	
• The outcomes considered?	Y – childbearing behaviour
• Are the aims of the investigation clearly stated?	Y – aim stated with corresponding hypotheses

A/ Do you trust it?

2. Is the choice of study method appropriate?	Y

3. Is the population studied appropriate?	
• *(x-sec study)* Was the sample representative of its target population?	Y – parent child pairs
• *(cohort study)* Was an appropriate control group used – ie were groups comparable on important confounding factors?	
• *(case-control study)* Were the controls randomly selected from the same population as the cases?	
4. Is confounding and bias considered?	
• Have all possible explanations of the effects been considered?	Y
• Did the study achieve a good response rate?	85% of the whole sample.
• *(cohort study)* Were the assessors blind to the different groups?	n/a
• *(cohort study)* Could selective drop out explain the effect?	n/a
• *(x-sec study)* Were rigorous processes used to develop the survey questions/measures? (E.g. were the questions piloted/validated?)	No detail about how the survey was developed
• *(case-control study)* How comparable are the cases and controls with respect to potential confounding factors?	n/a
• *(case-control study*) Were interventions and other exposures assessed in the same way for cases and controls?	n/a
5. (Cohort study) Was follow up for long enough?	n/a
• Could all likely effects have appeared in the time scale?	
• Could the effect be transitory?	
• Was follow up sufficiently complete?	
• Was dose response demonstrated?	

C/ What did they find?

6. Are tables/graphs adequately labelled and understandable?	Y - limited corresponding text referring to the not significant results
7. Are you confident with the authors' choice and use of statistical methods, if employed?	Y – with regards to addressing the aims and the hypotheses of the investigation

D/ Are the results relevant locally?

8. Can the results be applied to the local situation? Consider differences between the local and study populations (eg cultural, geographical, ethical) which could affect the relevance of the study.	Study conducted in America, is likely to be applicable to UK setting. However, it is possible that economic and cultural differences may be having a significant affect. White married mothers only – increase in cohabitation in contemporary society Cannot specifically apply gender differences in attitudes as gender differences are not considered. Do not know how much men and women differ in their attitudes and how these differences influence behaviour
9. Were all important outcomes/results considered?	Y
10. Is any cost-information provided?	N

Appendix E: Exclusion criteria from abstracts and full texts

Inclusion Criteria	Exclusion Criteria
Paper included if it meets all of the following:	Paper excluded if it meets any of the following:
1. Examines a relationship between drivers and the outcome of delay or postponing childbearing	1. Concerns teenage pregnancy
2. Prospective or cross-sectional study	2. Concerns abortion
3. Quantitative data	3. Concerns reproductive decision making after illness or use of specialist fertility treatments 4. Concerns family size or completed family size 5. Concerns birth spacing 6. Concerns the desire for more children (i.e., not first birth) 7. Theory paper 8. Focuses solely on qualitative data (e.g. interviews and focus groups with no quantitative analysis) i.e., narrative analysis 9. Does not examine the relationship between drivers and outcomes. 10. Retrospective studies (e.g. after birth has occurred and parents are reflecting back on their drivers or intentions), unless they are also cross-sectional and use comparison groups.

Appendix F: Full regression tables

Table F1

Summary of regression for variables predicting likelihood of medical help-seeking intentions (N = 1345)

	Model 1			Model 2			Model 3			Model 4		
Variable	*B*	*SE B*	*β*	*B*	*B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
(Constant)	2.944	.042		2.912	.066		2.902	.080		2.893	.080	
At least University education	.227***	.057	.115	.162**	.058	.082	.161**	.057	.082	.161**	.057	.082
Mcquillan economic hardship index	.035	.029	.035	.058*	.029	.058	.063*	.029	.063	.067*	.029	.067
Having a BMI of 25 and above				.018	.058	.009	.031	.098	.015	.042	.098	.021
Smoking > 10 cigarettes per day				-.178	.079	-.065	-.041	.135	-.015	-.071	.137	-.026
Aged >34				-.010	.077	-.004	.299*	.129	.110	.300*	.131	.110
Trying to conceive for over 12 months				-.153**	.057	-.078	-.289**	.096	-.147	-.295	.096	-.150
Fertility Knowledge (0-100)				.186	.028	.190	.190***	.059	.194	.313***	.075	.320
Suspect you/partner has a fertility problem				.264***	.063	.132	.209	.173	.105	.666**	.251	.333
How fertile you think you are (1-5)				-.046	.030	-.047	-.043	.088	-.044	.230	.126	.207
Fertility knowledge X BMI ≥25							.006	.059	.003	-.095	.098	-.056
Fertility knowledge X smoke >10							.132	.077	.055	-.017	.132	-.007
Fertility knowledge X age >34							-.218**	.075	-.091	-.205	.139	-.086
Fertility knowledge X trying >12 months							-.014	.057	-.010	-.180	.094	-.134
Suspect problem X BMI ≥25							-.032	.130	-.014	-.033	.131	-.014
Suspect problem X smoke >10							-.235	.180	-.070	-.200	.182	-.060
Suspect problem X age >34							-.505**	.176	-.150	-.510	.178	-.151

*P<.05, **P<.01, ***P<.001

Table F1

Summary of regression for variables predicting likelihood of medical help-seeking intentions (N = 1345) (continued)

	Model 1			Model 2			Model 3			Model 4		
Variable	*B*	*SE B*	*β*	*B*	*B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Suspect problem X trying >12 months							.272	.127	.132	.292	.127	.141
How fertile X BMI ≥25							.120	.064	.075	.125	.064	.078
How fertile X smoke >10							-.094	.088	-.037	-.079	.088	-.031
How fertile X age >34							.009	.088	.003	.007	.088	.003
How fertile X trying >12 months							-.020	.063	-.015	-.008	.063	-.006
Fertility knowledge X suspect problem							.001	.003	.026	-.008	.004	-.265
Fertility knowledge X how fertile							.000	.001	-.024	-.005*	.002	-.303
Suspect problem X how fertile							.007	.067	.005	.001	.067	.001
BMI >25 X fertility knowledge X suspect problem										.157	.131	.071
BMI >25 X fertility knowledge X how fertile										.104	.064	.064
Smoke >10 X fertility knowledge X suspect problem										.240	.181	.079
Smoke >10 X fertility knowledge X how fertile										.020	.091	.008
Age >34 X fertility knowledge X suspect problem										-.032	.190	-.011
Age >34 X fertility knowledge X how fertile										.034	.094	.014
Trying > 12 months X fertility knowledge X suspect problem										.279*	.124	.170
Trying > 12 months X fertility knowledge X how fertile										.137*	.061	.104

P<.05, **P<.01, ***P<.001

Table F2.

Summary of regression for variables predicting likelihood of non-medical help-seeking intentions (N = 1345)

	Model 1			Model 2			Model 3			Model 4		
Variable	*B*	*SE B*	*β*	*B*	*B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
(Constant)	2.533	.037		2.434	.059		2.396	0.73		2.396	.073	
At least University education	.084	.051	.048	.062	.052	.035	.067	.052	.039	.063	.052	.036
Mcquillan economic hardship index	.049	.026	.056	.053*	.026	.060	.053*	.026	.060	.059*	.026	.067
Having a BMI of 25 and above				.125*	.052	.070	.069	.089	.038	.081	.089	.045
Smoking > 10 cigarettes per day				-.202**	.072	-.083	-.141	.122	-.058	-.226	.124	-.093
Aged >34				-.050	.070	-.021	.203.	.120	.084	.200	.122	.083
Trying to conceive for over 12 months				.096	.052	.055	.038	.087	.022	.061	.087	.035
Fertility Knowledge (0-100)				.098***	.026	.113	.100	.054	.115	.094	.068	.109
Suspect you/partner has a fertility problem				.081	.057	.046	.108	.158	.061	.046	.228	.026
How fertile you think you are (1-5)				-.046	.027	-.053	-.080	.081	-.093	-.004	.115	-.004
Fertility knowledge X BMI ≥25							.048	.054	.032	.062	.090	.041
Fertility knowledge X smoke >10							.030	.071	.014	-.221	.120	-.102
Fertility knowledge X age >34							-.104	.069	-.049	-.127	.127	-.060
Fertility knowledge X trying >12 months							-.013	.052	-.011	.066	.086	.056
Suspect problem X BMI ≥25							.055	.119	.027	.067	.119	.033
Suspect problem X smoke >10							-.066	.163	-.022	-.015	.165	-.005
Suspect problem X age >34							-.421**	.161	-.142	-.419*	.164	-.141

*P<.05, **P<.01, ***P<.001

Table F2

Summary of regression for variables predicting likelihood of non-medical help-seeking intentions (N = 1345) (continued)

Variable	Model 1			Model 2			Model 3			Model 4		
	B	*SE B*	*β*	*B*	*B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Suspect problem X trying >12 months							.115	.116	.063	.108	.116	.059
How fertile X BMI ≥25							.083	.058	.059	.088	.058	.062
How fertile X smoke >10							.044	.080	.020	.049	.080	.022
How fertile X age >34							.016	.080	.007	.020	.080	.009
How fertile X trying >12 months							-.049	.057	-.042	-.060	.057	-.051
Fertility knowledge X suspect problem							-9.845	.002	-.004	.001	.004	.029
Fertility knowledge X how fertile							.002	.001	.105	8.164	.002	.005
Suspect problem X how fertile							-.087	.061	.077	-.075	.061	-.067
BMI >25 X fertility knowledge X suspect problem										-.045	.121	-.023
BMI >25 X fertility knowledge X how fertile										.038	.059	.026
Smoke >10 X fertility knowledge X suspect problem										.381*	.165	.140
Smoke >10 X fertility knowledge X how fertile										-.041	.082	-.019
Age >34 X fertility knowledge X suspect problem										.050	.174	.019
Age >34 X fertility knowledge X how fertile										.126	.085	.059
Trying > 12 months X fertility knowledge X suspect problem										-.122	.114	-.084
Trying > 12 months X fertility knowledge X how fertile										.015	.055	.013.

