# Prescription contraception use: A cross-sectional population study of psychosocial determinants

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Prescription contraception use: A cross-sectional population study of psychosocial determinants

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Objective

Many forms of contraception are available on prescription only e.g. the oral contraceptive pill (OCP) and long acting reversible contraceptives (LARCs). In this analysis we aim to identify key determinants of prescription contraceptive use.

Design

Cross-sectional population survey. Data on socio-demographic indices, concerns about the OCP and perceived barriers to access were collected.

Setting

Dataset constructed from a representative population based telephone survey of community dwelling adults in the Republic of Ireland (RoI)

Participants

1,515 women aged between 18 and 45 years

Main outcome measure

Self-reported user of the OCP or LARCs (intrauterine contraception, contraceptive injections or sub-dermal contraceptive implants) in the previous 12 months

Results

For at least some of the previous year, 35% had used the OCP and 14% had used LARCs, while 3% had used two or more of these methods. OCP users were significantly younger, more likely to be unmarried and had higher income than non-users. Overall, 68% agreed with the statement ‘that taking a break from long term use of the contraceptive pill is a good idea’ and 37% agreed with the statement that ‘the OCP has dangerous side effects’ and this was the strongest predictor variable of non-use of the OCP. Intrauterine contraception users were significantly older, more likely to be married and had lower income than non-users. Injections or sub-dermal contraceptive implant users were significantly younger, less likely to be married, had lower income and were less likely to agree that taking a break from long-term use of the pill is a good idea than non-users.

Conclusions: Prescription contraceptive use is socio-demographically patterned, with LARCs in particular being associated with lower incomes. Concerns about the safety of the OCP remain prevalent and are important and modifiable determinants of contraceptive-related behaviour.
Strengths and limitations of this study

• This is the first study to provide a detailed population level multivariable analysis of a range of psychosocial determinants of prescription contraceptive use, including concerns about the safety of the OCP, in a representative sample of over 1500 women.

• The study data were self-reported in a telephone interview and may be subject to recall and social desirability biases; however this is a widely used method to collect data on sexual health from large samples, and has established reliability and validity.

• The identification of both modifiable and non-modifiable determinants of prescription contraceptive use can inform targeted interventions to improve sexual and reproductive health.
INTRODUCTION

Many of the most effective and widely used methods of contraception usually require a prescription from a physician. [1] Data from the United Nations indicates that in more economically developed regions, the oral contraceptive pill (OCP), which is one such method, is second only to male condom use (18.4%) with an estimated international prevalence rate of 17.7% in women who are in a stable relationship. [1] OCP use has remained constant or has increased over the last 10 years in many countries, including Republic of Ireland (RoI) and the United Kingdom (UK). [2 3] The user-dependent nature of the OCP means that the failure rate of the OCP is substantially greater than long acting reversible contraception (LARCs) methods e.g. intrauterine contraception and subdermal contraceptive implants. [4] However, it is important to note that these methods are not suitable for all women. [5] There is also evidence that negative attitudes and misconceptions about specific types of LARC may be pervasive [6 7] including among health care providers [8 9]; therefore, use of these methods remains much lower than the OCP in many countries. [1]

Previous studies have shown that certain types of prescription contraception tend to be more widely used by certain demographic groups. However, these studies are somewhat dated, of variable methodological quality and from a limited range of socio-cultural contexts. [10] Additionally, these studies have not examined the independence of socio-demographic predictors in accounting for prescription contraception use. Some of these predictors become more closely related over time. For example, age and marital status have become more strongly associated with each other due to the increasing age at which people marry and the rapidly changing patterns of relationship stability in some countries. [11 12] It is also possible that there may be age-dependent beliefs about contraception, e.g. the OCP, which could determine its use. This may be due to the high profile reporting of health risks associated with earlier versions of the OCP to which older contraceptive users may have been exposed and the improved safety of more recent versions of the OCP. [5] In the context of RoI, there is also evidence that older contraceptive users may not have
received information on contraception as part of their formal sex education. [2] Analyses examining how beliefs about the OCP vary by age are necessary in order to elucidate under what conditions a range of factors explain patterns of OCP use.

Beliefs about the safety of medical treatments are of particular interest as these variables are potentially modifiable determinants of uptake and adherence to prescription contraception. There is a significant body of research focusing on the ‘Necessity-Concerns framework’ of treatment adherence over the last 15 years. [13 14] This approach emphasises the individual’s judgement of personal need for medication or other forms of treatment (necessity beliefs) and concerns about the potential adverse consequences of taking it e.g. side-effects and long-term use. Although much of this literature focuses on chronic illness, more recent work has identified similar associations between these treatment beliefs and adherence to the OCP, particularly concerns about the OCP. [15] This latter study was in a small sample of students (N=130) in the United Kingdom (UK), therefore the external validity of these findings is limited. In the present study, we examine whether a range of socio-demographic variables, including concerns about the OCP and barriers to access can account for prescription contraception use in a representative sample of women between the ages of 18-45 in the general population in RoI. Specifically, we examine OCP use and two types of LARC use, namely intrauterine contraception and contraceptive injections or sub-dermal contraceptive implants. Although some studies have combined these into one LARC user category [16], it is likely that the characteristics of users vary for these methods given the previous trends to avoid intrauterine contraception in nulliparous women. [17 18] Therefore, we assess intrauterine contraception use and contraceptive injections or sub-dermal contraceptive implants use separately in our analysis. Although these represent three distinct prescription contraception methods, the latter two methods are combined into one category in this study measure, due to the low frequency of use of contraceptive injections and sub-dermal contraceptive implants.
METHOD

Study design

Data were drawn from women who participated in the Irish Contraception and Crisis Pregnancy Study 2010 (ICCP-2010). [2] This was a nationally representative cross-sectional survey of men and women between the ages of 18 and 45 who were living in RoI (N=3,002; women n = 1,515). The study was designed to describe attitudes, knowledge and behaviours relating to sexual health and, in particular, contraception and crisis pregnancy. Crisis pregnancy in this context was defined as “a pregnancy that represents a personal crisis or an emotional trauma in either of the following circumstances: (a) a pregnancy that began as a crisis, even if the crisis was subsequently resolved or (b) a pregnancy that develops into a crisis before the birth due to a change in circumstances.” [2]

Setting and sample

This population-based telephone survey was conducted in 2010. The random digit dialling of both landline and mobile phones and the quota sampling technique that was used to ensure a representative sample of the general population within this age band are described in detail in the main report and a separate publication. [2 19] The overall response rate to the survey was 69%.

