

**A DYADIC APPROACH TO THE STUDY OF PERCEIVED
INFERTILITY AND CONTRACEPTIVE USE**

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NON-TECHNICAL SUMMARY

There is an increasing literature on women's perception of infertility and contraceptive use, with studies suggesting that it is related to unintended pregnancy. Little research investigates the correlates of perceived infertility, and quantitative investigation of couple-level perceived infertility appears absent from the literature, which is somewhat surprising, as infertility is a couple-level outcome. Furthermore, studies that relate to perceived infertility and use of contraception, or lack thereof, are typically limited to young adults. The present study aims to answer the following two research questions: (a) Are the factors that affect the perception of infertility among couples gendered? and (b) To what extent the perception of infertility affects contraceptive use? Drawing from previous literature, the factors associated with the perception of infertility are grouped in two main categories: biological factors (such as age and perceived health status) and life-course interference factors (such as the desire and intention to have children, parity status and type of relationship). Using data sourced from the Household Income and Labour Dynamics in Australia (HILDA) survey, binary and multinomial logistic regression models are estimated to analyse the association between these two groups of variables with perceived infertility and the association of perceived infertility with contraceptive use among 1,654 couples. The results indicate that both biological and life-course interference factors are strong predictors of the perception of infertility at the couple level and that women's characteristics are more influential than their partners' characteristics in determining this perception. Additionally, couples with perceived infertility are less likely to use contraception, regardless of their short-term intention and desire to have children. This is the first paper to explore factors associated with perceived infertility using dyads rather than individuals as the unit of analysis and to provide a detailed analysis of an unexplored yet relevant reason why couples do not use contraception (the perception of infertility) among a nationally representative sample of couples.



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ABSTRACT

Using data sourced from the Household Income and Labour Dynamics in Australia (HILDA) survey, binary and multinomial logistic regression models are estimated to analyse the correlates of perceived infertility, and the relationship between perceived infertility and contraceptive use of 1,654 couples. Results show that both biological and life-course interference factors are strong predictors of the perception of infertility at the couple level, with women's characteristics more influential than their partner's characteristics. Additionally, couples with perceived infertility are less likely to use contraception, regardless of their short-term intentions or desire to have a child.

Keywords: Perceived infertility, life course, contraception, childbearing desires, dyads.

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1. Introduction

There is an increasing literature on women's perception of infertility and contraceptive use, with many studies showing that it is related to unintended pregnancy (Gemmill 2018; Frohwirth, Moore & Maniaci 2013; Polis & Zabin 2012). Little research investigates the correlates of perceived infertility (Gemmill & Cowan 2021), and the quantitative investigation of couple-level perceived infertility appears absent from the literature, which is somewhat surprising, as infertility is a couple-level outcome. Some studies investigating the factors associated with perceived infertility, also included the perceived infertility of partners (Gemmill Sedlander & Bornstein 2020; Passet-Wittig *et al.* 2020), but due to data constraints they have not used the couple-dyad as the unit of analysis.

Perceived infertility, or low perceived susceptibility to pregnancy, is a major reason for unintended pregnancies occurring in the absence of contraception (Gemmill & Cowan 2021). The reason for this is that if individuals believe that they are at low risk of pregnancy, they may consider the use of contraceptives unnecessary. However, this provides a false sense of protection against unintended pregnancy for two main reasons. First, individual perceptions regarding their own infertility may not be accurate (Greil *et al.* 2014). Second, it has been shown that, even among couples with infertility, a natural conception can still occur after they cease trying to proactively conceive (Osmanagaoglu *et al.* 2002). This phenomenon is explained by the fact that infertility can be a temporary condition and not necessarily a permanent state. Most studies that relate to perceived infertility and use of contraception do not provide a comprehensive examination, as they are conducted with women who have unintended pregnancies and are often limited to young adults or university students (Polis and Zabin 2012; Gemmill 2018; Gemmill, Sedlande & Bornstein 2021).

In this paper, the correlates of perceived infertility are investigated and the association between perceived infertility and contraceptive use explored among a representative sample of Australian couples. The purpose is to understand the couple-level perceptions of infertility and their association with contraceptive use, specifically: (a) Are the factors that affect the perception of infertility among couples gendered? and, (b) To what extent does the perception of infertility affect contraceptive use? The data used to answer these questions are from the Household Income and Labour Dynamics in Australia (HILDA) survey, which provides a unique opportunity to investigate perceived infertility and contraceptive use as it contains reports from both members of a couple. This is the first paper to explore factors associated with perceived infertility using couple dyads rather than individuals as the unit of



analysis, and to investigate the relationship between perceived infertility and contraceptive use among a nationally representative sample.

2. Previous Research

Infertility is clinically defined as the failure to achieve a pregnancy after twelve months or more of regular and unprotected sexual intercourse (Zegers-Hochschild *et al.* 2017), whereas perceived infertility is a subjective measure that reflects individuals' beliefs regarding their own procreative ability and it is typically captured by social science surveys. Measures of perceived infertility and medical infertility are often not in agreement (Loftus 2009; Greil *et al.* 2010). Indeed, it was found that only about one in three women with infertility identifies as having a fertility problem (White *et al.* 2006), and that, by contrast, women may identify themselves as being infertile even if they do not meet the medical criteria for infertility (Polis & Zabin 2012).

Discrepancies between actual and perceived infertility are due to the existence of several non-medical factors that may affect people's belief regarding their own fecundity. The ways in which people make evaluations about their situation may vary as a function of their life-course goals (White *et al.* 2006). Previous studies drawing from the seminal work of Zola (1973) and Mechanic (1968) suggest that, at the individual level, symptom salience is an important predictor of perception of infertility (White *et al.* 2006) and of seeking help (Greil *et al.* 2013; Slauson-Blevins, McQuillan & Greil 2013). For women who wish to have a child, a lack of conception after unprotected sex is noticed and is often interpreted as a sign of infertility. In comparison women who have unprotected sex and who do not intend to become pregnant do not perceive infertility following the absence of pregnancy (Greil *et al.* 2010). In other words, infertility may not be perceived as a problem and it may even remain unnoticed, unless it interferes with individual fertility plans. The experience of infertility may be particularly distressing for women with no previous children (McQuillan *et al.* 2003; McQuillan, Stone & Greil 2007).

Relationship status is an important situational factor that can also affect one's ability to recognise the symptoms of infertility. Research has found that individuals are more likely to perceive infertility if they are in a relationship (Passet-Wittig *et al.* 2020; Polis *et al.* 2020; Gemmil & Cowan 2021) and that partnership stability and the partner's attitude toward childbearing can also affect one's ability to recognise the symptoms of infertility (Gemmil, Sedlander & Bornstein 2020; Passet-Wittig *et al.* 2020). These findings point at the inherently dyadic nature of the experience of infertility and confirm the importance of analysing infertility perceptions as a couple-level phenomenon. That the perception of



infertility is affected by life-course events is also evident by its instability over time (Passet-Wittig *et al.* 2020; Johnson *et al.* 2020).