P<.05, **P<.01, ***P<.001

Table F3

Summary of regression for variables predicting likelihood of intentions to change lifestyle (N = 722)

	Model 1			Model 2			Model 3			Model 4		
Variable	*B*	*SE B*	*β*	*B*	*B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
(Constant)	2.830	.079		2.600	.127		2.715	.153		2.687	.153	
At least University education	.341**	.111	.121	.337**	.114	.120	.341**	.115	.121	.349**	.115	.124
Mcquillan economic hardship index	.134*	.055	.097	.117*	.055	.085	.122*	.056	.088	.141*	.056	.102
Having a BMI of 25 and above				.435***	.117	.148	.250	.197	.085	.265	.197	.090
Smoking > 10 cigarettes per day				.204	.142	.058	.386	.234	.109	.274	.237	.077
Aged >34				.150	.152	.039	.200	.259	.052	.166	.259	.043
Trying to conceive for over 12 months				-.016	.113	-.006	-.273	.185	-.097	-.242	.186	-.086
Fertility Knowledge (0-100)				.148**	.056	.108	-.007	.113	-.005	.073	.142	.053
Suspect you/partner has a fertility problem				.055	.122	.019	-.205	.333	-.072	.067	.472	.024
How fertile you think you are (1-5)				-.006	.060	-.004	.007	.170	.005	.240	.244	.171
Fertility knowledge X BMI ≥25							.272*	.118	.112	.320	.198	.132
Fertility knowledge X smoke >10							.225	.141	.072	-.350	.231	-.113
Fertility knowledge X age >34							.010	.144	.003	.124	.248	.038
Fertility knowledge X trying >12 months							.034	.111	.018	-.032	.179	-.017
Suspect problem X BMI ≥25							.259	.266	.075	.277	.267	.081
Suspect problem X smoke >10							-.234	.318	-.054	-.104	.320	-.024
Suspect problem X age >34							-.117	.348	-.024	-.081	.350	-.017

*P<.05, **P<.01, ***P<.001

Table F3

Summary of regression for variables predicting likelihood of intentions to change lifestyle (N = 722) (continued)

Variable	Model 1			Model 2			Model 3			Model 4		
	B	*SE B*	*β*	*B*	*B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Suspect problem X trying >12 months							.454	.251	.152	.437	.252	.146
How fertile X BMI ≥25							.039	.131	.017	.072	.132	.031
How fertile X smoke >10							.034	.157	.011	.063	.158	.021
How fertile X age >34							.028	.169	.008	.037	.171	.011
How fertile X trying >12 months							-.012	.128	-.006	-.023	.130	-.012
Fertility knowledge X suspect problem							.001	.005	.016	-.004	.008	-.095
Fertility knowledge X how fertile							-.001	.003	-.057	-.006	.004	-.227
Suspect problem X how fertile							.087	.132	.046	.074	.132	.039
BMI >25 X fertility knowledge X suspect problem										-.171	.268	-.054
BMI >25 X fertility knowledge X how fertile										.015	.126	.007
Smoke >10 X fertility knowledge X suspect problem										.956**	.319	.243
Smoke >10 X fertility knowledge X how fertile										.107	.153	.036
Age >34 X fertility knowledge X suspect problem										-.211	.356	-.048
Age >34 X fertility knowledge X how fertile										.247	.174	.081
Trying > 12 months X fertility knowledge X suspect problem										.114	.241	.049
Trying > 12 months X fertility knowledge X how fertile										.051	.120	.028

P<.05, **P<.01, ***P<.001

Appendix G: Advertisements

General information

General information

General information

General information

Personal information

I drink more than 14 units of alcohol per week

(1 unit = small glass or wine, ½ pint of beer, 1 single measure of a spirit)

YES ☐

How old are you? ☐ Years of age

I have unprotected sex with multiple partners YES ☐

I have had a sexually transmitted infection YES ☐

I am more than 13 kilos (28 pounds/2 stone) overweight **YES** ☐

Personal information

I am a smoker, who regularly smokes more than 10 cigarettes a day **YES** ☐

Appendix H: Pre-experimental assessment

Please enter your participant ID number _____

What is your Cardiff University username (e.g., sap7aa or C12345678)? _____

About you

How old are you? _____

What is your country of residence? _____

What is your employment status?

Employed ○ Student ○ Unemployed ○

Other *(please state)*

_____

What is the highest level of education you have achieved?

- ○ No education
- ○ Primary school/Elementary school
- ○ Secondary school/High school
- ○ Post secondary school/trade or technical college (e.g., BTEC, NVQ, HND, HNC)
- ○ Undergraduate college or university (e.g., BA, BSC, BBA)
- ○ Graduate or postgraduate (e.g., MA, PhD)

Other (please specify)

_____

Are you in a relationship?

- ○ Yes
- ○ No

If you are in a relationship, please indicate if your partner is same-sex

Yes ○ No ○

If you are in a relationship, how long have you been together?

years _____ months _____

If you are in a relationship, and you live together, how long have you been living together?

years _____ months _____

Are you satisfied with your quality of life?

- ○ Very dissatisfied
- ○ Dissatisfied
- ○ Neither satisfied nor dissatisfied
- ○ Satisfied
- ○ Very satisfied

In general would you say your health is:

- ○ Poor
- ○ Fair
- ○ Good
- ○ Very good
- ○ Excellent

Do you suffer from (or have you ever suffered from) any of the following:

Cardiovascular disorders or diseases?
E.g., angina (chest pains), hardening of the arteries, low blood pressure, rapid/irregular hear beat, swelling of the ankles

Yes	No	Unsure
○	○	○

Respiratory disorders or disease?
E.g., restrictive and obstructive lung diseases, severe respiratory tract infections (pneumonia), tumours

Yes	No	Unsure
○	○	○

Alcohol or drug related disorders or diseases?
E.g., liver disease, substance abuse

Yes	No	Unsure
○	○	○

Diabetes?

Yes	No	Unsure
○	○	○

High blood pressure and/or cholesterol?

Yes	No	Unsure
○	○	○

Are you aware of any family history of cardiovascular disease?

Yes	No	Unknown
○	○	○

If YES, please specify if known

_____

Are you currently suffering from common cold symptoms?

Yes	No	Unsure
○	○	○

Are you currently taking any prescribed drugs/herbal medicines?

Yes	No	Unsure
○	○	○

If YES, please specify

_____

About your lifestyle habits

During a typical week, on how many days do you do **vigorous** physical activities?

Vigorous activities - these are activities that take hard physical effort. They make you breathe much harder than normal and may include heavy lifting, digging, aerobics or fast bicycling. Only count activities that you did for at least 10 minutes at a time.

Days per week _____ Hours on a typical day _____ Minutes on a typical day _____

During a typical week, on how many days do you do **moderate** physical activities?

Moderate activities - these are activities that take a medium amount of physical effort. They make you breathe a bit harder than normal and may include carrying light loads, bicycling at a regular pace or walking at a reasonable pace. Only count activities that you did for at least 10 minutes at a time.

Days per week _____ Hours on a typical day _____ Minutes on a typical day _____

For a typical week, please indicate the number of days that you consume the following:

Fruit (e.g., bananas, apples, mangoes, oranges, berries)

How many days in a week do you eat this kind of food? _____

Vegetables (e.g., carrots, broccoli, peas)

How many days in a week do you eat this kind of food? _____

Fried food (e.g., burgers, chips, fried chicken)

How many days in a week do you eat this kind of food? _____

High fat dairy food (e.g., cream, full-fat milk, cheese, butter, ice cream)

How many days in a week do you eat this kind of food? _____

How much do you weigh?

Stones _____ and pounds _____ OR kilos _____

What is your height?

Feet _____ and inches _____ OR centimeters _____

Do you consider yourself to be more than 13 kilos (28 pounds or 2 stone) overweight?

Yes ○ No ○

Do you drink alcohol?

Yes ○ No ○

If **YES**, please estimate the total number of units you drink **per week**

One unit = 1/2 a pint of lager/beer/cider **OR** a small glass of wine/sherry/port **OR** a single pub measure of spirit.

_____

Do you drink caffeinated drinks?

Yes ○ No ○

If **YES**, please estimate the total number of units you drink **per week**

One unit = one cup of coffee. **1/2 unit** = one cup of tea **OR** one can of soft drink (e.g., cola).

_____

Do you smoke (this includes smoking hand-rolled cigarettes)?

Yes ○ No ○

If **YES**, do you consider yourself a regular (smokes everyday) or social (does not smoke on a daily basis) smoker?

Regular ○ Social ○

If you consider yourself a **regular** smoker, how many cigarettes **per day** do you usually smoke?

_____

If you consider yourself a **social** smoker, how many cigarettes **per week** do you usually smoke?

_____

Are you sexually active?

- ○ Yes, I am currently or have previously been sexually active
- ○ No, I have never been sexually active

If **you are (or have been) sexually active**, when you have sexual intercourse do you use contraception?

- ○ Yes
- ○ No

If **YES**, what contraception do you use

_____
_____
_____

If **you are (or have been) sexually active,** have you ever had unprotected sexual intercourse?

- ○ Yes
- ○ No

If **you are (or have been) sexually active,** have you ever had a sexually transmitted infection?

- ○ Yes
- ○ No

About your fertility

Are you currently trying to get pregnant?

Yes ○ No ○

If **YES**, please state how long you have been trying to get pregnant.

Years _____ Months _____

Please tick the response below corresponding to how fertile you believe you are:

Not fertile ○ Slightly fertile ○ Moderately fertile ○ Very fertile ○ Extremely fertile ○

Please place a mark on the scale below to represent how confident you are that you would become pregnant if you tried to get pregnant:

Not at all confident ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Completely confident ○

Do you have any reasons to believe you may have difficulties getting pregnant OR do you have any (medical) problems that would affect your ability to have children?

Yes ○ No ○

If **YES**, what are these reasons?

Please list in order of importance

_____

_____

_____

_____

_____

About your childbearing intentions and desires

Please indicate to what extent you agree or disagree with the following statements using the response scale: strongly agree with statement to strongly disagree with statement.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Having a child is the most important thing in life	O	O	O	O	O
It's hard for me to imagine a life without children	O	O	O	O	O
Having a child is not necessary for my happiness	O	O	O	O	O
Couples without a child are just as happy as those with a child	O	O	O	O	O
Being a parent is one of the most important things a person can do	O	O	O	O	O
There is a certain freedom without children that appeals to me	O	O	O	O	O
Without a child I would be excluded from my community and social groups *(by community we mean your friends, colleagues and neighbours)*	O	O	O	O	O

How strong is your **desire** to have a child?

No desire at all O O O O O O O O O O Very strong desire O

If you have a **partner**, how strong do you believe is their **desire** to have a child?

No desire at all O O O O O O O O O O Very strong desire O

Do you intend to have a child in the future?

By intention we mean the actual behaviour of trying to get pregnant.

Yes ○ No ○

If YES, please indicate how strong your intention to have a child is:

No intention at all ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Very strong intention

What would be the best age for you to have a first child?

In the first line below please state the age that you consider to be **'too early'** for **you** to have a first child. In the second line, state the age that you think is the **'ideal or right time'** for **you** to have a first child. In final line, state the age that you consider to be **'too late'** for **you** to have your first child.

In each case the age might be your current age, younger than your current age or older than your current age.

Too Early _____ Ideal or right time _____ Too late _____ I do not intend to have children ○

What would be the best age for women in general to have a first child?

In the first line below please state the age that you consider to be **'too early'** for **women** to have a first child. In the second line, state the age that you think is the **'ideal or right time'** for **women** to have a first child. In final line, state the age that you consider to be **'too late'** for **women** to have a first child.