Recruitment and consent

A standardised introduction to the study was used to describe who was carrying out the survey, its confidential nature and how the telephone numbers had been randomly selected. Following confirmation that the respondent was over 18 years of age and verbal agreement to participate, the telephone interview began.

Questionnaire survey

The telephone-administered questionnaire collected information on the participant’s socio-demographic data, living arrangements, children, sex education, knowledge and attitudes about
contraception, contraceptive use over the last year, sources of contraception and contraceptive services, sexually transmitted infections, most recent sexual partnership, experience of pregnancy and knowledge of crisis pregnancy services, including abortion. The full questionnaire and dataset are available on request from the Irish Social Science Data Archive. For the present study, we highlight ten variables in our main analyses; these psychosocial variables were selected based on previous literature and variables that capture aspects of an individual’s motivation, capability and opportunity to use prescription contraception, as defined by the behaviour change wheel approach for identifying factors for behaviour change interventions. [20]

Socio-demographic data

In addition to age in years, data were gathered on marital and relationship status (married, separated, divorced, widowed and never married), education (primary or incomplete secondary only, complete secondary and third level) and whether respondents were in receipt of general medical services (GMS). Such entitlement is based on an assessment of individual’s income and is therefore a reliable indicator of socio-economic status; individuals with GMS have lower incomes. In 2010, approximately 40% of the population in RoI had GMS eligibility. At the time of this survey patients with such eligibility receive all medications, including contraceptives, free of charge; non-GMS patients pay for all prescriptions up to a monthly limit of approximately €90.

Prescription contraception use in the last year

In order to assess prescription contraception use, respondents were asked ‘Which of these methods of contraception or precautions to avoid pregnancy have you and any partner(s) used together in the last year?’ The first contraceptive mentioned on this list was ‘The contraceptive pill’. The fifth contraceptive method mentioned on the list was ‘Coil, intrauterine device or intrauterine system (Mirena®)’. The eleventh method mentioned was ‘Injections (Depo Provera®) or Implanted contraceptive capsules’ (Implanon®). If respondents used these in the last year, they were scored as
1 and if not, they were scored as 0. It is important to note that this would not necessarily refer to
continuous use of these methods. Participants were also asked which methods of contraception or
precautions to avoid pregnancy had they ever heard of as part of this section.

Concerns about the OCP

Two items assessed concerns about the contraceptive pill. These were, ‘The contraceptive pill has
dangerous side-effects’ and ‘Taking a break from the long-term use of the contraceptive pill is a good
idea’. These were scored on a 5 point scale from 1 Strongly Agree to 5 Strongly Disagree. Higher
scores related to lower concerns. There was a small to moderate positive correlation between these
two items (r= 0.15, p<0.01), which indicates that they can be treated as distinct but related aspects
of concerns about the OCP. A “Don’t know” response that was not part of the 5 point scale was used
by approximately 3% of the participants; therefore, the two concern variables were dichotomised
into ‘Agree’ versus ‘other’ to preserve cases in the analyses.

Barriers to access

Various barriers to accessing contraception were assessed in ICCP-2010. These included the
following items: Do not know where to get contraception/services, cannot access
contraception/services in your locality, are embarrassed about accessing contraception/services,
cannot afford contraception/services. The responses to these items were ‘Yes’ or ‘No’. As fewer than
1% of the overall sample responded ‘Yes’ to the item ‘Do not know where to get
contraception/services,’ this variable was not included in the analyses. Participants were also asked
‘How difficult do you find it to get contraception?’ Responses were provided on a 4 point scale from
1 Very difficult to 4 Not at all difficult.

Data analyses

Descriptive statistics were calculated for the main study variables in order to characterise the
sample. Independent t tests and Chi square tests for independence were used to compare groups on
continuous and categorical data respectively. Logistic regression analyses were used to test multivariable models. The final complete multivariable model allowed the statistical independence of the predictive variables to be established. Logistic regression provides odds ratios and 95% confidence intervals for each predictor of prescription contraception use, which calculates estimates of effect sizes for the study predictors. As there were 536 OCP users (35%) and 152 intrauterine contraception users (10%) in this sample (n= 1,515), there were sufficient numbers of events per variable to use our multivariable logistic regression with 10 predictors. [21] As there were only 67 women using injections or sub-dermal contraceptive implants (4%) this analysis could provide less reliable estimates with 10 predictors. Moderation analyses were carried out using the moderation script for SPSS developed by Hayes and Matthes. [22] Moderation analyses were used to assess whether there were age dependent associations between beliefs about the OCP and OCP use. This tested whether the strength of the association between beliefs about the OCP and OCP use varies for different age groups. All analyses were weighted to ensure that the results are representative of the population. Full details of the weighting parameters used are provided in the ICCP-2010 report. [2]

Ethical approval

The original ICCP-2010 survey protocol received ethical approval from the Research Ethics Committee of the Royal College of Surgeons in Ireland (RCSI) and the programme of work that includes the present analysis received ethical approval from the NUI Galway Research Ethics Committee (Reference: 14/Jan/03).