Perceived infertility is a useful measure, as it reflects the meaning individuals make of their ability to reproduce, which provides a basis for understanding their fertility plans, intentions and behaviours (Shreffler *et al.* 2016; Johnson *et al.* 2020). Furthermore, the increasing literature on the relationship between susceptibility to pregnancy and contraceptive use illustrates its importance in the field of reproductive health. Several studies show that contraceptive use is more or less directly associated with the desire to have children: individuals in committed and long-term relationships manifest a lower desire to avoid pregnancy and higher fertility expectations (Barber *et al.* 2019; Wilson & Koo 2006; Weitzman *et al.* 2017) and, hence, are less likely to use contraception. However, the perception of low susceptibility to pregnancy may be another important mechanism explaining why women that do not intend to become pregnant cease using contraception (Gemmil 2018; Polis & Zabin 2012).

This paper builds on these previous two lines of research by investigating the association of couple's similarity and dissimilarity with respect to biological and life-course factors with perceived infertility, and, in turn, with contraceptive use. Data are sourced from the HILDA survey, which provides a unique opportunity to investigate perceived infertility and contraceptive use taking account of reports from both members of the couple. The data contains information that can inform the correlates of perceived infertility, as well as the relationship between perceived infertility and contraceptive use.

3. Theoretical Framework and Hypotheses

In this paper, the life-course approach (Elder 1994) is adopted as a framework through which to investigate perceived infertility and contraceptive use. In particular, we refer to an aspect that has received less attention in fertility research (Buhr & Huinink 2014; Settersten 2015): the core life-course principle of *linked lives*. Key transitions in life are linked to significant others: an individual's perception regarding the importance of becoming a parent and their expectation about when and if to have a child are influenced by the desires of other significant people, most importantly their partner.

Based on the literature review, the analysis focuses on two types of explanatory variables: biological factors and life-course interference factors, while also adjusting for standard socio-economic variables



and life satisfaction. Each of the two primary groups of factors has an individual-level and couple-level dimension, which is captured by measuring the degree of similarity or dissimilarity between partners.

Biological factors. The investigation of the correlates of perceived infertility notably calls for the inclusion of the biological factors that affect fecundity. The ability to reproduce naturally declines with age. For instance, it has been estimated that only 75% of women trying to conceive at age 30 will have a conception ending in a birth within one year, 66% at age 35, and 44% at age 40 (Leridon 2004). Age is an important factor affecting the procreative ability of both men and women, although the decline in fecundity with age is slower for men (Liu & Case 2011; Schmidt *et al.* 2012).

Hypothesis 1: The couple's likelihood of perceiving infertility will be positively associated with an increase in both partners' age, but couples in which the female partner is older than the male partner will be more likely to perceive infertility compared to couples where the male partner is older.

Self-reported health status has been identified as being associated with a number of lifestyle risk factors that predispose individuals to infertility, such as smoking and extremes body mass index (BMI), and as having a strong association with infertility (Kelly-Weder & Cox 2006). The medical literature has shown that men and women are just as likely to contribute to the couple's fecundity (Brugh & Lipshultz 2004; Isidori *et al.* 2006), suggesting that couples in which at least one partner is in poor health status should be more likely to perceive infertility compared to couples in which both partners are in good health, regardless of whether the person in poor health is the male or female partner.

Hypothesis 2: The couple's likelihood of perceiving infertility will be equally associated with men's and women's self-rated health status.

Life-course interference factors. Infertility may remain unnoticed and not be perceived as a problem, unless it interferes with the couple's plans to have a child. In other words, if couples do not wish to have a child, can they experience infertility and would they label themselves as infertile? While infertility has a negative impact on the life of both men and women wishing to have a child, research has shown that within a couple, women are more likely than men to see infertility as a distressing experience (Greil, Leitko & Porter 1988; Hjelmstedt *et al.* 1999). The effect of a dissimilarity in childbearing desires on the perception of infertility has not been explored yet. In Australia, when couples disagree about wanting a child, women tend to be more influential than men in fertility decision-making (Testa & Bolano 2021),



which may suggest that women's fertility desires have a greater importance in determining couple perceptions.

Hypothesis 3: The strength of a couple's desire to bear future children will be positively associated with its perception of infertility. Additionally, if partners disagree about wishing a child, women's childbearing desires will have more influence on the perception of infertility than men's childbearing desires.

Further, research suggests that a couple's reproductive history can be crucial for understanding the salience of infertility (Passet-Wittig & Greil 2021), with the inability to reproduce coming as a particularly distressing experience among couples with no previous children (McQuillan *et al.* 2003; McQuillan, Stone & Greil 2007).

Hypothesis 4: A couple with one or more children will be less likely to perceive infertility compared to a couple with no children.

The interference of infertility with personal plans may be higher among married couples. Indeed, despite the increase in cohabitation in Australia, the majority of childbearing still happens within marriage (Australian Bureau of Statistics, 2017) and marriage is the transition most commonly associated with entry into parenthood (McDonald & Reimondos 2013).

Hypothesis 5: The likelihood of perceiving infertility will be higher among married couples than among cohabiting couples.

Contraceptive Use. There is a growing body of literature suggesting that low susceptibility to pregnancy is related to lower contraceptive use, and, in turn, to a higher risk of unintended pregnancies (Gemmill 2018; Gemmill Sedlander & Bornstein 2020; Frohwirth *et al.* 2013; Polis & Zabin 2012). A substantial proportion (57%) of unintended pregnancies in Australia occurs among couples that do not use birth control measures (Taft *et al.* 2018). Although there are several reasons why couples do not use contraception, in Australia (2012-2013), one study found that infertility of the woman or her partner was the most common reason for not using contraception among women in their reproductive ages not wanting a child (16-49) (Richters *et al.* 2016).

Hypothesis 6: The likelihood of using contraception will be lower among couples with a perception of infertility.

The following framework considers the factors associated with perceived infertility and contraceptive use.

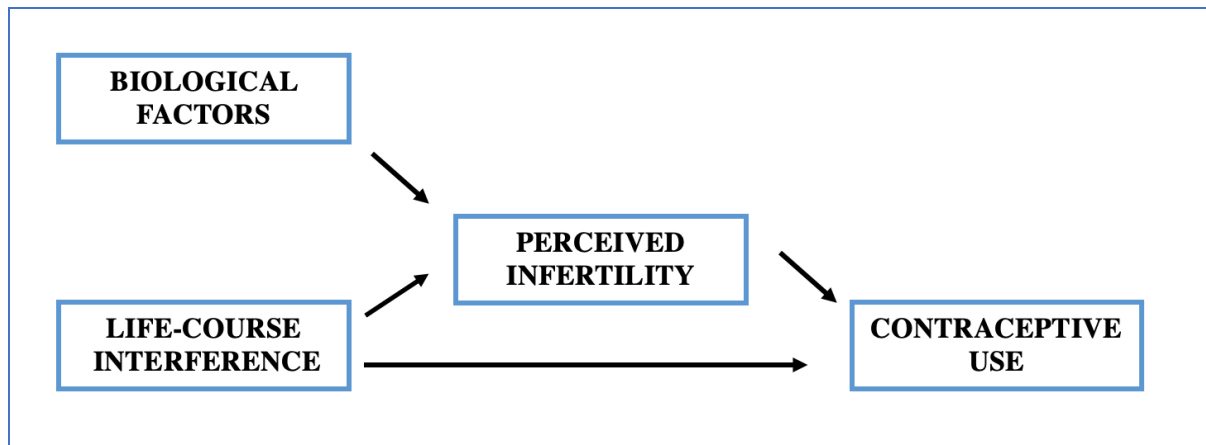


Figure 1. Factors associated with the perception of infertility and contraceptive use among couples.