Too Early _____ Ideal or right time _____ Too late _____

What would be the best age for men in general to have a first child?

In the first line below please state the age that you consider to be **'too early'** for **men** to have a first child. In the second line, state the age that you think is the **'ideal or right time'** for **men** to have a first child. In final line, state the age that you consider to be **'too late'** for **men** to have a first child.

Too Early _____ Ideal or right time _____ Too late _____

We would be grateful for any comments or feedback you may have about the survey:

_____
_____
_____
_____
_____

Thank you for completing the survey, all your responses will be stored confidentially.

Please press submit and inform the experimenter you have completed the survey.

Once the study is completed your responses will be anonymised.

Appendix I: Daily behaviour diary

Daily Behaviour Diary

Thank you for completing the first stage of our study. You are now required to complete this lifestyle questionnaire for the next 3 days. Please complete the questions as honestly and accurately as possible. You may omit any questions you feel unable to answer. You will be sent a daily email which will remind you to fill in the lifestyle questionnaire. The questionnaire will take less than 5 minutes to complete each day.

What is your Cardiff University username (e.g., sap7aa or C12345678)?

_____

What is the date and time today (please state time using 24 hour clock e.g., 23:00)?

_____

Please state the number of cigarettes you have smoked in the past 24 hours

_____

Please state the number of alcohol units you have consumed in the past 24 hours.

One unit = 1/2 a pint of lager/beer/cider OR a small glass of wine/sherry/port OR a single pub measure of spirit.

_____

Have you done any moderate exercise in the past 24 hours?

If YES for how long did you exercise? These are activities that take moderate (a medium amount of) physical effort. They make you breathe a bit harder than normal and may include carrying light loads, bicycling at a regular pace or walking at a reasonable pace.

Please answer in minutes

_____

Have you done any vigorous exercise in the past 24 hours?

If YES for how long did you exercise? These are activities that take hard physical effort. They make you breathe much harder than normal and may include heavy lifting, digging, aerobics or fast bicycling.

Please answer in minutes

_____

Please tick if you ate any fruit in the past 24 hours

○ Yes
○ No

Please tick if you ate any vegetables in the past 24 hours

○ Yes
○ No

Please tick if you ate any fast food in the past 24 hours

○ Yes
○ No

Please tick if you ate any high fat dairy food in the past 24 hours

○ Yes
○ No

Please tick if you have had sexual intercourse in the past 24 hours

○ Yes
○ No

If YES, did you use any form of protection?

○ Yes
○ No

If Yes, what protection did you use?

_____

Thank you for completing your diary today

Appendix J: Diary evaluation

Daily Behaviour Diary

Thank you for completing the first stage of our study.

You are now required to complete this final lifestyle questionnaire.
Please complete the questions as honestly and accurately as possible. You may omit any questions you feel unable to answer.

The questionnaire will take approximately 5 minutes to complete.

What is your Cardiff University username (e.g., sap7aa or C12345678)?

_____

What is the date and time today (please state time using 24 hour clock e.g., 23:00)?

_____

Please state the number of cigarettes you have smoked in the past 24 hours

_____

Please state the number of alcohol units you have consumed in the past 24 hours.

One unit = 1/2 a pint of lager/beer/cider OR a small glass of wine/sherry/port OR a single pub measure of spirit.

_____

Have you done any moderate exercise in the past 24 hours?

If YES for how long did you exercise? These are activities that take moderate (a medium amount of) physical effort. They make you breathe a bit harder than normal and may include carrying light loads, bicycling at a regular pace or walking at a reasonable pace.

Please answer in minutes

_____

Have you done any vigorous exercise in the past 24 hours?

If YES for how long did you exercise? These are activities that take hard physical effort. They make you breathe much harder than normal and may include heavy lifting, digging, aerobics or fast bicycling.

Please answer in minutes

_____

Please tick if you ate any fruit in the past 24 hours

○ Yes
○ No

Finally, we would like to ask you a few questions about the study.

In your opinion what do you think the study was about?

_____
_____
_____
_____

Have you discussed any of the information presented to you in this study with other people?

- ○ Yes
- ○ No

If Yes, what were the main things you told others about?

_____

_____

_____

Did you find the information presented to you easy to understand?

- ○ Not at all easy to understand
- ○ Somewhat easy to understand
- ○ Easy to understand
- ○ Very easy to understand
- ○ Extremely easy to understand

How interesting was the information presented to you?

- ○ Not at all interesting
- ○ Somewhat interesting
- ○ Interesting
- ○ Very interesting
- ○ Extremely interesting

How believable was the information presented to you?

- ○ Not at all believable
- ○ Somewhat believable
- ○ Believable
- ○ Very believable
- ○ Extremely believable

To what extent did you feel the information was personally relevant to you?

- ○ Not at all relevant
- ○ Somewhat relevant
- ○ Relevant
- ○ Very relevant
- ○ Extremely relevant

Please would you let us know what parts you found personally relevant/irrelevant and why.

_____

_____

_____

To what extent did you feel that the information addressed you personally?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much

Did the information make you think about your fertility?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much

After being presented with the information did you feel worried about your fertility?

- ○ Not at all worried
- ○ Somewhat worried
- ○ Worried
- ○ Very worried
- ○ Extremely worried

Would you say that the information presented to you would encourage you to do any of the following?

If you smoke, reduce the number of cigarettes you smoke?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

If you smoke, consider quitting smoking?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

If you drink alcohol, monitor the number of units of alcohol you consume per week?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

If you drink alcohol, reduce the number of units of alcohol you consume per week?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

If you drink alcohol, consider quitting drinking alcohol?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

Maintain a healthy weight through a healthy diet?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

Maintain a healthy weight through regular exercise?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

Have a sexual health check up (e.g., test for sexually transmitted infections/diseases)?

- ○ Not at all
- ○ A little
- ○ Somewhat
- ○ Very much
- ○ Not applicable

Appendix K: Weekday and weekend effects

Weekday effects

Table K1 shows the percentage of people in each group who took part in the study on each of the days.

Table K1.

Percentage of people taking part in the study on each day.

	Group (%)			
Day of study	ConA	GenA	PerA	Total
Monday	7.9	10.4	7.9	26.2
Tuesday	7.9	7.9	6.1	22
Wednesday	6.1	4.3	6.7	17.1
Thursday	6.1	9.1	7.3	22.6
Friday	5.5	2.4	4.3	12.2
Total	33.5	34.1	32.3	

Unprotected sex

There was no effect of day when examining whether people did not use protection for day one of the behaviour diary (X^2 (4, N = 36) = 5.738, p = .220) (Figure K1), day two (X^2 (4, N = 32) = 7.940, p = .094) (Figure K2) or day three (X^2 (4, N = 33) = 5.785, p = .216) (Figure K3)

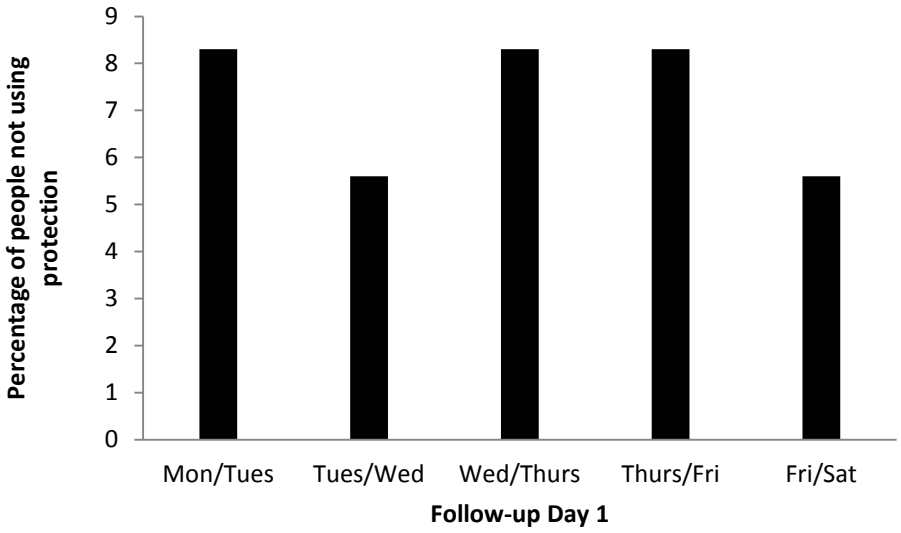


Figure K1. Number of people who had sexually intercourse without using protection on day one following the study.

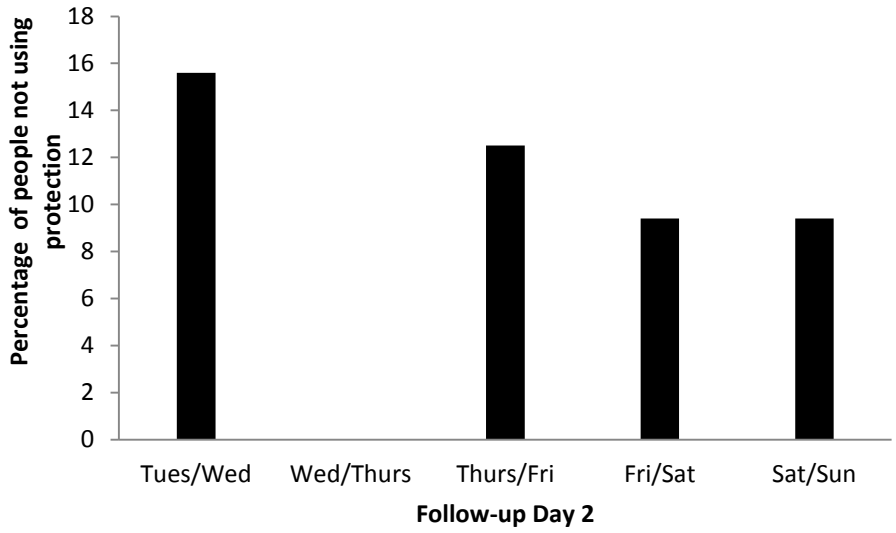


Figure K2. Number of people who had sexually intercourse without using protection on day two following the study.