RESULTS

Sample

An outline of the sample characteristics grouped by prescription contraception users and non-users of that method is provided in Table 1. Forty-four women (3%) had used 2 or more of the OCP,
intrauterine contraception, contraceptive injections or sub-dermal contraceptive implants in the previous year, therefore the totals do not equal 1515 participants in Table 1. Full details of the study sample are provided elsewhere. [2] Eighty-three per cent had heard of the OCP, 76% had heard of intrauterine devices/systems and 72% had heard of injections or sub-dermal contraceptive implants. Only 5% of women had not used any method of contraception in the previous year. OCP users, compared with non-OCP users, were significantly younger, were less likely to be married, less likely to be in receipt of GMS, less likely to believe that the pill has dangerous side effects, less likely to believe that taking a break from the long-term use of the contraceptive pill is a good idea, more likely to report difficulty in getting contraception, more likely to report that they could not access contraception/services in their locality and more likely to say they could not afford contraception/services. Intrauterine contraception users were significantly older, more likely to be married, less likely to have third level education and more likely to be in receipt of GMS. Injections or sub-dermal contraceptive implants users were more likely to be significantly younger, more likely to be unmarried, more likely to be in receipt of GMS and less likely to believe that taking a break from the long-term use of the contraceptive pill is a good idea. In the total sample (n=1515), 37% agreed with the statement that the OCP had dangerous side effects and 68% agreed that taking a break from long-term use of the contraceptive pill was a good idea. The proportion of participants in all groups who reported barriers to access was relatively low i.e. ≤ 5%.

Table 1

In the multivariable analysis presented in Table 2, all study variables were included regardless of univariate associations in order to assess the statistical independence of these determinants. In this table, lower odds are associated with non-use of the method e.g. being married and having general medical services were associated with non-use of the OCP as shown in Table 2. The multivariable model shows that younger age, being unmarried, not being in receipt of GMS and not believing that the OCP has dangerous side effects emerged as significant independent predictors of OCP use. The
The strongest predictor was not agreeing with the statement that ‘The contraceptive pill has dangerous side-effects’. This overall pattern of findings did not change when the continuous measures of education and concerns about the OCP were included in place of the dichotomized variables. Older age, being married and being in receipt of GMS were significant predictors of intrauterine contraception use, while younger age, being in receipt of GMS and not agreeing that taking a break from the long-term use of the contraceptive pill is a good idea were significant predictors of injections or sub-dermal contraceptive implants use. Being in receipt of GMS was the strongest predictor of both LARCs methods. The multivariate models accounted for a moderate amount of variability in prescription contraception use as indicated by the Nagelkerke $R^2$ value.

| Table 2 |

Respondents who agreed that ‘The contraceptive pill has dangerous side effects’ were significantly older ($M=32.26$, $SD=7.83$ years versus $M=31.42$, $SD=7.41$ years, $t=-2.06$, $p=0.04$), as were respondents who agreed that ‘Taking a break from the long-term use of the contraceptive pill is a good idea’ ($M=32.61$, $SD=7.44$ years versus $M=29.87$, $SD=7.53$, $t=-6.60$, $p<0.01$). In moderation analyses, there was no significant interaction between age and believing that the OCP had dangerous side-effects in predicting OCP use. However, there was a significant interaction between age and believing that taking a break from the long-term use of the contraceptive pill was a good idea (Interaction term Beta= -0.05, $p<0.01$). These age-dependent associations are provided in Table 3 below. This table compares the strength of this association, i.e. Beta values, at 1 standard deviation above and below the mean value of the moderator variable i.e. age. In older women, i.e. those 1 standard deviation (SD) above the mean age of 31.85 years agreeing with this statement was strongly predictive of pill non-use, whereas this was not the case among younger women i.e. those 1SD below the mean age. This decomposition of the interaction into these three groups is recommended by statistical texts describing this analytical method. [22]

| Table 3 |

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Table 1 Sample characteristics of study participants (n= 1,515) by OCP or LARCs user status

<table>
<thead>
<tr>
<th>Variable</th>
<th>OCP user</th>
<th>Non-user</th>
<th>Intrauterine contraception</th>
<th>Injections or sub-dermal contraceptive implant</th>
<th>Non-users</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=536</td>
<td>n=978</td>
<td>n=152</td>
<td>n=67</td>
<td>n=1302</td>
</tr>
<tr>
<td>Age in years (SD)</td>
<td>29 (7)**</td>
<td>33 (8)</td>
<td>36 (6)**</td>
<td>28 (7)**</td>
<td>31 (8)</td>
</tr>
<tr>
<td>Married (%)</td>
<td>169 (32)**</td>
<td>502 (51)</td>
<td>110 (72)**</td>
<td>21 (31)*</td>
<td>542 (42)</td>
</tr>
<tr>
<td>Education (% Third level)</td>
<td>223 (42)</td>
<td>391 (40)</td>
<td>45 (30)**</td>
<td>20 (30)</td>
<td>551 (42)</td>
</tr>
<tr>
<td>General medical services (% yes)</td>
<td>120 (22)*</td>
<td>279 (29)</td>
<td>65 (43)**</td>
<td>31 (46)**</td>
<td>307 (24)</td>
</tr>
<tr>
<td>The OCP has dangerous side-effects (% Agree)</td>
<td>143 (27)**</td>
<td>404 (42)</td>
<td>59 (39)</td>
<td>18 (27)</td>
<td>472 (37)</td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea (% Agree)</td>
<td>339 (63)**</td>
<td>678 (71)</td>
<td>103 (68)</td>
<td>32 (48)**</td>
<td>886 (69)</td>
</tr>
<tr>
<td>Question</td>
<td>Non-User</td>
<td>User A</td>
<td>User B</td>
<td>User C</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
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<td>--------</td>
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<td></td>
</tr>
<tr>
<td>How difficult do you find it to get contraception (SD)</td>
<td>3.76 (0.59)*</td>
<td>3.83 (0.49)</td>
<td>3.86 (0.48)</td>
<td>3.85 (0.53)</td>
<td>3.79 (0.55)</td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality (% yes)</td>
<td>27 (5)**</td>
<td>24 (2.5)</td>
<td>4 (3)</td>
<td>2 (3)</td>
<td>47 (4)</td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services (% yes)</td>
<td>21 (4)</td>
<td>23 (2)</td>
<td>4 (3)</td>
<td>1 (2)</td>
<td>39 (3)</td>
</tr>
<tr>
<td>Cannot afford contraception/services (% yes)</td>
<td>21 (4)*</td>
<td>19 (2)</td>
<td>5 (3)</td>
<td>0 (0)</td>
<td>35 (3)</td>
</tr>
</tbody>
</table>