4. Data

This study uses wave 19 of the HILDA panel study (<https://melbourneinstitute.unimelb.edu.au/hilda>), collected in 2019 (see Watson & Wooden (2012) for information on the scope of the HILDA study). Wave 19 is the most recent wave that includes a special fertility module with questions on: contraceptive use, desires and intentions to have children, infertility, and sterility which can be used to understand fertility plans and perceptions taking account of reports from both members of the couple. The analytical sample consists of heterosexual couples where both partners are of reproductive age (women between 15 and 44 and men between 15 and 54) and in which the female partner was not pregnant at the time of the interview. Those that mentioned having had an operation that makes it impossible to have a child were also excluded (n=413). The final analytical sample interviewed totalled 1,654 couples, who were legally married or in a cohabiting relationship (Table 1).



Table 1. Selection of the Analytical Sample

	Couples in reproductive years*
Total in selected age range in 2019 wave	2,491
Exclusions:	
Female partner pregnant	85
One or both partners sterile	413
Missing data on dependent variable	339
Total selected	1,654
Of whom:	
Perceiving infertility	271
Not using contraception	390

Dependent variables.

The first dependent variable was constructed based on the following question on perceived infertility: *Based on medical advice, do you know of any physical or health reason that would make it difficult for you (and/or your partner) to have [children / more children]?* This question was not asked to people that provided a positive answer to the following question on permanent infertility (or sterility): *Have you ever had any operation that makes it impossible for you (and/or your partner) to have [a child / more] children?* as these respondents were excluded. These questions distinguish between couples who perceive infertility, where at least one partner answered yes to the first question, and couples where it is impossible to conceive. We note that the prevalence of perceived infertility may be underestimated because the question asks whether the perception of the respondent is based on medical advice, and so it may exclude individuals that perceive that they are infertile but who did not consult a physician. Perceived infertility is a dichotomous variable, coded as 1 if at least one partner perceived infertility. The second dependent variable was derived from the following question on contraceptive use: *Do you (and your partner) use birth control measures? (That is, are you using some form of contraception, including natural methods such as the rhythm method?).* Contraceptive use is also a dichotomous variable, coded as 1 if at least one partner uses contraception.

Independent variables.

The explanatory variables included three biological factors (age, age difference between partners, and perceived health status) and three life-course interference factors (desire for children, parity, and type of relationship).



Age. This variable is based on the age group of the female partner. In a couple, the male and female partner's ages are highly correlated. Hence, including both variables in the model would lead to unreliable regression coefficients. The regressions were repeated using the male partner's age and no significant difference was found in the results (not shown).

Age Difference between Partners. This variable captures potential gender differences in the relationship between age and perceived infertility. Three categories are considered: the partners of the couple are three or less years of age apart, the female partner is three or more years older than the male partner, or the male partner is three or more years older than the female partner.

Perceived Health Status. The variable on perceived health status is computed by combining both partners' perceptions of their health status. The variable is based on a question asking respondents to rate their health status as: excellent, very good, good, fair, or poor. Respondents answering that their health status was excellent, very good, or good are considered to be in good health, while respondents answering any of the other two options are considered to be in poor health. Four categories are considered: both partners are in good health, the female partner but not the male partner is in good health, the male partner but not the female partner is in good health, or neither of the partners is in good health.

Parity. This variable is based on the number of children ever born to the female partner. Couples are counted as childless if the female partner does not have any children, of first parity if the female partner has only one child, and of parity two or above if the female partner has two or more children. Parity information is based on the female partner, as men tend to report the occurrence of births with more errors compared to women (Rendall et al. 1999). A robustness check (not shown) revealed that there was no significant difference in the findings using information based on the male partner's parity history, as in only a small proportion of couples (8%) partners reported a different number of children ever born.

Desire for Children. Couple desire about having a child is computed by combining both partners' desires to have children. The variable is derived from a question asking respondents to express their desire for one (more) child by choosing a number between 0 and 10, where a higher number indicates a stronger desire to have a child. A value above 4 has been considered as a sign of a strong desire to have a child. Different cut-points may also be used, however they cannot importantly affect the results, since fertility



desires tend to be polarized between those who definitely do not want to have a child and those who definitely want to have one (Wagner, Huinink & Liefbroer 2019). Such polarization can also be observed in the HILDA sample. Four categories are considered: neither of the partners wishes to have a child, the female partner but not the male partner wishes to have a child, the male partner but not the female partner wishes to have a child, or both partners wish to have a child.

Type of Relationship. The last predictor of interest is type of relationship, which indicates whether the couple is legally married or in a cohabitating relationship. This is a dichotomous variable, coded as 1 if the members of the couple are legally married.

In addition to the biological and life-course interference factors, control variables which are not of primary interest but that have been identified as influencing the perception of infertility or the use of contraception are also included.

Short-term Childbearing Intentions. To account for differences in motivation for pregnancy in the next twelve months, a measure of short-term childbearing intentions was added. This measure was grouped into four categories: neither of the partners has a short-term intention to have a child, the female partner but not the male partner has a short-term intention to have a child, the male partner but not the female partner has a short-term intention to have a child, or both partners have a short-term intention to have a child.

Life Satisfaction. Studies have shown that infertility is associated with lower levels of life satisfaction both at the individual and couple level (Klemetti et al. 2010; Luk & Loke 2015; McQuillan et al. 2007; Peterson, Newton & Rosen 2003). Additionally, life satisfaction might be an important confounding variable to control for as it is largely driven by personality traits (Schimmack *et al.* 2004). The variable is derived from a question asking respondents to express their satisfaction with their life by choosing a number between 0 and 10, where 0 indicates that the respondent is totally dissatisfied with life and 10 indicates that the respondent is totally satisfied with life. Since the variable is symmetrically distributed, it is dichotomised at the mean (Cohen 1983): coded as low if neither partner gave a score higher than 7.

Highest Level of Education. As previous research highlights that educational attainment is associated with contraceptive use (Frost, Singh & Finer 2007; Gemmill 2018) and with fertility knowledge and beliefs (Bunting, Tsibulsky & Boivin 2013; Gemmill & Cowan 2021), a two-category variable specifies whether both partners have a tertiary degree obtained through university.