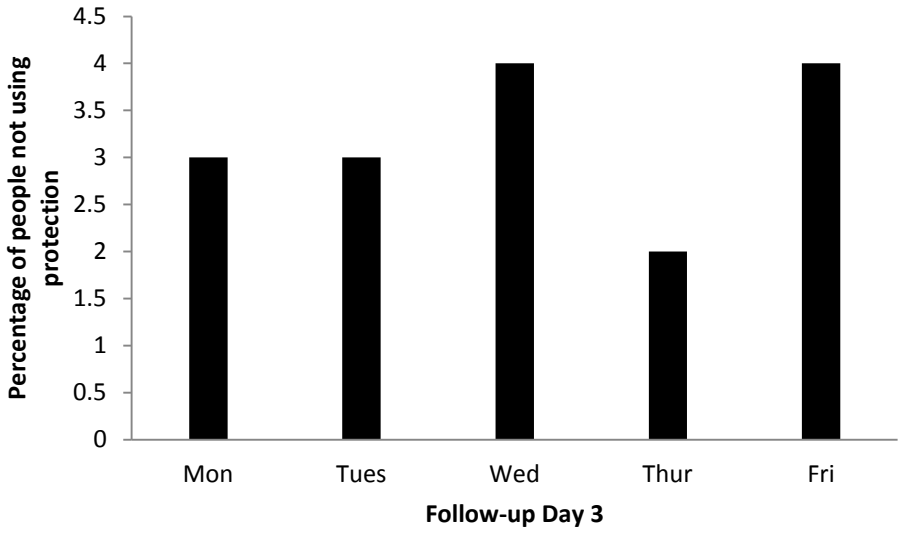


Figure K3. Number of people who had sexually intercourse without using protection on day three following the study.

Smoking

One-way between-subjects ANOVAs revealed that there was no effect of day of study with regards to how many cigarettes smokes on day one of behaviour diary (F (4, 142) = 1.005, p = .407) (Figure K4) , day two (F (4, 131) = .569, p = .686) (Figure K5) or day three *(*F (4, 119) = .618, p = .651) (Figure K6).

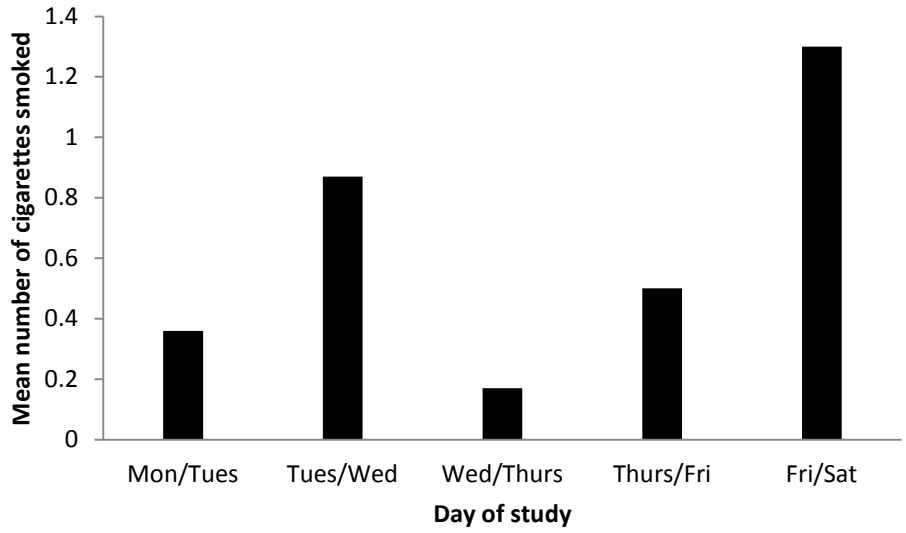


Figure K4. Mean number of cigarettes smoked on day one following the study.

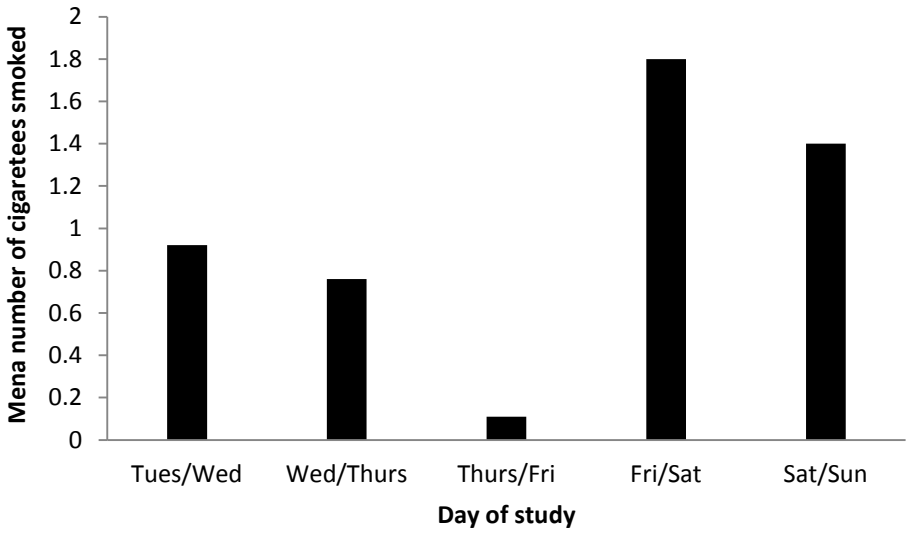


Figure K5. Mean number of cigarettes smoked on day two following the study.

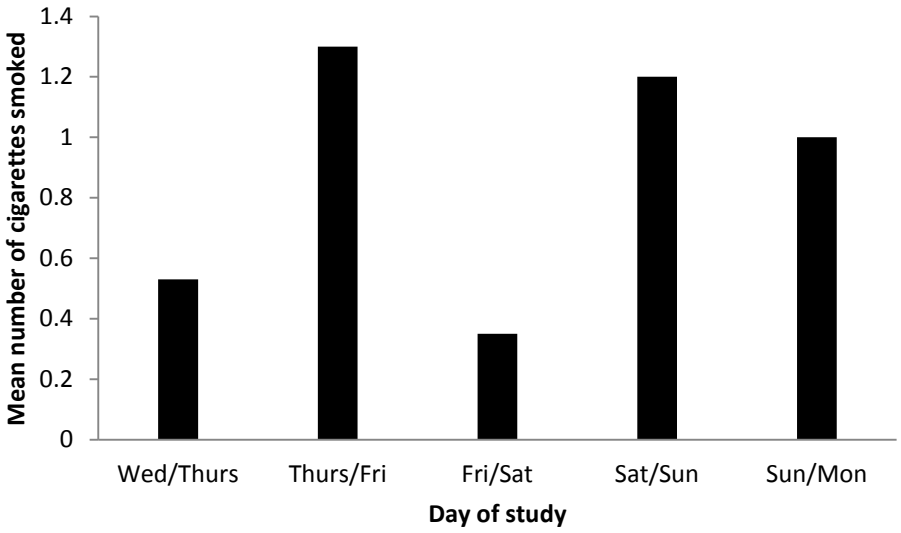


Figure K6. Mean number of cigarettes smoked on day three following the study.

Alcohol units

One way ANOVAs revealed a significant effect of day of study on alcohol units consumed for day one of the behavioural diary (F (4, 142) = 2.997, $p < .05$) (Figure K7). Employing the Tukey post-hoc test revealed that significantly more alcohol units were consumed by those who took part in the study on a Wednesday than those on a Monday (*M.diff* = 3.33, P < .05) or a Thursday (*M.diff* = 3.08, p < .05). No significant effect of day of study was found for day two of the behavioural diary (F (4, 132) = .845, p = .499) (Figure K8) while there was a significant effect of day of study on day three of the behavioural diaries (F (4, 119) = 3.806, p <.01) (Figure K9). Employing the Tukey post-hoc test revealed that marginally significantly more alcohol units were consumed on day three of the diary when taking part in the study on a Wednesday than a Monday (M.diff = 2.544, P = .059). Significantly more alcohol units were consumed when taking part in the study on a Wednesday than a Tuesday (M.diff = 3.42, p < .01) or a Friday (M.diff = 3.76, p < .01).

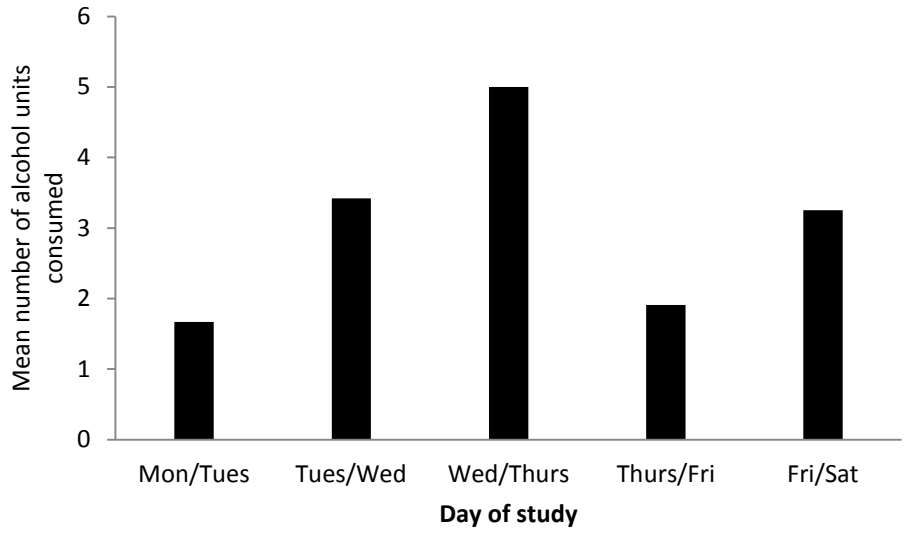


Figure K7. Mean number of alcohol units consumed on day one following the study.

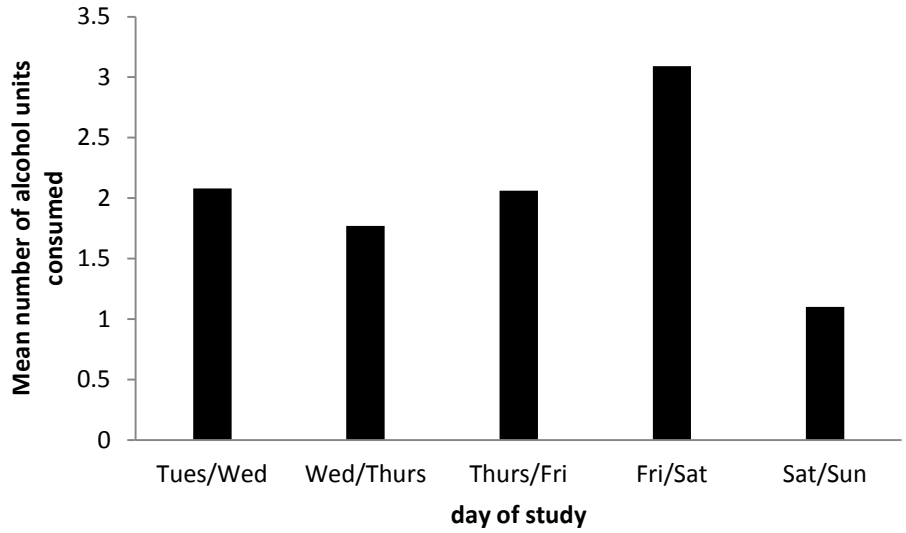


Figure K8. Mean number of alcohol units consumed on day two following the study.