*<0.05; **<0.01: Comparisons are with the non-user group of the specified contraception; SD: Standard deviation
Table 2 Multivariable logistic regression predicting prescription contraception use (1 = Yes, 0 = No) among study participants (n = 1,515)

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>OCP Odds ratio</th>
<th>95% CI</th>
<th>Intrauterine contraception Odds ratio</th>
<th>95% CI</th>
<th>Injections or sub-dermal contraceptive implant Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years (continuous)</td>
<td>0.92**</td>
<td>0.91,0.94</td>
<td>1.10**</td>
<td>1.06,1.13</td>
<td>0.92**</td>
<td>0.88,0.97</td>
</tr>
<tr>
<td>Unmarried (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Married</td>
<td>0.67**</td>
<td>0.51,0.89</td>
<td>2.48**</td>
<td>1.62,3.80</td>
<td>1.09</td>
<td>0.56,2.13</td>
</tr>
<tr>
<td>Education at Third level No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Education at Third level Yes</td>
<td>0.83</td>
<td>0.65,1.07</td>
<td>0.74</td>
<td>0.49,1.12</td>
<td>0.74</td>
<td>0.41,1.32</td>
</tr>
<tr>
<td>General medical services- No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>General medical services- Yes</td>
<td>0.62**</td>
<td>0.46,0.83</td>
<td>2.63**</td>
<td>1.76,3.91</td>
<td>2.31**</td>
<td>1.33,3.99</td>
</tr>
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<td></td>
</tr>
<tr>
<td>The OCP has dangerous side-effects</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Reference)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>The OCP has dangerous side-effects</td>
<td>0.52**</td>
<td>0.43, 0.68</td>
<td>1.19</td>
<td>0.81, 1.76</td>
<td>0.84</td>
<td>0.47, 1.49</td>
</tr>
<tr>
<td>Agree</td>
<td></td>
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<tr>
<td>Taking a break from the long-term</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>use of the OCP is a good idea</td>
<td>(Ref)</td>
<td></td>
<td></td>
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<tr>
<td>Taking a break from the long-term</td>
<td>0.89</td>
<td>0.68, 1.15</td>
<td>0.73</td>
<td>0.49, 1.11</td>
<td>0.48**</td>
<td>0.28, 0.81</td>
</tr>
<tr>
<td>use of the OCP is a good idea</td>
<td>Agree</td>
<td></td>
<td></td>
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<tr>
<td>How difficult do you find it to get</td>
<td>0.80</td>
<td>0.56, 1.15</td>
<td>1.32</td>
<td>0.66, 2.66</td>
<td>0.92</td>
<td>0.44, 1.91</td>
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<tr>
<td>contraception (continuous)</td>
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<tr>
<td>Cannot access contraception/services</td>
<td>1.20</td>
<td>0.55, 2.63</td>
<td>1.13</td>
<td>0.26, 4.97</td>
<td>0.71</td>
<td>0.11, 4.45</td>
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<td>in your locality-No (Reference)</td>
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<td>Nagelkerke R² for full model</td>
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**<0.01; 1 = Yes, 0 = No; 1 = Agree, 0 = Other; 1 = reference category for binary predictor variables.
Table 3 Association between agreeing that ‘taking a break from the oral contraceptive pill is a good idea’ and OCP non-use across younger, average and older age groups

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Beta</th>
<th>Standard error</th>
<th>95% CI Beta</th>
<th>P</th>
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<td>24.23 (-1 SD)</td>
<td>0.09</td>
<td>0.15</td>
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<td>-0.50, -0.02</td>
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<td>39.46 (+ 1SD)</td>
<td>-0.61</td>
<td>0.19</td>
<td>-0.98, -0.24</td>
<td>&lt;0.01</td>
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</table>
DISCUSSION

The analysis provides a detailed description of the characteristics of prescription contraception users in RoI. Lower income, as indexed by having GMS, was the strongest predictor of both kinds of LARC use. These results highlight that concerns about the OCP are common and that these concerns are linked to prescription contraception use, with the strongest predictor of not using the OCP being the belief that ‘the contraceptive pill has dangerous side-effects’. The analysis also shows that the association between concerns and OCP use varied according to age, with the association being particularly strong among older women. This might be partly explained by exposure to historical reporting of specific health risks associated with the OCP that have since been shown to be unsupported. [5] It is also likely that the increased duration of exposure to the OCP that older users will have may also partly account for this. In the ICCP-2010 report [2] there was evidence indicating that contraception was a topic in the sex education of 70% of those between the ages of 18-25 years of age in the survey, but only 34% of those between the ages of 36-45 years of age said that contraception was mentioned. This might also partly explain the greater concerns about OCP reported by older women, as it is likely that access to accurate information about contraception was harder to access.