Country of Birth. A large body of research, mainly from the United States, has shown that race has a well-established relationship with contraceptive use and fertility knowledge (Gemmill, Sedlander & Bornstein 2021; Yano, Lundsberg & Pal 2014). A four-category variable specifies whether both partners, the female partner only, the male partner only or neither partner were born in Australia or in another English speaking country.

Characteristics of both partners, and their similarity and dissimilarity, are analysed simultaneously in order to investigate gendered effects on the perception of infertility and contraceptive use. Table A1 in the Appendix shows the descriptive statistics for the measures used.

5. Methods

The analytical strategy employed to examine factors associated with both the perception of infertility and contraceptive use among couples is binomial logistic regression as both the dependent variables take the form of a discrete variable with two options. Then, to properly understand how perceived infertility and contraceptive use decisions of couples are influenced by life-course interference and biological factors, a multinomial logistic regression model was fitted. To do this, firstly a categorical variable was created from couples' answers to the perceived infertility and contraceptive use questions, with four values: 1 for couples that do not perceive infertility and use contraception, 2 for couples that do not perceive infertility and do not use contraception, 3 for couples that perceive infertility and use contraception, and 4 for couples that perceive infertility and do not use contraception. Since the response variable has no natural ordering, the subgroup of couples that do not perceive infertility and that use contraception was chosen as the reference category, as it corresponded to the highest-numbered sub-group (1,103). The fitted multinomial logistic model compares the reference to the remaining three subgroups, and investigates how the different life-course and biological factors affect couples' perceived fertility and contraceptive use simultaneously.

Partners were mostly concordant in their answers regarding the existence of a fertility problem and the non-utilization of contraception, with a disagreement rate of 8.5% and 9.5%, respectively. At all ages, women were more likely than men to perceive infertility, while the cases of disagreement were more symmetrically distributed across genders in the case of contraceptive non-use, with only slightly more women indicating that contraception was not used at ages 30-34 and above (Figure 2 and Figure 3). A sensitivity analysis sample was created, in which all cases of disagreement were excluded. Despite the p-

values being smaller due to the reduced sample size, coefficients maintained the same direction and remained statistically significant (not shown).

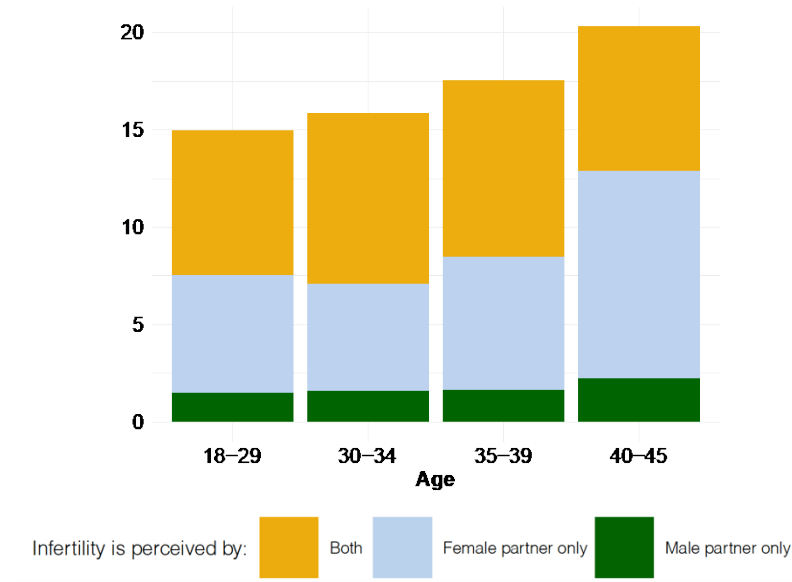


Figure 2. Congruence between partners' responses on perceived infertility, Australia, 2019.

Source: Authors' calculations using data from the HILDA survey, wave 19, release 19.

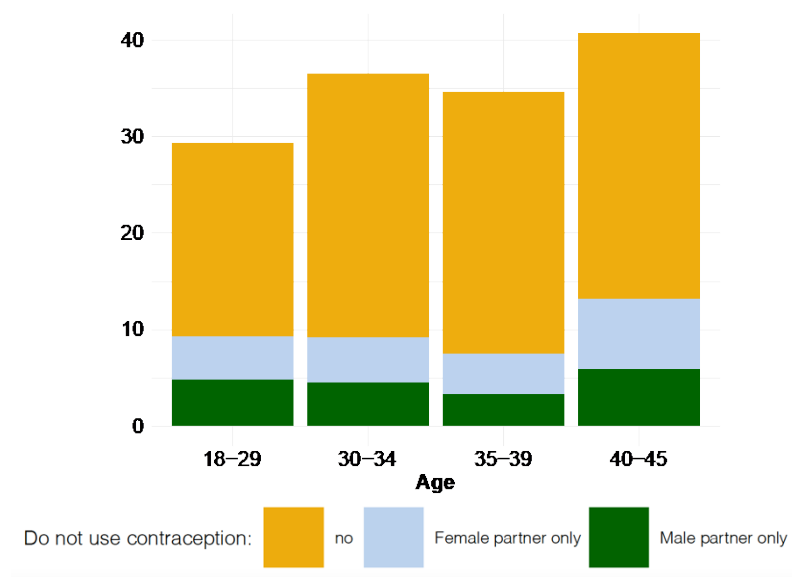


Figure 3. Congruence between partners' responses on contraceptive use, Australia, 2019.

Source: Authors' calculations using data from the HILDA survey, wave 19, release 19.



6. Results

Correlates of perceived infertility

The results for the binomial regression analyses are presented in Table 2. Model 1 shows the estimated coefficients of the two main sets of explanatory variables: biological and life-course interference factors. Model 2, 3, and 4 include the control variables. A clear gradient with age is found, with higher odds of perceiving infertility for couples in which the woman is aged 40-44 (2.34). Couples in which the woman is more than three years older than the man also have higher odds of perceiving infertility (2.04), while no statistically significant effect is observed when the man is older. Couples in which both partners perceive to be in good health are not significantly different from couples in which only the woman is in good health in the perception of infertility; by contrast, couples in which the woman or both partners perceive to be in poor health have a higher likelihood of perceiving infertility (2.96 and 6.48, respectively). In Model 4, couples in which the woman only or both partners have a strong desire for children are more likely to perceive infertility (odds ratio 1.66 and 1.52, respectively), while if only the man has a strong desire for children, the effect on perceived infertility is not statistically significant. Compared to couples with two or more children, couples with one or no children are more likely to perceive infertility, although the magnitude of the association is larger for couples with only one child (2.97). Compared to marriage, cohabitation is largely protective against the perception of infertility (0.65). Results from Model 4 largely parallel those from Model 1, with few differences. First, the effect of perceived health status is reduced after including life satisfaction, although it remains statistically significant, indicating its independent effect on the perception of infertility. Second, the inclusion of educational attainment accentuates the effect of age on perceived infertility. This is explained by the fact that the biological clock plays a greater importance for highly educated men and women due to their higher tendency to delay childbearing (Lazzari 2021). However, due to the existence of a marked negative educational gradient with perceived infertility (Gemmill, Sedlander & Bornstein 2021), these two effects partly compensate for each other before controlling for educational attainment, leading to a weaker effect of age on perceived infertility.