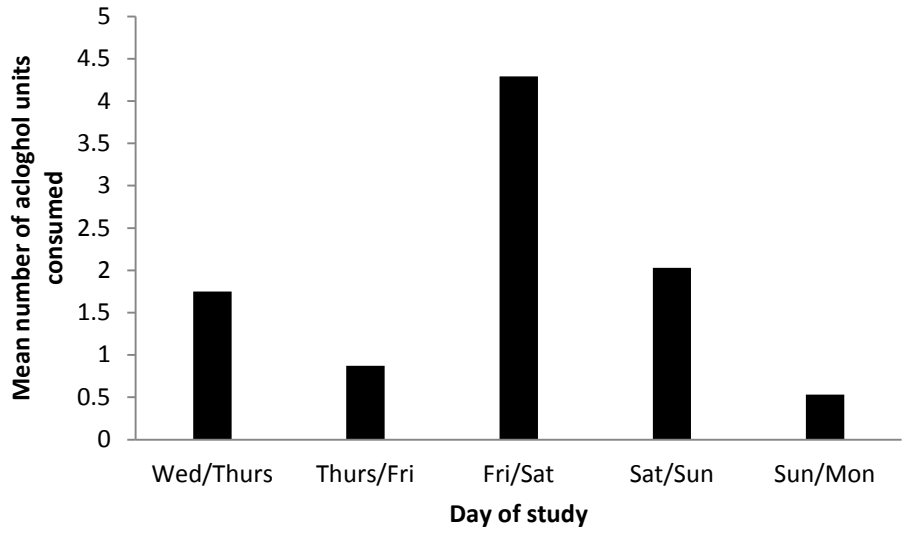


Figure K9. Mean number of alcohol units consumed on day three following the study.

Weekend effects

Table K2 shows the number of weekend effects for each day of the follow up for each of the three groups.

Table K2.

Percentage of follow-ups diaries completed on weekend days

	Completed follow-up diary on a weekend day (%)		
Follow-up day	ConA group	GenA group	PerA group
Day 1	19.0 (33.3)	19.0 (33.3)	19.0 (33.3)
Day 2	29.0 (34.1)	26.0 (30.6)	30.0 (35.3)
Day 3	29.0 (34.1)	26.0 (30.6)	30.0 (35.3)

Unprotected sex

There was no effect of weekend when examining whether people did not use protection for follow-up day 1 (X^2 (1, N = 36) = .825, p = .552), a marginal effect for follow-up day two (X^2 (1, N = 32) = .077, p = .078) and no significant effect for follow-up day three (X^2 (1, N = 33) = .221, p = .191) (Figure K10).

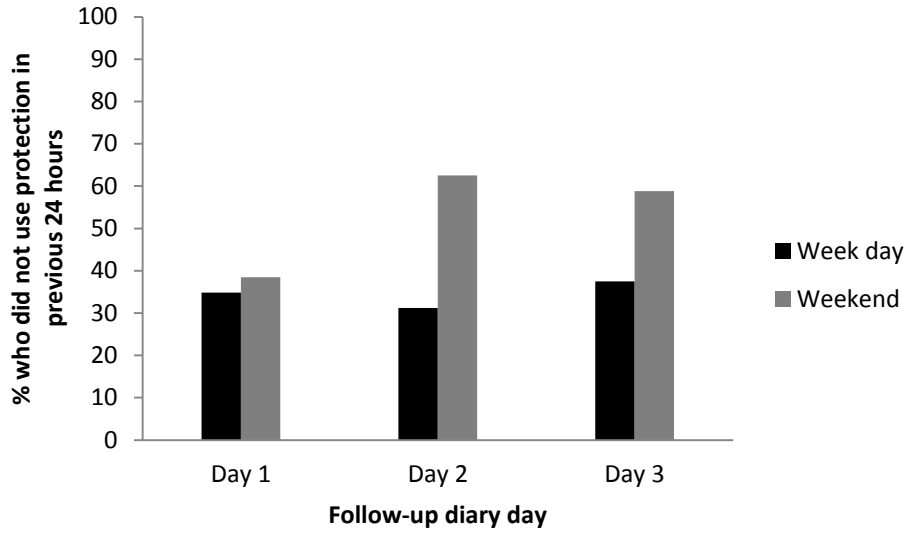


Figure K10. Percentage of people who did not use protection in the previous 24 hours according to whether the follow-up was completed on a week day or weekend.

Smoking

One-way between-subjects ANOVAs revealed there no effect of weekend on the number of cigarettes smoked for follow-up day 1 (F (1, 145) = .676, p = .412), follow-up day 2 (F (1, 134) = .318, p = .574) or follow-up day 3 (F (1, 122) = .014, p = .905) (Figure K11).

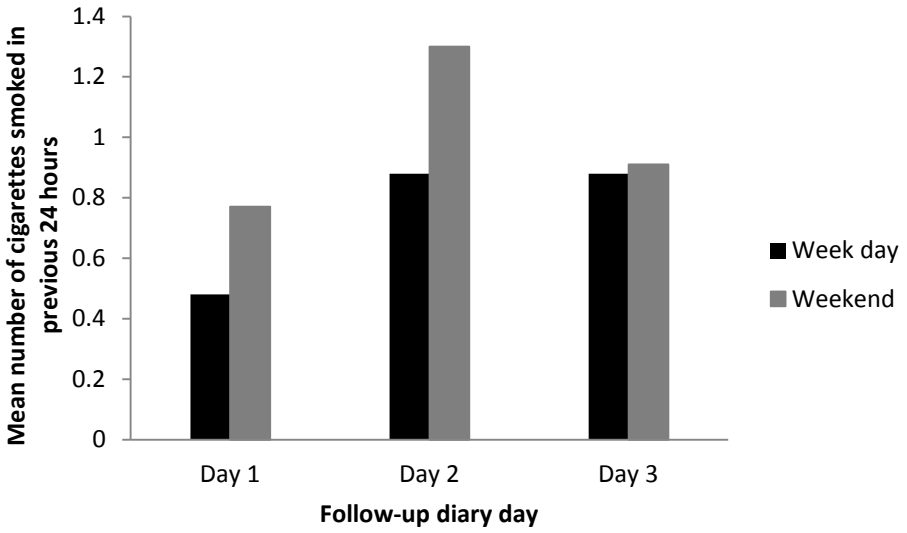


Figure K11. Mean number of cigarettes smoked in previous 24 hours according to whether the follow-up was completed on a week day or weekend.

Alcohol

One-way between-subjects ANOVAs revealed there was no effect of weekend on the number of alcoholic units consumed for follow-up day 1 (F (1, 145) = .848, p = .359), follow-up day 2 (F (1, 135) = .211, p = .647) or for follow-up day 3 (F (1, 122) = .1.951, p = .165) (Figure K12)

.

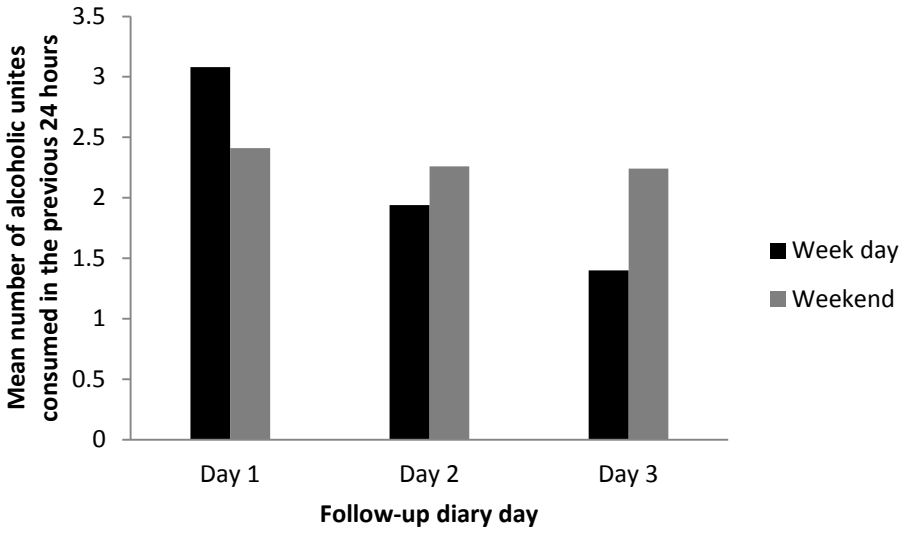


Figure K12. Mean number of alcohol units consumed in previous 24 hours according to whether the follow-up was completed on a week day or weekend.

Appendix L: Difference between groups for behaviour change

Differences between groups in positive and negative behaviour change

Chi-square tests were performed on all the data and exact significant tests are provided when cells have an expected count less than 5.

Unprotected sex

Chi-square tests revealed no significant difference between groups showing positive behaviour change on any of the follow-up days compared to baseline compared to baseline. (Table L1)

Table L1. *Percentage (n) of participants displaying positive behaviour change for unprotected sex from baseline to each of the three follow-up days.*

	Positive behaviour change (*n*)			
Follow-up day	ConA	GenA	PerA	χ^2 (*p*)
Day 1	28.6 (4)	35.7 (5)	35.7 (5)	.295 (1.0)
Day 2	28.6 (2)	42.9 (3)	28.6 (2)	.511 (1.0)
Day 3	25.0 (3)	33.3 (4)	41.7 (5)	3.795 (.158)

Chi-square tests revealed no significant differences between the groups with regards to negative behaviour change on each of the three follow-up days compared to baseline (table L2)

Table L2. *Percentage (n) of participants displaying negative behaviour change for unprotected sex from baseline to each of the three follow-up days.*

Negative behaviour change (*n*)				
Follow-up day	ConA	GenA	PerA	χ^2 (*p*)
Day 1	33.3 (1)	33.3 (1)	33.3 (1)	.442 (1.0)
Day 2	33.3 (1)	0 (0)	66.7 (2)	2.033 (.754)
Day 3	33.3 (1)	33.3 (1)	33.3 (1)	.870 (1.0)

Alcohol consumption

There was no comparison for day one as there were no participants who positively changed their alcohol consumption. Chi-square tests revealed a marginally significant difference in groups on day two, with a higher percentage of the PerA group positively changing their alcohol consumption from more than two units per day to two or less units χ^2 (2, N = 136) = 4.946, exact *p* = .084. There was no significant difference between groups on follow-up day three. (Table L3)

Table L3. *Percentage (n) of participants displaying positive behaviour change for alcohol consumption from baseline to each of the three follow-up days.*

Positive behaviour change (*n*)				
Follow-up day	ConA	GenA	PerA	χ^2 (*p*)
Day 1	0	0	0	-
Day 2	28.1 (9)	21.9 (7)	50.0 (16)	4.644 (.104)
Day 3	38.5 10)	19.2 (5)	42.3 (11)	2.440 (.291)

As with positive change, there was no data for follow-up day one with regards to negative behavior change as no participants changed their behaviour. Chi-square tests found no differences in negative behaviour change between groups on follow-up days two and three (Table L4)

Table L4. *Percentage (n) of participants displaying negative behaviour change for alcohol consumption from baseline to each of the three follow-up days.*

Negative behaviour change (*n*)				
Follow-up day	ConA	GenA	PerA	χ^2 (*p*)
Day 1	0	0	0	-
Day 2	19 (4)	47.6 (10)	33.3 (7)	4.019 (.128)
Day 3	35.7 (5)	35.7 (5)	28.6 (4)	.293 (.881)

Smoking

Chi-square tests revealed no significant change in positive behaviour between groups (table L5) or in negative behaviour (table L6).