The independent links between prescription contraception use and age, marital status and having GMS i.e. having lower income, are consistent with observations seen in other countries. [10] The prevalence and predictive power of the two variables assessing concerns about the OCP suggests that concerns may continue to have an important role in contraceptive choice, as has been observed in earlier studies in other contexts. [23] The low numbers of respondents reporting barriers to access (≤ 5%) and the weak predictive power of ‘perceived difficulty’ of finding contraception measure suggest that access to contraception is no longer reported as a major problem among adults in RoI and probably not an important determinant of OCP use. However, it is important to acknowledge that there may be barriers to access in those under 18. [24]
relating to sex education in ICCP-2010 mentioned in the last paragraph [2] do indicate that contraception is more likely to be part of the sex education of younger cohorts. However, it is not universally covered according to the data and there is a relatively recent history of avoiding the topic in sex education [2], which may create and reflect implicit social disapproval of contraception.

The predictive power of ‘concerns about the OCP’ and the potentially modifiable nature of these beliefs suggest that reproductive health promotion needs to place particular emphasis on shaping accurate beliefs about the OCP and indeed LARCs’ methods to optimise individual contraceptive choices. In addition to this, it is clear that there are socio-economic determinants of OCP use in that the current results show that OCP use was more common among those who did not have GMS i.e. those with higher income, and LARCs use was more common among those who did have GMS i.e. those with lower incomes. Therefore, although few people indicated that they could not afford contraceptive services (<5%), it is likely that there are socio-economic barriers to contraception use. Recent intervention studies, including natural experiments, suggest that removing financial and other access barriers can have a substantial impact on uptake of contraceptives, particularly LARCs. [25 26]

The OCP is currently a significantly less expensive option in the short term for those who do not have GMS costing less than €20 per month. Therefore it is possible that LARCs methods, which may cost up to €300 initially, are not financially feasible for those with incomes just above the threshold that would entitle them to GMS. As a result, LARC use may predominate in those with lowest incomes who do qualify for GMS and those with higher incomes in RoI, where the initial higher cost is not a barrier. It is also worth noting that this socio-economic difference seen within RoI reflects socio-economic differences between other countries in respect of LARC use. For example, intrauterine contraception is more commonly used and often freely available in less economically developed parts of the world, e.g. in Asia, there is a 27% prevalence among women using
contraception, whereas it is a relatively expensive option in many more wealthier regions e.g. 6% prevalence in North America. [18]

Contraception has been a controversial socio-political topic in the RoI. Prescribing and having contraception of any description was illegal in the RoI until 1980 [27] and emergency contraception was not available without prescription until 2011. [28] This can be largely explained by the particular religious ethos that historically pervaded healthcare and politics in RoI. [29] Given this cultural backdrop, policy measures such as providing free contraceptive services to all may be likely to receive resistance in RoI, even if evidence from health economic analysis in other contexts indicates that this investment may lead to health gain for the population. [28]

Limitations and strengths

There are a number of aspects of the methodology where alternative approaches would have been desirable. First, the data were entirely self-reported in the format of a telephone interview. This is subject to the usual problems of recall and social desirability biases in measurement. However this is a widely used approach with established reliability and validity that may be superior to face-to-face interviews for sensitive topics. [30] Second, the cross-sectional study design does not allow any causal inferences to be made from the data. Third, it would have been preferable to have psychometrically validated measures of concerns about the pill [15] and other related psychological constructs related to medication beliefs [14] and LARCs rather than the single item measures used in this study that only addressed the OCP. Nevertheless, there are several strengths to the present study which help to mitigate these limitations, including: the representative sample of the general population within the specified age band who provided anonymized data; the reporting of multivariable and moderation analyses to provide a more detailed and nuanced assessment of the relationship between a broad range of predictors and prescription contraceptive use; the separate analysis for two different classes of LARCs which are sometimes considered together; [16] and the use of relatively recently collected data on this topic. This is particularly
important due the changing nature of contraceptive use over the last 10-15 years in this [2] and other international contexts. [1]

Conclusion

Prescription contraceptive use is socio-demographically patterned with LARCs’ methods in particular being associated with lower incomes in RoI. Despite the established safety of the OCP, concerns remain prevalent in RoI, which may reflect the socio-cultural context surrounding contraception. These concerns are important and modifiable determinants of contraceptive-related behaviour that may have more resonance in older users of contraception. The evidence from this study suggests that further efforts are required to clarify the health risks associated with the OCP and LARCs. Future work will also need to establish who (e.g. GP or nurse), where (e.g. primary care or educational settings) and how (e.g. during consultations or sex education classes), this can be optimally delivered.
**Funding** This study was funded by a project grant awarded by the Health Service Executive Crisis Pregnancy Programme and administered by the Irish Research Council in December 2013 to Dr Gerry Molloy (Principal Investigator), Dr Karen Morgan, Dr Molly Byrne and Dr Andrew Murphy (Co-Investigators). Professor Carmel Hughes, Professor Roger Ingham and Professor Richard Layte were members of the steering committee for this study. The original ICCP-2010 study was also funded by the Health Service Executive Crisis Pregnancy Programme.

**Competing interests** None.

**Participant consent** Obtained.

**Ethics approval** The original ICCP-2010 survey protocol received ethical approval from the Research Ethics Committee of the Royal College of Surgeons in Ireland (RCSI) and the programme of work that includes the present analysis received ethical approval from the NUI Galway Research Ethics Committee (Reference: 14/Jan/03).

**Contributors** GM, KM, MB and AM conceived the research. GM carried out the research, data analysis and drafted the paper. All authors approved the final manuscript.