Regarding the control variables, couples in which at least one partner was tertiary-educated had a lower odds of perceiving infertility (0.62) compared to couples where both partners had lower levels of education. Couples in which the woman or both partners were born overseas had lower odds of perceiving infertility (0.23 and 0.30, respectively) compared to the reference category. High life satisfaction was associated with a significantly lower likelihood of perceiving infertility (0.50).



Table 2. Odds ratios and 95% confidence intervals assessing associations between selected characteristics and perceived infertility.

	Perceived infertility (N=1,654) Odds ratios & 95% CI			
	Model 1	Model 2	Model 3	Model 4
<i>Biological factors</i>				
Age¹				
18-24 (ref.)	1.00	1.00	1.00	1.00
25-29	1.26 (0.78, 2.06)	1.32 (0.81, 2.14)	1.37 (0.84, 2.24)	1.48 (0.90, 2.42)
30-34	1.21 (0.72, 2.03)	1.24 (0.74, 2.10)	1.38 (0.82, 2.32)	1.47 (0.86, 2.49)
35-39	1.71 (0.97, 3.01)	1.72 (0.98, 3.05)	2.03** (1.15, 4.61)	2.37** (1.33, 4.24)
40-44	2.34** (1.28, 4.29)	2.36** (1.28, 4.34)	2.82*** (1.53, 5.21)	3.27*** (1.75, 6.13)
Age difference				
No difference (ref.)				
W more than 3 years older	2.04** (1.18, 3.52)	2.08** (1.20, 3.61)	1.89* (1.09, 3.28)	1.88* (1.07, 3.29)
M more than 3 years older	1.06 (0.78, 1.44)	1.07 (0.79, 1.46)	1.04 (0.77, 1.42)	1.14 (0.84, 1.57)
Perceived health status				
Both good (ref.)	1.00	1.00	1.00	1.00
W good, M poor	1.17 (0.70, 1.95)	1.00 (0.59, 1.69)	1.05 (0.62, 1.76)	0.86 (0.51, 1.47)
W poor, M good	2.96*** (1.97, 4.44)	2.57*** (1.69, 3.91)	2.78*** (1.85, 4.19)	2.26*** (1.47, 3.48)
Both poor	6.48*** (3.12, 13.41)	4.84*** (2.91, 12.55)	6.04*** (2.17, 9.89)	4.50*** (2.11, 9.62)
<i>Life-course interference factors</i>				
Desire for children				
Both low (ref.)	1.00	1.00	1.00	1.00
W high, M low	1.64 (0.96, 2.80)	1.61 (0.94, 2.75)	1.61 (0.94, 2.74)	1.66* (0.96, 2.87)
M high, W low	1.27 (0.72, 2.21)	1.24 (0.71, 2.15)	1.25 (0.72, 2.19)	1.26 (0.72, 2.22)
Both high	1.42 (0.95, 2.13)	1.46* (0.98, 2.20)	1.47* (0.98, 2.20)	1.52* (1.01, 2.29)
Parity¹				
Zero	1.79** (1.20, 2.68)	1.77** (1.18, 2.65)	1.92*** (1.28, 2.88)	2.05*** (1.36, 3.09)
One	2.67*** (1.82, 3.94)	2.63*** (1.79, 3.88)	2.80*** (1.90, 4.12)	2.97*** (2.00, 4.40)
Two or more (ref.)	1.00	1.00	1.00	1.00
Type of relationship				
De facto	0.77 (0.60, 1.11)	0.74 (0.54, 1.01)	0.74* (0.55, 1.01)	0.65** (0.47, 0.90)
Married (ref.)	1.00	1.00	1.00	1.00
<i>Controls</i>				
Highest level of education				
Less than university (ref.)			1.00	1.00
University			0.53*** (0.37, 0.77)	0.62* (0.43, 0.90)
Country of birth				
Both Australians (ref.)				1.00
Only M born overseas				0.70 (0.33, 1.49)
Only W born overseas				0.22** (0.09, 0.58)
Both born overseas				0.30*** (0.15, 0.59)
Life satisfaction				
Low or normal (ref.)		1.00		1.00
High		0.56*** (0.40, 0.78)		0.50*** (0.36, 0.71)
AIC	1412	1403	1401	1372
BIC	1499	1495	1493	1486
Mc Fadden's R-square	0.065	0.062	0.073	0.098
Mc Fadden's R-square Adj	0.043	0.0749	0.050	0.070

Note: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. ¹Based on female respondent. Source: Authors' calculations using data from the HILDA survey, wave 19, release 19.



Association between perceived infertility and contraceptive use

In Table 3, Model 1 shows that the perception of infertility is a strong predictor of not using contraception at the couple level (0.37). Using a predicted probability approach, it is estimated that the perception of infertility increases the probability of not using contraception from 19% to over 35%. When all control variables are added (Model 2), the association between perceived infertility and contraceptive use remains significant. As expected, there is also a strong association between childbearing desires and contraceptive use, with women's childbearing desires more influential in the decision to use contraception than men's childbearing desires (0.43 and 0.69, respectively).



Table 3. Odds ratios and 95% confidence intervals assessing associations between selected characteristics and contraceptive use.

Contraceptive use (N=1,654) Odds ratios & 95% CI		
	Model 1	Model 2
Perceived infertility (PI)		
Yes	0.37*** (0.28, 0.49)	0.42*** (0.31, 0.57)
No (ref.)	1.00	1.00
Age¹		
18-24 (ref.)		1.00
25-29		0.87 (0.55, 1.39)
30-34		0.57* (0.36, 0.93)
35-39		0.49** (0.29, 0.82)
40-44		0.32*** (0.18, 0.57)
Desire for children		
Both low (ref.)		1.00
W high, M low		0.43*** (0.27, 0.70)
M high, W low		0.69*** (0.41, 1.17)
Both high		0.43*** (0.29, 0.64)
Short-term intention to have children²		
Neither (ref.)		1.00
W only		0.39*** (0.22, 0.69)
M only		0.42** (0.25, 0.73)
Both		0.19*** (0.13, 0.28)
Parity¹		
Zero		1.22 (0.85, 1.76)
One		1.41 (0.97, 2.05)
Two or more (ref.)		1.00
Type of relationship		
De facto		1.23 (0.92, 1.63)
Married (ref.)		1.00
Highest level of education		
Less than university (ref.)		1.00
University		1.47* (1.08, 2.00)
AIC	1763	1620
BIC	1774	1706
Mc Fadden's R-square	0.026	0.121
Mc Fadden's R-square Adjusted	0.024	0.103

Note: Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

¹Based on female respondent.

²Intention to have a child in the next 12 months.

Source: Authors' calculations using data from the HILDA survey, wave 19, release 19.