Table L5. *Percentage (n) of participants displaying positive behaviour change for smoking from baseline to each of the three follow-up days.*

Positive behaviour change (*n*)				
Follow-up day	ConA	GenA	PerA	χ^2 (*p*)
Day 1	57.1 (4)	42.9 (3)	0	3.949 (.177)
Day 2	37.5 (3)	50.0 (4)	12.5 (1)	2.136 (.352)
Day 3	100 (1)	0	0	1.629 (1.0)

Table L6. *Percentage (n) of participants displaying negative behaviour change for smoking from baseline to each of the three follow-up days.*

Negative behaviour change (*n*)				
Follow-up day	ConA	GenA	PerA	χ^2 (*p*)
Day 1	50 (1)	0	50 (1)	1.181 (1.0)
Day 2	33.3 (1)	33.3 (1)	33.3 (1)	.010 (1.0)
Day 3	50 (1)	0	50 (1)	1.120 (1.0)

Appendix M: Behaviour change within groups

Unprotected sex

A McNemar test revealed no significant differences within the ConA group with regards to whether participants changed their behaviour in having unprotected sex between baseline and each follow-up day. Table M1 shows the percentage of participants in the ConA group who had not used protection at baseline and at each of the follow-up days. On follow-up day one, 57.1% changed from not using protection to using protection (N = 11, exact p = .375). On follow-up day two, 28.6% changed from not using protection to using protection (N = 10, exact p = 1.0) and on follow-up day three, 25% changed from not using protection to using protection (N = 15, exact p = .065).

Table M1. *Percentage (n) of people in ConA group who had unprotected sexual intercourse at baseline and at each follow-up day*

		Follow-up day (post intervention) If you had sex in the past 24 hours, did you use protection??					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Baseline: Used protection in the past?	Yes	75.0 (3)	25.0 (1)	66.7 (2)	33.3 (1)	66.7 (2)	33.3 (1)
	No	57.1 (4)	42.9 (3)	28.6 (2)	71.4 (5)	25.0 (3)	75.0 (9)
	Total per day (*n*)	11		10		15	

There were no significant changes in behaviour within the GenA group. Table M2 shows the percentage of participants in the GenA group who had not used protection at baseline and at each of the follow-up days. On follow-up day one 62.5% changed from not using

protection to using protection (N = 11, exact p = .219), on follow-up day two 42.9% changed (N = 10, exact p = .250) and on follow-up day three 66.7% changed (N = 7, exact p = .375)

Table M2. *Percentage (n) of people in GenA group who had unprotected sexual intercourse at baseline and at each follow-up day*

		Follow-up day (post intervention) If you had sex in the past 24 hours, did you use protection??					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Baseline: Used protection in the past?	Yes	66.7 (2)	33.3 (1)	100 (3)	0 (0)	0 (0)	100 (1)
	No	62.5 (5)	37.5 (3)	42.9 (3)	57.1 (4)	66.7 (4)	33.3 (2)
	Total per day (*n*)	11		10		7	

Finally there were no significant changes in behaviour within the PerA group. Table M3 shows the percentage of participants in the PerA group who had not used protection at baseline and at each of the follow-up days. On follow-up day one 71.4% changed from not using protection to using protection (N = 12, exact p = .219), on follow-up day two 66.7% changed (N = 10, exact p = 1.0) and on follow-up day three 83.3% changed (N = 10, exact p = .219)

Table M3. *Percentage (n) of people in PerA group who had unprotected sexual intercourse at baseline and at each follow-up day*

		Follow-up day (post intervention) If you had sex in the past 24 hours, did you use protection??					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Baseline: Used protection in the past?	Yes	80.0 (4)	20.0 (1)	71.4 (5)	28.6 (2)	75.0 (3)	25.0 (1)
	No	71.4 (5)	28.6 (2)	66.7 (2)	33.3 (1)	83.3 (5)	16.7 (1)
	Total per day (*n*)	12		10		10	

Alcohol units consumed

McNemar tests revealed that within the ConA group there were no significant differences, no participants changed from drinking more than 2 units per day to drinking 2 or less units ($N = 52$, exact $p = 1.0$). On follow-up day 2, 64.3% changed from more than 2 units to 2 units or less ($N = 48$, exact $p = .267$). On follow-up day three, 71.4% changed from more than 2 units to 2 or less units ($N = 46$, exact $p = .302$) (Table M4).

Table M4. *Percentage (n) of participants in ConA group who consumed more than 2 alcohol units per day pre and post experimental manipulation.*

		Follow-up day (post intervention) Consume more than 2 units in past 24 hours?					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Pre : Consume more than 2 units per day	Yes	100 (14)	0 (0)	35.7 (5)	64.3 (9)	28.6 (4)	71.4 (10)
	No	0 (0)	100 (38)	88.2 (30)	11.8 (4)	15.6 (5)	84.4 (27)
	Total per day(*n*)	52		48		46	

Within the GenA group there were also no significant differences. On follow-up day one no participants changed from drinking more than 2 units per day to drinking less (N = 47, exact p = 1.0). On follow-up day 2, 62.5% changed from drinking more than 2 units per day to drinking less (N = 42, exact p = .629). Finally, on follow-up day three, no participants changed (N = 38, exact p = 1.0) (Table M5)

Table M5. *Percentage (n) of participants in GenA group who consumed more than 2 alcohol units per day pre and post experimental manipulation.*

		Follow-up day (post intervention) Consume more than 2 units in past 24 hours?					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Pre : Consume more than 2 units per day	Yes	100 (15)	0 (0)	37.5 (3)	62.5 (5)	100 (21)	0 (0)
	No	0 (0)	100 (32)	16.7 (5)	83.3 (25)	0 (0)	100 (27)
	Total per day(*n*)	47		38		48	

Similarly, within the PerA group no significant differences were found. Follow-up day one showed that no participants changed ($N = 48$, exact $p = 1.0$). On follow-up day two 80% changed from more than 2 unites to 2 units or less ($N = 46$, exact $p = .093$). Finally on follow-up day three 68.8% changed from more than 2 units to 2 units or less ($N = 40$, exact $p = .118$) (Table M6)

Table M6. *Percentage (n) of participants in PerA group who consumed more than 2 alcohol units per day pre and post experimental manipulation.*

		Follow-up day (post intervention) Consume more than 2 units in past 24 hours?					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Pre : Consume more than 2 units per day	Yes	100 (21)	0 (0)	20.0 (4)	80.0 (15)	31.2 (5)	68.8 (11)
	No	0 (0)	100 (27)	26.9 (7)	71.3 (19)	16.7 (4)	83.3 (20)
	Total per day(*n*)	48		46		40	

Smoking

McNemar test revealed no significant differences in the ConA group between pre and post intervention. On follow-up day one 44.4% changed from smoked to did not smoke (N = 52, exact p = .375). On follow-up day two, 37.5% changed from smoked to did not smoke (N = 48, exact p = .625). On follow-up day 12.5% changed (N = 46, exact p = 1.0) (Table M7)

Table M7. *Number of participants in ConA group who smoked pre and post experimental manipulation.*

		Follow-up day (post intervention) Smoked in past 24 hours?					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Do you smoke?	Yes	55.6 (5)	44.4 (4)	62.5 (5)	37.5 (3)	87.5 (7)	12.5 (1)
	No	2.3 (1)	97.7 (42)	2.5 (1)	97.5 (39)	2.6 (1)	97.4 (37)
	Total per day (*n*)	52		48		46	

There were no significant differences found in the GenA group with regards to whether they changed smoking behaviours pre and post intervention. On follow-up day one, 50% changed from smoked to did not smoke (N = 47, exact p = .250). On follow-up day two, 80% changed (N = 42, exact p = .375). Finally on follow-up day three, no participants changed from smoked to did not smoke (N = 38, exact p = 1.0) (Table M8).

There were also no significant differences within the PerA group. On follow-up day one no participants changed from smoked to did not smoke (N = 48, exact p = 1.0). On follow-up day two 14.3% changed (N = 46, exact p = 1.0). Finally, on follow-up day three, no participants changed from smoked to did not smoke (N = 40, exact p = 1.0) (Table M9).

Table M8. *Number of participants in GenA group who smoked pre and post experimental manipulation.*

		Follow-up day (post intervention) Smoked in past 24 hours?					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Do you smoke?	Yes	50 (3)	50.0 (3)	20.0 (1)	80.0 (4)	100 (3)	0 (0)
	No	0 (0)	100 (41)	2.7 (1)	97.3 (36)	0 (0)	100 (35)
	Total per day (*n*)	47		42		38	

Table M9. *Number of participants in PerA group who smoked pre and post experimental manipulation.*

		Follow-up day (post intervention) Smoked in past 24 hours?					
		Day 1		Day 2		Day 3	
		Yes	No	Yes	No	Yes	No
Do you smoke?	Yes	100 (7)	0 (0)	85.7 (6)	14.3 (1)	100 (6)	0 (0)
	No	2.4 (1)	97.6 (40)	2.6 (1)	97.4 (38)	2.9 (1)	97.1 (33)
	Total per day (*n*)	48		46		40	

Appendix N: Gatekeeper letter

Address

Date

Dear

I am a postgraduate student in the School of Psychology, Cardiff University. As part of my degree I am carrying out a study on starting families. I am writing to enquire whether you would be willing to let me circulate a questionnaire on this topic to your staff.

The goal of this project is to better understand the range of factors that influence how people decide when to start a family. By doing this research we hope to achieve a comprehensive model of personal, social and health factors that lead to the decision to have a first child. We are currently recruiting males and females aged 18 to 49. We will be recruiting participants who do not currently have any children, are not currently pregnant or have a partner who is pregnant, and who are not currently trying to conceive. This is to enable us to ascertain which factors influence the decision to have a first child before people have actually started their efforts to conceive.