**Data sharing statement:** There ICCP-2010 dataset is available from the Irish Social Science Data Archive: [http://www.ucd.ie/issda/](http://www.ucd.ie/issda/)
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   Accessed December 16, 2014


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### STROBE Statement—checklist of items that should be included in reports of observational studies

<table>
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<tr>
<th>Item No</th>
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| **Title and abstract** | 1. (a) Indicate the study’s design with a commonly used term in the title or the abstract  
(b) Provide in the abstract an informative and balanced summary of what was done and what was found |
| **Introduction** | 2. Explain the scientific background and rationale for the investigation being reported |
| **Objectives** | 3. State specific objectives, including any prespecified hypotheses |
| **Methods** | 4. Present key elements of study design early in the paper |
| **Setting** | 5. Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection |
| **Participants** | 6. (a) **Cohort study**—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  
(b) **Case-control study**—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  
(c) **Cross-sectional study**—Give the eligibility criteria, and the sources and methods of selection of participants  
(b) **Cohort study**—For matched studies, give matching criteria and number of exposed and unexposed  
(d) **Case-control study**—For matched studies, give matching criteria and the number of controls per case |
| **Variables** | 7. Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable |
| **Data sources/measurement** | 8. For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group |
| **Bias** | 9. Describe any efforts to address potential sources of bias |
| **Study size** | 10. Explain how the study size was arrived at |
| **Quantitative variables** | 11. Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why |
| **Statistical methods** | 12. (a) Describe all statistical methods, including those used to control for confounding  
(b) Describe any methods used to examine subgroups and interactions  
(c) Explain how missing data were addressed  
(d) **Cohort study**—If applicable, explain how loss to follow-up was addressed  
**Case-control study**—If applicable, explain how matching of cases and controls was addressed  
**Cross-sectional study**—If applicable, describe analytical methods taking account of sampling strategy  
(e) Describe any sensitivity analyses |

Continued on next page
Results

Participants 13* (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
(b) Give reasons for non-participation at each stage
(c) Consider use of a flow diagram

Descriptive data 14* (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
(b) Indicate number of participants with missing data for each variable of interest
(c) Cohort study—Summarise follow-up time (eg, average and total amount)

Outcome data 15* Cohort study—Report numbers of outcome events or summary measures over time
Case-control study—Report numbers in each exposure category, or summary measures of exposure
Cross-sectional study—Report numbers of outcome events or summary measures

Main results 16 (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
(b) Report category boundaries when continuous variables were categorized
(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses 17 Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion

Key results 18 Summarise key results with reference to study objectives

Limitations 19 Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias

Interpretation 20 Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence

Generalisability 21 Discuss the generalisability (external validity) of the study results

Other information

Funding 22 Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Prescription contraception use: A cross-sectional population study of psychosocial determinants**

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  Sweeney, Leigh-Ann; NUI Galway, School of Psychology  
  Byrne, Molly; NUI Galway, School of Psychology  
  Hughes, Carmel; Queens University Belfast, School of Pharmacy  
  Ingham, Roger; University of Southampton, Centre for Sexual Health Research  
  Morgan, Karen; Royal College of Surgeons in Ireland, Division of Population Health Sciences  
  Murphy, Andrew; NUI Galway, Discipline of General Practice, School of Medicine |
| Primary Subject Heading: | Sexual health |
| Secondary Subject Heading: | Public health, Reproductive medicine, Sexual health |
| Keywords: | Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, EPIDEMIOLOGY, Reproductive medicine < GYNAECOLOGY, PUBLIC HEALTH, SOCIAL MEDICINE |
Prescription contraception use: A cross-sectional population study of psychosocial determinants

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Key words: contraception; contraception behaviour; contraceptive methods; contraception, female

Word count: 4,596
Objective

Many forms of contraception are available on prescription only e.g. the oral contraceptive pill (OCP) and long acting reversible contraceptives (LARCs). In this analysis we aim to identify key determinants of prescription contraceptive use.

Design

Cross-sectional population survey. Data on socio-demographic indices, concerns about the OCP and perceived barriers to access were collected.

Setting

Dataset constructed from a representative population based telephone survey of community dwelling adults in the Republic of Ireland (RoI)

Participants

1,515 women aged between 18 and 45 years

Main outcome measure

Self-reported user of the OCP or LARCs (intrauterine contraception, contraceptive injections or sub-dermal contraceptive implants) in the previous 12 months

Results

For at least some of the previous year, 35% had used the OCP and 14% had used LARCs, while 3% had used two or more of these methods. OCP users were significantly younger, more likely to be unmarried and had higher income than non-users. Overall, 68% agreed with the statement ‘that taking a break from long term use of the contraceptive pill is a good idea’ and 37% agreed with the statement that ‘the OCP has dangerous side effects’ and this was the strongest predictor variable of non-use of the OCP. Intrauterine contraception users were significantly older, more likely to be married and had lower income than non-users. Injections or sub-dermal contraceptive implant users were significantly younger, less likely to be married, had lower income and were less likely to agree that taking a break from long-term use of the pill is a good idea than non-users.

Conclusions: Prescription contraceptive use is socio-demographically patterned, with LARCs in particular being associated with lower incomes. Concerns about the safety of the OCP remain prevalent and are important and modifiable determinants of contraceptive-related behaviour.
Strengths and limitations of this study

- This is the first study to provide a detailed population level multivariable analysis of a range of psychosocial determinants of prescription contraceptive use, including concerns about the safety of the OCP, in a representative sample of over 1500 women.

- The study data were self-reported in a telephone interview and may be subject to recall and social desirability biases; however this is a widely used method to collect data on sexual health from large samples, and has established reliability and validity.