Perceived infertility and contraceptive use sub-groups

On a broad level, 66.7% (1,103 couples) of the analytic sample reported not perceiving infertility and using contraception, which was the most common subgroup. The other groups consisted of 16.9% (280) of couples that did not perceive infertility and did not use contraception, 9.7% (161) that perceived infertility and used contraception, with the remaining 6.7% (110) of the sample reporting that they perceived infertility and did not use contraception. The full table of coefficients with the base category of not perceiving infertility and using contraception is in the Appendix Table A1. For ease of interpretation, Figure 3 shows the predicted probabilities for a selected group of variables obtained from the multinomial regression model comparing perceived infertility and contraceptive use subgroups, holding all the other variables at their averages. The full table of predicted probabilities is in the Appendix Table A2. With age there is an increase in the probability of perceiving infertility. For instance, 14% of couples in which the female partner is aged 40-44 perceive infertility and do not use contraception, compared to only 2% at age 18-24. Another 10% of couples at age 40-44 perceives infertility and uses contraception compared to 7% at age 18-24. The probability of not using contraception increases with age even in the absence of a perception of infertility, from 13% in the youngest age group to over 20% in the oldest age group. Perceived health status is another key driver of the perception of infertility and of using contraception. The probability of belonging to the most common group of couples that does not perceive infertility and uses contraception markedly declines if the female partner or both partners perceive to be in poor health, from 73% to 61% and 48% respectively, while the probability of belonging to the two groups of couples with positive infertility perceptions increases, from 7% to 22% for the group that perceives infertility and uses contraception, and from 4% to 16% for the group that perceives infertility and does not use contraception. As expected, a stronger desire for children increases the predicted probability of not using contraception from 10% to 19%, but also of perceiving infertility and not using contraception, from 2% to 7%. This indicates that the desire for children affects contraceptive use in two different ways: directly and indirectly through the perception of infertility. Couples with one or no children have a higher predicted probability of identifying as infertile compared to couples with two or more children.

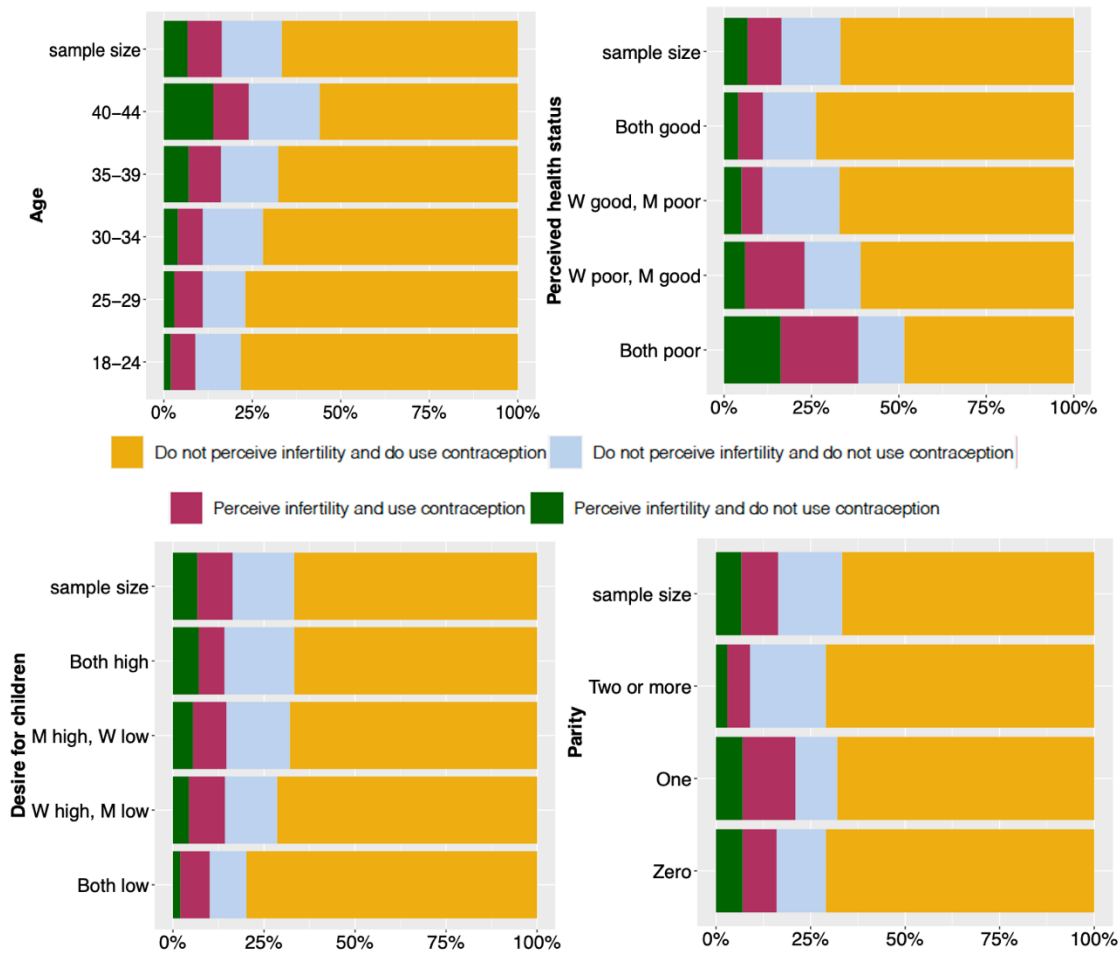


Figure 3. Stacked bar plots for the predicted probability of selected explanatory variables, Australia, 2019.

Source: Authors' calculations using data from the HILDA survey, wave 19, release 19.

7. Discussion

While prior studies are hampered by the use of non-representative samples and by paying only limited attention to the male partner, this study has gone beyond the state-of-the-art by being the first to comprehensively analyse the correlates of perceived infertility among a nationally representative sample of couples and to demonstrate a significant correlation between perceived infertility and contraceptive use. Taken together, the findings suggest that the perception of infertility is only partly driven by the actual biological inability to conceive and that life-course interference factors are also among its drivers. Although consistent with previous research at the individual level showing that the recognition of an infertility problem depends on the degree to which it disrupts personal plans (White *et al.* 2006), the present study has also unveiled new insights into how self-perceptions regarding infertility



are formed within the couple and how they are associated with contraceptive use. It was demonstrated that the correlates of perceived infertility are gendered, as the characteristics of the female's partner appear to be more influential than those of the male's partner in determining a perception of infertility at the couple level. Additionally, evidence was found on how the perception of infertility is a relevant reason why couples that do not wish to have a child do not use contraception.