We would ask whether it would be possible to circulate the questionnaire to staff members in your company, either by way of an internet link, through a company notice-board or by paper copies of the questionnaire. The questionnaire takes between 10 and 15 minutes to complete. Because impressions of when is the best time to start a family change over time we will also ask those who complete the questionnaire to allow us to email them in three months to complete another (shorter) questionnaire on this topic. However, this is entirely voluntary and people are not required to provide their email addresses and can just fill out the current questionnaire if they wish.

The project has received ethical approval from School of Psychology Ethics Committee, Cardiff University. If you have any questions about this project then please contact the principal investigator Professor Jacky Boivin at cardifffertilitystudies@cardiff.ac.uk

Many thanks in advance for your consideration of this project. Please let me know if you require further information.

Regards,

Appendix O: Starting families questionnaire

Thank you for considering participation in the 'Starting Families Study'.

The goal of this project is to better understand the range of factors that influence how people decide when to start a family. By doing this research we hope to achieve a comprehensive account of personal, social and health factors that lead to the decision to have a first child.

We are currently recruiting:

· Men and women
· Aged 18 years and older

Who, at present:

· Do not have children, are not expecting a child and are not trying to get pregnant/father a child
· Are planning to have a child in the future.

The survey is divided into six parts that ask questions about your background (e.g., age, education), childbearing intentions and desires, social factors (e.g., opinions of those around you), individual factors (e.g., reasons for when to start a family), health factors (e.g., knowledge of fertility issues) and finally a section about where you are now. **The survey takes between 15 and 20 minutes to complete.** Because your impressions of when is the best time to start a family may change over time, we will ask you to allow us to email you in three months to complete another questionnaire on this topic. However, if you would rather not be contacted again you can just fill out the survey today.

Any information provided by you will be held anonymously unless you provide your email. If you provide an email, your email will be held according to the Data Protection Act and will be deleted after we have sent the second email in three months making your responses fully anonymous. All data will be stored on computers that are password-protected. Only Professor Boivin and the researcher Natasha Kalebic (postgraduate student of the School of Psychology) will have access to the data you provide. You can contact the research team and ask for your information to be deleted/destroyed at any time up until the data has been anonymised.

The project has received ethical approval from the School of Psychology Ethics Committee, Cardiff University. If you have any questions about this project then please contact the principal investigator Professor Jacky Boivin at cardifffertilitystudies@cardiff.ac.uk

Participation in this study is entirely voluntary and you are free to omit any questions you do not wish to answer or withdraw from the study at any time by closing the window.

After completing the survey you will be provided with additional information about the aims of the study.

THANK YOU FOR YOUR PARTICIPATION IN THIS IMPORTANT STUDY

I am over the age of 18 and consent to participation

○ **Yes**

	Yes	No
Do you have any children?	○	○
Are you currently pregnant or expecting a child?	○	○
Are you currently **trying** to get pregnant/father a child?	○	○
Do you **intend** to have a child in the future?	○	○

Part 1: About your background

1. Are you	Male ○	Female ○
2. How old are you?	_____	
3. What is your country of residence?	_____	
4. What is your country of origin?	_____	
5. What is your employment status?	○ Full time employment ○ Part time employment ○ Unemployed ○ Student ○ Retired ○ Other	
If you ticked 'other' to Q5, please state	_____	
6. What is the highest level of education you have achieved? (Please tick the highest category that applies)	○ No education ○ Primary/Elementary school ○ Secondary/High school ○ Post secondary school/trade or technical college (e.g. BTEC) ○ Undergraduate college or University ○ Graduate or Postgraduate ○ Other	
If you ticked 'other' to Q6, please state	_____	
7. Are you currently in a relationship?	Yes ○	No ○
If yes, how long have you been in the relationship?		
Years _____	Months _____	
If yes, are you currently living together?	Yes ○	No ○
If yes, how long have you been living together?		
Years _____	Months _____	
If you are in a relationship, is your partner same-sex	Yes ○	No ○

Part 2: Childbearing desires, intentions and timing

1. How strong is your desire to have a child? By desire we mean your wishes/want for a child Please indicate on the response scale where [0] means no desire at all and [10] means a very strong desire

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

2. If you have a partner, how strong do you believe their desire is to have a child ? Please indicate on the response scale where [0] means no desire at all and [10] means a very strong desire

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

3. How strong is your intention to have a child? By intention we mean the future behaviour of actually trying to get pregnant or father a child. Please indicate on the response scale where [0] means no intention at all and [10] means a very strong intention.

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

4. If you have a partner, how strong do you believe their intention is to have a child? Please indicate on the response scale where [0] means no intention at all and [10] means a very strong intention.

1	2	3	4	5	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○

5. When do you plan to **actively start trying** to have child? Please state in months or years **from today**. By actively trying we mean not just planning on having a child at some point but actually trying to get pregnant/father a child.

Years _____ Months _____

6. What would be the best age for **you** to have children?

In box 1 below please state the age before which you consider it to be 'too early' for **you** to have your first child. In box 2, state the age that you think is the 'ideal or right time' for **you** to have your first child. In box 3, state the age after which you would consider it to be 'too late' for **you** to have your first child.

In each case the age might be your current age, younger than your current age or older than your current age

TOO EARLY _____ IDEAL TIME _____ TOO LATE _____

7. What would be the best age for **women in general** to have children?

   In box 1 below please state the age before which you consider it to be 'too early' for **women in general** to have their first child. In box 2, state the age that you think is the 'ideal or right time' for **women in general** to have their first child. In box 3, state the age above which you would consider it to be 'too late' for **women in general** to have their first child.

TOO EARLY	IDEAL TIME	TOO LATE
_____	_____	_____

8. What would be the best age for **men in general** to have children?

   In box 1 below please state the age before which you consider it to be 'too early' for **men in general** to have their first child. In box 2, state the age that you think is the 'ideal or right time' for **men in general** to have their first child. In box 3, state the age after which you would consider it to be 'too late' for **men in general** to have their first child.

TOO EARLY	IDEAL TIME	TOO LATE
_____	_____	_____

Part 3: Social factors					
1. Below is a list of statements referring to possible reasons why you may think you want to start a family. Please read each statement and indicate to what extent you agree or disagree using the response scale: strongly disagree to strongly agree					
	Strongly disagree	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Strongly agree**
I feel I ought to have a child at some point in the future	○	○	○	○	○
If I can have a child, I think it would be wrong of me not to have one	○	○	○	○	○
Starting a family would bring me closer to family members who already have children	○	○	○	○	○
Starting a family would bring me closer to friends who already have children	○	○	○	○	○
Starting a family would lead to developing new friendships	○	○	○	○	○
Starting a family would make me more involved in community life	○	○	○	○	○
I would welcome the new social contacts that starting a family would bring	○	○	○	○	○
Without a child I would feel excluded from my community and social groups	○	○	○	○	○
Most of my friends or close family think I should start trying for a family	○	○	○	○	○
Generally speaking, I want to do what my friends or close family think is best	○	○	○	○	○
My parents think I should start trying for a family	○	○	○	○	○
Generally speaking, I want to do what my parents think is best	○	○	○	○	○
I feel under social pressure to start trying for a family	○	○	○	○	○

2. These days in the press and on the news we hear many reports concerning starting families. Please indicate how each statement makes you feel about intending to start a family

	Sooner than intended	Later than intended	No effect on intentions
Newspaper or magazine reports make me feel that I should be trying to start a family	○	○	○
Television reports (e.g. news programs, documentaries) make me feel that I should be trying to start a family	○	○	○
I think that newspaper and/or television reports make my close family or friends feel they should be trying to start a family	○	○	○
I think that newspaper and/or television reports make people in general feel they should be trying to start a family	○	○	○

3. The media and press often refer to 'older' and 'younger' mothers. What ages would you consider these to be?

An older mother would be older than _____

A younger mother would be younger than _____

The following 2 questions are based on age group. If you are **34 years or younger**, please complete **question 5** and skip question 6. If you are **35 years old or older**, please complete **question 6** and skip question 5

5. Please indicate to what extent you agree or disagree with the following statements using the response scale: strongly disagree with statement to strongly agree. **ONLY ANSWER THIS QUESTION IF YOU ARE AGED 34 OR YOUNGER**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I intend to have my first child **after** the age of 35	○	○	○	○	○
I intend to have my first child **before** the age of 35	○	○	○	○	○
I would prefer to have my first child **after** the age of 35	○	○	○	○	○
I would prefer to have my first child **before** the age of 35	○	○	○	○	○
I think it would be easier to have my first child **after** the age of 35	○	○	○	○	○
I think it would be easier to have my first child **before** the age of 35	○	○	○	○	○
Having my first child **after** the age of 35 would fit in better with my lifestyle	○	○	○	○	○
Having my first child **before** the age of 35 would fit in better with my lifestyle	○	○	○	○	○
People around me think it is better to wait to have a first child until **after** the age of 35	○	○	○	○	○
People around me think it is better to have a first child before the age of 35	○	○	○	○	○
I would be unhappy if I waited until **after** the age of 35 to have children	○	○	○	○	○

6. Please indicate to what extent you agree or disagree with the following statements using the response scale: strongly disagree with statement to strongly agree. **ONLY ANSWER THIS QUESTION IF YOU ARE AGED 35 OR OLDER**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I always intended to have my first child **after** the age of 35	○	○	○	○	○
I intended to have my first child **before** the age of 35	○	○	○	○	○
I would prefer to have my first child **after** the age of 35	○	○	○	○	○
I would have preferred to have my first child **before** the age of 35	○	○	○	○	○
I think it will be easier to have my first child **after** the age of 35	○	○	○	○	○
I think it would have been easier to have my first child **before** the age of 35	○	○	○	○	○
Having my first child **after** the age of 35 will fit in better with my lifestyle	○	○	○	○	○
Having my first child **before** the age of 35 would have fit in better with my lifestyle	○	○	○	○	○
People around me think it is better to wait to have a first child until **after** the age of 35	○	○	○	○	○
People around me think it is better to have a first child **before** the age of 35	○	○	○	○	○
I am unhappy that I waited until **after** the age of 35 to have my first child	○	○	○	○	○

Part 4: Individual factors

1. When thinking about starting a family what three things would you consider being the most important to you before you started trying to become pregnant/father a child. Please indicate in order of importance, with the first consideration being the most important:

   First

   _____

   Second

   _____

   Third

   _____

2. There are many things that people feel they need to achieve before planning to start a family. Please indicate how important each thing is to you using the response scale: Not at all important to extremely important

	Not at all important	Somewhat important	Moderately important	Very important	Extremely important
Finishing education or training	○	○	○	○	○
Having a stable career	○	○	○	○	○
Having financial security	○	○	○	○	○
Owning own home	○	○	○	○	○
Being in permanent employment	○	○	○	○	○
Feeling a strong desire for children	○	○	○	○	○
Feeling personally ready	○	○	○	○	○
Being with a suitable partner	○	○	○	○	○
Being with a partner who has a strong desire for children	○	○	○	○	○
Being with a partner who feels personally ready	○	○	○	○	○