- The identification of both modifiable and non-modifiable determinants of prescription contraceptive use can inform targeted interventions to improve sexual and reproductive health.
INTRODUCTION

Many of the most effective and widely used methods of contraception usually require a prescription from a physician. [1] Data from the United Nations indicates that in more economically developed regions, the oral contraceptive pill (OCP), which is one such method, is second only to male condom use (18.4%) with an estimated international prevalence rate of 17.7% in women who are in a stable relationship. [1] OCP use has remained constant or has increased over the last 10 years in many countries, including Republic of Ireland (RoI) and the United Kingdom (UK). [2 3] The user-dependent nature of the OCP means that the failure rate of the OCP is substantially greater than long acting reversible contraception (LARCs) methods e.g. intrauterine contraception and subdermal contraceptive implants. [4] However, it is important to note that these methods are not suitable for all women. [5] There is also evidence that negative attitudes and misconceptions about specific types of LARC may be pervasive [6 7] including among health care providers [8 9]; therefore, use of these methods remains much lower than the OCP in many countries. [1]

Previous studies have shown that certain types of prescription contraception tend to be more widely used by certain demographic groups. However, these studies are somewhat dated, of variable methodological quality and from a limited range of socio-cultural contexts. [10] Additionally, these studies have not examined the independence of socio-demographic predictors in accounting for prescription contraception use. Some of these predictors become more closely related over time. For example, age and marital status have become more strongly associated with each other due to the increasing age at which people marry and the rapidly changing patterns of relationship stability in some countries. [11 12] It is also possible that there may be age-dependent beliefs about contraception, e.g. the OCP, which could determine its use. This may be due to the high profile reporting of health risks associated with earlier versions of the OCP to which older contraceptive users may have been exposed and the improved safety of more recent versions of the OCP. [5] In the context of RoI, there is also evidence that older contraceptive users may not have
received information on contraception as part of their formal sex education. [2] Analyses examining how beliefs about the OCP vary by age are necessary in order to elucidate under what conditions a range of factors explain patterns of OCP use.

Beliefs about the safety of medical treatments are of particular interest as these variables are potentially modifiable determinants of uptake and adherence to prescription contraception. There is a significant body of research focusing on the ‘Necessity-Concerns framework’ of treatment adherence over the last 15 years. [13 14] This approach emphasises the individual’s judgement of personal need for medication or other forms of treatment (necessity beliefs) and concerns about the potential adverse consequences of taking it e.g. side-effects and long-term use. Although much of this literature focuses on chronic illness, more recent work has identified similar associations between these treatment beliefs and adherence to the OCP, particularly concerns about the OCP. [15] This latter study was in a small sample of students (N=130) in the United Kingdom (UK), therefore the external validity of these findings is limited. In the present study, we examine whether a range of socio-demographic variables, including concerns about the OCP and barriers to access can account for prescription contraception use in a representative sample of women between the ages of 18-45 in the general population in RoI. Specifically, we examine OCP use and two types of LARC use, namely intrauterine contraception and contraceptive injections or sub-dermal contraceptive implants. Although some studies have combined these into one LARC user category [16], it is likely that the characteristics of users vary for these methods given the previous trends to avoid intrauterine contraception in nulliparous women. [17 18] Therefore, we assess intrauterine contraception use and contraceptive injections or sub-dermal contraceptive implants use separately in our analysis. Although these represent three distinct prescription contraception methods, the latter two methods are combined into one category in this study measure, due to the low frequency of use of contraceptive injections and sub-dermal contraceptive implants.
METHOD

Study design

Data were drawn from women who participated in the Irish Contraception and Crisis Pregnancy Study 2010 (ICCP-2010). [2] This was a nationally representative cross-sectional survey of men and women between the ages of 18 and 45 who were living in RoI (N=3,002; women n = 1,515). The study was designed to describe attitudes, knowledge and behaviours relating to sexual health and, in particular, contraception and crisis pregnancy. Crisis pregnancy in this context was defined as “a pregnancy that represents a personal crisis or an emotional trauma in either of the following circumstances: (a) a pregnancy that began as a crisis, even if the crisis was subsequently resolved or (b) a pregnancy that develops into a crisis before the birth due to a change in circumstances.” [2]

Setting and sample

This population-based telephone survey was conducted in 2010. The random digit dialling of both landline and mobile phones and the quota sampling technique that was used to ensure a representative sample of the general population within this age band are described in detail in the main report and a separate publication. [2 19] The overall response rate to the survey was 69%.

Recruitment and consent

A standardised introduction to the study was used to describe who was carrying out the survey, its confidential nature and how the telephone numbers had been randomly selected. Following confirmation that the respondent was over 18 years of age and verbal agreement to participate, the telephone interview began.

Questionnaire survey
The telephone-administered questionnaire collected information on the participant’s socio-demographic data, living arrangements, children, sex education, knowledge and attitudes about contraception, contraceptive use over the last year, sources of contraception and contraceptive services, sexually transmitted infections, most recent sexual partnership, experience of pregnancy and knowledge of crisis pregnancy services, including abortion. The full questionnaire and dataset are available on request from the Irish Social Science Data Archive. For the present study, we highlight ten variables in our main analyses; these psychosocial variables were selected based on previous literature and variables that capture aspects of an individual’s motivation, capability and opportunity to use prescription contraception, as defined by the behaviour change wheel approach for identifying factors for behaviour change interventions. [20]

**Socio-demographic data**

In addition to age in years, data were gathered on marital and relationship status (married, separated, divorced, widowed and never married), education (primary or incomplete secondary only, complete secondary and third level) and whether respondents were in receipt of general medical services (GMS). Such entitlement is based on an assessment of individual’s income and is therefore a reliable indicator of socio-economic status; individuals with GMS have lower incomes. In 2010, approximately 40% of the population in RoI had GMS eligibility. At the time of this survey patients with such eligibility receive all medications, including contraceptives, free of charge; non-GMS patients pay for all prescriptions up to a monthly limit of approximately €90.

**Prescription contraception use in the last year**

In order to assess prescription contraception use, respondents were asked ‘Which of these methods of contraception or precautions to avoid pregnancy have you and any partner(s) used together in the last year?’ The first contraceptive mentioned on this list was ‘The contraceptive pill’. The fifth contraceptive method mentioned on the list was ‘Coil, intrauterine device or intrauterine system
(Mirena®)’. The eleventh method mentioned was ‘Injections (Depo Provera®) or Implanted contraceptive capsules’ (Implanon®). If respondents used these in the last year, they were scored as 1 and if not, they were scored as 0. It is important to note that this would not necessarily refer to continuous use of these methods. Participants were also asked which methods of contraception or precautions to avoid pregnancy had they ever heard of as part of this section.