More specifically, consistently with Hypothesis 1, age was an important factor affecting the perception of infertility, and couples in which the female partner was older than the male partner were almost twice as likely to perceive infertility compared to couples where the male partner was older. This indicates that the perception of infertility is more affected by a woman's age, which is consistent with the fact that fecundity starts declining at a younger age among women (Liu & Case 2011; Schmidt *et al.* 2014). Only partial support was found for Hypothesis 2. When both partners perceive to be in poor health status, the predicted probability of perceiving infertility increases from 13% to 40%. However, when only one partner is in poor health, there is a significant positive effect on the perception of infertility only if it is the female partner. This suggests that infertility may be wrongly thought of as mainly a woman's condition and highlights how the medical focus on women's body may lead to a marginalisation of men (Carmeli & Birenbaum-Carmeli 1994). Furthermore, while perceived infertility might be an important marker of overall health among women because of its strong association with self-rated health status, this might not be the case among men. In line with Hypothesis 3, couples in which both partners or the female partner only had a strong desire for children were predicted to be more likely to perceive infertility compared to couples with a low childbearing desire, 11% versus 16-17%. These results support the findings from an earlier study that suggested that childbearing desires are positively associated with the perception of infertility (Shreffler *et al.* 2016) and add to the existing literature by showing that if partners disagree about wishing a child, women's childbearing desires are more influential than their partners' childbearing desires. Partial support was found for Hypothesis 4. Childless couples and couples with only one child were predicted to be more likely to perceive infertility compared to couples with two or more children, which is in line with the predominance of the two-child family norm in Australia (Kippen, Evans & Gray 2007). The relationship between parity and perceived infertility was not linear: couples with only one child were more likely to perceive infertility than childless couples, 22% versus 17%. Hypothesis 5 received support, as cohabiting couples were less likely to perceive infertility compared to married couples, suggesting that infertility interferes more with life-course plans if the couple is married. This can be explained by the fact that, despite an increasing detachment of childbearing from formal marriage in Australia (Carmichael and McDonald 2003), the



majority of childbearing still happens within marriage (Australian Bureau of Statistics 2017). In line with Hypothesis 6, the perception of infertility is associated with a significantly higher predicted probability of not using contraception. This positive association remains even after controlling for the fundamental differences in the couples' childbearing desires and short-term intentions to have a child. Since even among couples that experience infertility, the probability of conception is not null (Osmanagaoglu *et al.* 2002), this finding supports previous research suggesting a link between perceived infertility and unwanted pregnancies (Polis & Zabin 2012, Gemmill 2018).

Despite its merits, this study does not come without limitations. First, the measurement of perceived infertility may underestimate the number of couples perceiving to be infertile. This is due to the fact that the infertility question in the HILDA survey specifically asks whether the perception of the respondent is based on medical advice, and it might exclude individuals that perceive to be infertile but that did not consult a physician. Second, although a positive association was found between perceived infertility and childbearing desires, the cross-national nature of this analysis does not allow to assess the causal direction of this relationship. Indeed, while the desire for children may have increased couples' awareness about their infertility status, it is also possible that couples experience a heightened desire for children if conception does not occur (Johnsons *et al.* 2018).

Research on infertility has primarily focused on women, as they have been traditionally considered to be more concerned about reproduction (Goldscheider & Kaufman 1996). However, the understanding of how infertility perceptions are formed and how they affect reproductive behaviour clearly calls to investigate the characteristics of both partners, due to the shared nature of reproduction. As couples keep postponing childbearing until later in life, a growing proportion of them will likely experience infertility. Hence, the understanding of how infertility perceptions are formed and of their association with biological and life-course factors will become ever more essential in fertility and family research. This study has made an important first step in this direction by accounting for the interplay between partners' characteristics in the determination of infertility perceptions and by showing how such perceptions are a key predictor of contraceptive use.



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Appendix

Table A1. Descriptive statistics.

Name	Mean %	Description
Perceive infertility	16.6	Measured with the question: <i>Based on medical advice, do you know of any physical or health reason that would make it difficult for you (and/or your partner) to have [children / more children]?</i> Coded as 0 if both partners did not perceive infertility, 1 if at least one partner perceived infertility.
Use contraception	75.4	Measured with the question: <i>Do you (and your partner) use birth control measures?</i> Coded as 0 if both partners did not use contraception, 1 if at least one partner used contraception.
Age		Coded as 0 if the female partner was between 18 and 24 years of age.
18-24	13.6	
25-29	24.8	
30-34	26.1	
35-39	19.2	
40-44	16.2	
Perceived health status		Perceived health status was measured with the question: <i>In general, would you say your health is: [1] excellent, [2] very good, [3] good, [4] fair, [5] poor.</i> Coded as 0 if both partners believe to have excellent, very good, or good health.
Both good	82.3	
Woman good, man poor	7.5	
Man good, woman poor	8.2	
Both poor	2.0	
Parity		The total number of children ever born were used to construct parity. Coded as 0 if the female partner does not have any children.
Zero	37.0	
One	18.4	
Two or more	44.7	
Desire for children		Measured with the question: <i>I now want you to pick a number between 0 and 10 to show how you feel about having (more) children /a child in the future. [The more definite you are that you would like to have (more) children /a child, the higher the number you should pick].</i> Coded as 0 if neither partner gave a score higher than 4.
Both low	31.4	
Woman high, man low	7.9	
Man high, woman low	8.3	
Both high	52.4	
Type of relationship		Coded as 0 if the members of the couple were in a cohabiting relationship or coded as 1 if the members of the couple were legally married.
Cohabitation	43.6	
Marriage	56.4	
Short-term intentions		Intentions to have children were measured with the questions: <i>How many more children do you intend to have (including zero) and In which year do you intend to have a / your next child?</i> Coded as 0 if neither partner intend to have a child/ their next child within the next 12 months.
Neither	81.8	
Woman only	3.7	
Man only	4.3	
Both	10.2	
Life satisfaction		Measured with the question: <i>All things considered, how satisfied are you with your life? Pick a number between 0 and 10 to indicate how satisfied you are.</i> Coded as 0 if neither partner gave a score higher than 7.
Low	18.2	
High	81.8	
Highest level of education		Coded as 0 if the highest educational attainment of at least one member of the couple was below tertiary.
Less than university	75.9	
University	24.1	
Country of birth		Coded as 0 if both partners were born either in Australia or in another English speaking country.
Both Australians	82.6	
Woman only Australian	5.1	
Man only Australian	3.9	
Both born overseas	8.3	

Table A2. Multinomial logistic regression results comparing perceived infertility and contraceptive use subgroups.