3. There are also many concerns people have about starting a family. Please indicate to what extent you agree with the following statements using the scale: strongly disagree to strongly agree

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Starting a family now would cause financial strain or difficulties	○	○	○	○	○
Starting a family now would leave me with less freedom than I have now	○	○	○	○	○
Starting a family now would interfere with my career	○	○	○	○	○
Starting a family now would leave me with less freedom	○	○	○	○	○
Starting a family now would mean less time with a partner or friends	○	○	○	○	○
If I started a family now I would not be a good parent	○	○	○	○	○
I would find it hard to cope as a parent right now	○	○	○	○	○

4. Thinking about starting a family may evoke different emotions and feelings in different people. Please indicate to what extent you agree or disagree with each of the statements below using the scale: strongly disagree to strongly agree

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Starting a family now would be unwise of me	○	○	○	○	○
Starting a family now would be good for me	○	○	○	○	○
Starting a family now would be foolish of me	○	○	○	○	○
Starting a family now would be worthwhile to me	○	○	○	○	○
Starting a family now would be bad for me	○	○	○	○	○
Starting a family now would make me feel excited	○	○	○	○	○
Starting a family now would make me feel happy	○	○	○	○	○
Starting a family now would be easy for me	○	○	○	○	○

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I would feel I was missing something fundamental if I could not be a father/mother	○	○	○	○	○
I cannot see myself being a good father/mother	○	○	○	○	○
I would make a very good father/mother	○	○	○	○	○
Becoming a father/mother is very important to me	○	○	○	○	○
Becoming a father/mother would make me feel more fulfilled as a man/woman	○	○	○	○	○

Part 5: Health factors

1. Below are some statements relating to the physical side of starting a family. Please indicate to what extent you agree or disagree with each statement using the scale: Strongly disagree to strongly agree

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I feel broody when around children or thinking of starting my own family	○	○	○	○	○
I feel the pressure of time when I think about starting a family	○	○	○	○	○
I want to feel physically ready before I start trying for a family	○	○	○	○	○
I want to be with a partner who feels physically ready to start trying for a family	○	○	○	○	○
I want to feel at my optimum health before I start trying for a family	○	○	○	○	○
I want to be with a partner who feels at their optimum health before thinking about starting a family	○	○	○	○	○

2. There are many reasons people give for having children. Please read the statements below and indicate how important each one is to use using the scale: Not at all important to extremely important

	Not at all important	Somewhat important	Moderately important	Very important	Extremely important
Giving a partner the satisfaction of parenthood	○	○	○	○	○
Feeling the satisfaction of parenthood	○	○	○	○	○
Feeding a baby	○	○	○	○	○
Holding and cuddling a baby	○	○	○	○	○
Devoting much of my time to raising children and being a mother or father	○	○	○	○	○

The following 2 statements are for WOMEN ONLY

	Not at all important	Somewhat important	Moderately important	Very important	Extremely important
Giving birth to a baby	○	○	○	○	○
Feeling a baby move and kick inside me	○	○	○	○	○

Below are some general questions regarding fertility and getting pregnant/fathering a child			
3. Do you believe fertility (i.e., the ability to get pregnant) declines for women?	Yes ○	No ○	
	If yes, at what age do you think the decline starts? _____		
4. Do you believe fertility (i.e., the ability to father a child) declines for men?	Yes ○	No ○	
	If yes, at what age do you think the decline starts? _____		
5. Please read the following statements and indicate whether you think each statement is true or false (or mark 'do not know' if you are unsure).			
	True	False	Do not know
A woman's age is an important consideration in being able to get pregnant	○	○	○
A man's age is an important consideration in being able to father a child	○	○	○
A pregnancy after the age of 35 would be more physically demanding for a woman after the age of 35	○	○	○
A pregnancy after the age of 35 would be more emotionally demanding for a woman after the age of 35	○	○	○
A pregnancy after the age of 35 is more likely to result in complications such as increased risk of Down Syndrome or premature birth	○	○	○
Any decline in female fertility could be compensated by medical treatment (e.g. IVF or fertility drugs)	○	○	○
Any decline in male fertility could be compensated by medical treatment (e.g. IVF or fertility drugs)	○	○	○
A woman in her 40s has as much chance of getting pregnant as a woman in her 30s	○	○	○
A woman in her 30s has as much chance of getting pregnant as a woman in her 20s	○	○	○

Part 6: Where you are now

1. People often want to have a certain things in place before they start a family. Throughout this questionnaire we have asked you about certain goals and how important they are to you

We would now like to know how far along you feel you are in achieving some of these goals in relation to starting a family.

For example, If you have a job but feel you would like promotion before you start trying for a family you might mark 60%. However if you feel you have done all the education and/or training you want to achieve you may mark 100%

Finishing my education or training

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

Being in a good job (or stable career)

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

Having financial security

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

Being in a stable relationship

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

Being with a partner who wants to start a family

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

Being at the stage where I feel personally ready to start a family

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

Being at the stage where I feel physically ready to start a family

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
○ ○

As explained at the beginning of the survey, we would like to contact you in three months time to see if your opinions and impressions of when the best time is to start a family have changed. If you are happy for us to do this please provide an email address below.

Email address: _____

Decision making about starting families

Thank you for taking the time to complete this important survey.

Previous research has informed us that there are many preconditions that people feel they need to fulfill before they make the decision to start a family. These preconditions range from social considerations such as close friends having children to personal and individual considerations such as being with the right partner along with health considerations such as having children before a certain age. While there have been numerous studies examining these preconditions, thus far research has not told us whether individuals place more emphasis on social, individual or health factors or whether there is equal importance placed on all three factors.

By using the information you have provided us with, the present studies aims to achieve a comprehensive account of how social, personal and health factors interact and influence an individual's decision making about when to start a family.

The data you have provided will be held anonymously unless you provided your email address. Email addresses will be held according to the data protection act. After completion of the research (i.e., after the three month follow-up study) your email address will be anonymised. You have the right to withdraw your data at any time up until the data has been completely anonymised.

If you would like more information about fertility health issues or would like information about fertility medical care then please see the following websites:
http://www.fertility.com/ (except residents of Australia)
http://www.icsi.ws/
US residents should consult www.fertilitylifelines.com

(Cardiff University is not responsible for the content of these external internet sites)

If you have any further questions about this research then please contact Natasha Kalebic or Professor Jacky Boivin:

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Appendix P: Factor analysis

Initially, the factorability of the 13 social items, the 29 individual items and the 9 biological items were examined. The items needed to correlate at least .3 with at least one other item to suggest reasonable factorability. Principle components analysis was used to identify and compute composite scores for the factors underlying each of the sections of the questionnaire (i.e., social, individual and biological).

In reference to the two social scales, reliability analysis revealed an alpha of .830 for social benefits and .749 for social pressure and subjective norms. Table P1shows the factor loadings of the items onto the subscales.

In reference to the five individual scales, reliability analysis revealed an alpha of .803 for personal and relational readiness, .797 for economic preconditions, .817 for concerns about parenthood, .888 for positive feelings towards parenthood and .844 for parenthood aspirations. Table P2 shows the factor loadings of the items onto the subscales.

In reference to the two biological scales, reliability analysis revealed an alpha of .863 for feeling physically ready and .840 for physical aspects of parenthood. Table P3shows the factor loadings of the items onto the subscales.

Table P1. Factor loadings and communalities based on a principle components analysis for 13 social items from the starting families questionnaire (N = 945)

Social Items	**Social Benefits**	**Social pressure**
Starting a family would bring me closer to family members who already have children	.687	
Starting a family would bring me closer to friends who already have children	.728	
Starting a family would lead to developing new friendships	.812	
Starting a family make me more involved in community life	.783	
I would welcome the new contacts starting a family brings	.749	
I feel I ought to have a child at some point in the future		.780
If I can have a child I think it would be wrong of me not to		.847
Without a child I'd feel excluded from my community and social groups		.387
Most of my friends/family think I should start trying for a family		.883
Generally speaking, I want to do what my friends/family think is best		.907
My parents think I should start trying to start a family		.881
Generally speaking, I want to do what my parents think is best		.912
I feel under social pressure to start trying for a family		.760

Table P2. Factor loadings and communalities based on a principle components analysis for 29 individual items from the starting families questionnaire (N = 945)

Individual items	**Personal & relational preconditions**	**Economic preconditions**	**Concerns about parenthood**	**Positive feelings towards parenthood**	**Parenthood aspirations**
Be with a partner who feels personally ready	.846				
Be with a partner who has a strong desire for children	.803				
Feel personally ready	.715				
Feel a strong desire for children	.688				
Be with a suitable partner	.648				
Have a stable career		.866			
Have financial security		.811			
Be in permanent employment		.784			
Own own home		.638			
Finish education/training		.560			
Starting a family now would cause financial difficulties or strain			.658		
Starting a family now would leave me with less freedom than I have now			.719		
Starting a family now would interfere with my career			.786		
Starting a family now would mean less time with a partner or friends			.706		
If I started a family now I would not be a good parent			.639		
I would find it hard to cope as a parent right now			.806		

Table P2. Factor loadings and communalities based on a principle components analysis for 29 individual items from the starting families questionnaire (N = 945) (continued)

Individual items	**Personal & relational preconditions**	**Economic preconditions**	**Concerns about parenthood**	**Positive feelings towards parenthood**	**Parenthood aspirations**
Starting a family now would be unwise of me (recoded)				.825	
Starting a family now would be good for me				.812	
Starting a family now would be bad for me (recoded)				.808	
Starting a family now would be worthwhile to me				.803	
Starting a family now would be foolish of me (recoded)				.799	
Starting a family now would make me feel happy				.755	
Starting a family now would make me feel excited				.726	
Starting a family now would be easy for me				.639	
Becoming a father/mother would make me feel more fulfilled as a man/woman					.817
I would feel I was missing something fundamental if I could not be a father/mother					.806
Becoming a father/mother is very important to me					.796
I cannot see myself being a good father/mother (recoded)					.877
I would make a very good father/mother					.866

Table P3. Factor loadings and communalities based on a principle components analysis for 9 biological items from the starting families questionnaire (N = 945)

Biological Items	**Feeling physically ready**	**Physical aspects of parenthood**
I want to feel at my optimum health before I start trying for a family	.872	
I want to be with a partner who feels at optimum health before thinking about starting a family	.871	
I want to feel physically ready before I start trying for a family	.822	
I want to be with a partner who feels physically ready to start trying for a family	.802	
Holding and cuddling a baby		.861
Feeding a baby		.833
Feeling the satisfaction of parenthood		.792
Devoting much of my time to raising children and being a mother or father		.754
Giving a partner the satisfaction of parenthood		.661