	Do not perceive infertility and do not use contraception (N=280) Odds ratios & 95% CI	Perceive infertility and use contraception (N=161) Odds ratios & 95% CI	Perceive infertility and do not use contraception (N=110) Odds ratios & 95% CI
Desire for children			
Both low (ref.)	1.00	1.00	1.00
W high, M low	2.33** (1.36, 4.01)	1.48 (0.76, 2.89)	3.23** (1.36, 7.68)
M high, W low	1.44 (0.80, 2.60)	1.22 (0.63, 2.36)	1.62 (0.60, 4.37)
Both high	2.33*** (1.48, 3.65)	1.13 (0.67, 1.89)	3.32*** (1.60, 6.88)
Parity¹			
Zero	0.63* (0.42, 0.96)	1.50 (0.89, 2.53)	2.29** (1.23, 4.29)
One	0.57* (0.36, 0.88)	2.47*** (1.50, 4.05)	2.67** (1.45, 4.90)
Two or more (ref.)	1.00	1.00	1.00
Type of relationship			
De facto	0.96 (0.69, 1.34)	0.78 (0.52, 1.16)	0.53** (0.32, 0.86)
Married (ref.)	1.00	1.00	1.00
Perceived health status			
Both good (ref.)	1.00	1.00	1.00
W good, M poor	1.64 (1.00, 2.69)	0.87 (0.43, 1.74)	1.16 (0.52, 2.56)
W poor, M good	1.27 (0.74, 2.19)	2.81*** (1.71, 4.63)	1.69 (0.83, 3.46)
Both poor	1.35 (0.41, 4.42)	4.39*** (1.78, 10.81)	5.50** (1.78, 16.99)
Short-term intention to have children²			
Neither (ref.)	1.00	1.00	1.00
W only	2.95*** (1.57, 5.54)	1.12 (0.43, 2.93)	2.04 (0.76, 5.46)
M only	2.15* (1.15, 4.01)	0.58 (0.20, 1.71)	2.20 (0.95, 5.07)
Both	6.18*** (3.93, 9.71)	1.17 (0.58, 2.38)	4.77*** (2.64, 8.63)
Age¹			
18-24 (ref.)	1.00	1.00	1.00
25-29	0.96 (0.57, 1.62)	1.23 (0.69, 2.20)	2.00 (0.81, 4.93)
30-34	1.46 (0.85, 2.49)	1.11 (0.59, 2.12)	2.70* (1.07, 6.79)
35-39	1.50 (0.82, 2.75)	1.54 (0.75, 3.17)	5.15*** (1.94, 13.69)
40-44	2.21* (1.15, 4.24)	2.02 (0.94, 4.34)	11.21*** (3.96, 31.75)
Age difference			
No difference (ref.)	1.00	1.00	1.00
W more than 3 years older	1.27 (0.93, 1.73)	1.06 (0.71, 1.59)	1.44 (0.90, 2.31)
M more than 3 years older	1.11 (0.57, 2.14)	1.71 (0.81, 3.59)	2.05 (0.93, 4.51)
Highest level of education			
Less than university (ref.)	1.00	1.00	1.00
University	0.58** (0.41, 0.84)	0.61* (0.38, 0.99)	0.50** (0.29, 0.87)
Country of birth			
Both Australians (ref.)	1.00	1.00	1.00
Only M born overseas	1.33 (0.65, 2.72)	0.40 (0.12, 1.35)	1.41 (0.55, 3.62)
Only W born overseas	2.14** (1.24, 3.68)	0.10* (0.01, 0.73)	0.52 (0.17, 1.56)
Both born overseas	2.37*** (1.47, 3.80)	0.22** (0.08, 0.64)	0.61 (0.25, 1.49)
Life satisfaction			
Low or normal (ref.)	1.00	1.00	1.00
High	1.20 (0.81, 1.79)	0.46*** (0.30, 0.69)	0.67 (0.39, 1.15)

Note: The base category is “Do not perceive infertility and use contraception”. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. ¹Based on female respondent. ²Intention to have a child in the next 12 months.

Source: Authors’ calculations using data from the HILDA survey, wave 19, release 19.



Table A3. Predicted probabilities (95% CI) of perceived infertility and contraceptive use subgroups (N= 1,654).

	Do not perceive infertility and do use contraception	Do not perceive infertility and do not use contraception	Perceive infertility and use contraception	Perceive infertility and do not use contraception
Age¹				
18-24	79 (73,85)	13 (8,18)	7 (3,10)	2 (0,3)
25-29	77 (72,81)	12 (9,15)	8 (5,11)	3 (2,5)
30-34	72 (67,76)	17 (13,21)	7 (4,9)	4 (2,6)
35-39	67 (61,73)	16 (12,21)	9 (5,12)	7 (4,11)
40-44	56 (49,64)	20 (14,26)	10 (5,14)	14 (8,20)
Age difference				
No difference	73 (70,76)	15 (12,17)	8 (6,10)	4 (3,6)
M more than 3 years older	68 (63,73)	18 (14,21)	8 (5,10)	6 (4,8)
F more than 3 years older	65 (54,76)	15 (7,22)	12 (5,19)	8 (2,13)
Perceived health status				
Both good	73 (70,76)	15 (13,17)	7 (6,9)	4 (3,6)
W good, M poor	67 (58,76)	22 (14,30)	6 (2,10)	5 (1,8)
W poor, M good	61 (52,69)	16 (9,22)	17 (11,24)	6 (2,10)
Both poor	48 (30,67)	13 (1,26)	22 (8,35)	16 (3,30)
Desire for children				
Both low	79 (75,84)	10 (7,13)	8 (5,11)	2 (1,4)
W high, M low	65 (56,73)	13 (7,19)	9 (4,14)	4 (1,7)
M high, W low	74 (66,81)	19 (12,26)	10 (4,15)	6 (2,11)
Both high	66 (62,70)	19 (16,23)	7 (5,10)	7 (5,9)
Parity¹				
Zero	71 (67,76)	13 (10,16)	9 (6,12)	7 (4,9)
One	68 (62,73)	11 (7,14)	14 (8,18)	7 (4,10)
Two or more	71 (67,75)	20 (17,24)	6 (4,8)	3 (2,4)
Type of relationship				
De facto	74 (70,77)	16 (13,19)	7 (5,9)	3 (2,5)
Married	70 (66,73)	15 (13,18)	9 (7,11)	6 (4,8)
Short-term intention to have children²				
Neither	75 (72,77)	10 (7,13)	8 (5,11)	2 (1,4)
W only	65 (56,73)	19 (12,26)	10 (4,15)	7 (2,11)
M only	74 (66,81)	13 (7,19)	9 (4,14)	4 (1,7)
Both	66 (62,70)	19 (16,23)	7 (5,10)	7 (5,9)
Life satisfaction				
Low or normal	67 (61,73)	12 (9,16)	14 (10,19)	6 (3,9)
High	72 (69,75)	16 (14,18)	7 (5,9)	4 (3,6)
Highest level of education				
Less than university	69 (66,72)	17 (15,19)	9 (7,11)	5 (4,7)
University	79 (75,83)	11 (8,15)	6 (4,9)	3 (2,5)
Country of birth				
Both Australians	71 (68,73)	14 (12,16)	11 (9,12)	2 (0,4)
Only M born overseas	71 (59,82)	18 (8,28)	2 (0,4)	7 (1,13)
Only W born overseas	68 (58,79)	28 (18,34)	1 (0,3)	2 (0,5)
Both born overseas	65 (56,74)	30 (21,39)	2 (0,4)	3 (0,5)

¹Based on female respondent.

²Intention to have a child in the next 12 months.

Source: Authors' calculations using data from the HILDA survey, wave 19, release 19.