Concerns about the OCP

Two items assessed concerns about the contraceptive pill. These were, ‘The contraceptive pill has dangerous side-effects’ and ‘Taking a break from the long-term use of the contraceptive pill is a good idea’. These were scored on a 5 point scale from 1 Strongly Agree to 5 Strongly Disagree. Higher scores related to lower concerns. There was a small to moderate positive correlation between these two items ($r = 0.15$, $p<0.01$), which indicates that they can be treated as distinct but related aspects of concerns about the OCP. A “Don’t know” response that was not part of the 5 point scale was used by approximately 3% of the participants; therefore, the two concern variables were dichotomised into ‘Agree’ versus ‘Other’ to preserve cases in the analyses. Those scoring Strongly Agree and Agree were classified as ‘Agree’ and all other responses were classified as ‘Other’.

Barriers to access

Various barriers to accessing contraception were assessed in ICCP-2010. These included the following items: Do not know where to get contraception/services, cannot access contraception/services in your locality, are embarrassed about accessing contraception/services, cannot afford contraception/services. The responses to these items were ‘Yes’ or ‘No’. As less than 1% of the overall sample responded ‘Yes’ to the item ‘Do not know where to get contraception/services,’ this variable was not included in the analyses. Therefore, these four variables are binary variables where participants were classified as Yes or No. Participants were also
asked ‘How difficult do you find it to get contraception?’ Responses were provided on a 4 point scale from 1 Very difficult to 4 Not at all difficult.

Data analyses

Descriptive statistics were calculated for the main study variables in order to characterise the sample. Independent t tests and Chi square tests for independence were used to compare groups on continuous and categorical data respectively. Logistic regression analyses were used to test multivariable models. The final complete multivariable model allowed the statistical independence of the predictive variables to be established. Logistic regression provides odds ratios and 95% confidence intervals for each predictor of prescription contraception use, which calculates estimates of effect sizes for the study predictors. As there were 536 OCP users (35%) and 152 intrauterine contraception users (10%) in this sample (n= 1,515), there were sufficient numbers of events per variable to use our multivariable logistic regression with 10 predictors. [21] As there were only 67 women using injections or sub-dermal contraceptive implants (4%) this analysis could provide less reliable estimates with 10 predictors. Moderation analyses were carried out using the moderation script for SPSS developed by Hayes and Matthes. [22] Moderation analyses were used to assess whether there were age dependent associations between beliefs about the OCP and OCP use. This tested whether the strength of the association between beliefs about the OCP and OCP use varies for different age groups. All analyses were weighted to ensure that the results are representative of the population. Full details of the weighting parameters used are provided in the ICCP-2010 report. [2]

Ethical approval

The original ICCP-2010 survey protocol received ethical approval from the Research Ethics Committee of the Royal College of Surgeons in Ireland (RCSI) and the programme of work that
includes the present analysis received ethical approval from the NUI Galway Research Ethics Committee (Reference: 14/Jan/03).

RESULTS

Sample

An outline of the sample characteristics grouped by prescription contraception users and non-users of that method is provided in Table 1. Forty-four women (3%) had used 2 or more of the OCP, intrauterine contraception, contraceptive injections or sub-dermal contraceptive implants in the previous year, therefore the totals do not equal 1515 participants in Table 1. The three most widely used methods of contraception were condoms (39%), the OCP (35%) and the intrauterine contraception (10%). The ‘non-users of LARCs’ column in Table 1 refers to participants who neither used intrauterine contraception use nor sub-dermal contraceptive implants as a method of contraception in the previous year. Full details of the study sample are provided elsewhere. [2]

Eighty-three per cent had heard of the OCP, 76% had heard of intrauterine devices/systems and 72% had heard of injections or sub-dermal contraceptive implants. Only 5% of women had not used any method of contraception in the previous year. OCP users, compared with non-OCP users, were significantly younger, were less likely to be married, less likely to be in receipt of GMS, less likely to believe that the pill has dangerous side effects, less likely to believe that taking a break from the long-term use of the contraceptive pill is a good idea, more likely to report difficulty in getting contraception, more likely to report that they could not access contraception/services in their locality and more likely to say they could not afford contraception/services. Intrauterine contraception users were significantly older, more likely to be married, less likely to have third level education and more likely to be in receipt of GMS. Injections or sub-dermal contraceptive implants users were more likely to be significantly younger, more likely to be unmarried, more likely to be in receipt of GMS and less likely to believe that taking a break from the long-term use of the
contraceptive pill is a good idea. In the total sample (n=1515), 37% agreed with the statement that the OCP had dangerous side effects and 68% agreed that taking a break from long-term use of the contraceptive pill was a good idea. The proportion of participants in all groups who reported barriers to access was relatively low i.e. ≤ 5%

Table 1

In the multivariable analysis presented in Table 2, all study variables were included regardless of univariate associations in order to assess the statistical independence of these determinants. In this table, odds ratios less than 1 are associated with non-use of the method; for example, being married and having general medical services were associated with non-use of the OCP as shown in Table 2. The multivariable model shows that younger age, being unmarried, not being in receipt of GMS and not believing that the OCP has dangerous side effects emerged as significant independent predictors of OCP use. The strongest predictor was not agreeing with the statement that ‘The contraceptive pill has dangerous side- effects’. This overall pattern of findings did not change when the continuous measures of education and concerns about the OCP were included in place of the dichotomised variables. In Table 2 intrauterine contraception use and sub-dermal contraceptive implants use are compared with non-use of these methods. Older age, being married and being in receipt of GMS were significant predictors of intrauterine contraception use, while younger age, being in receipt of GMS and not agreeing that taking a break from the long-term use of the contraceptive pill is a good idea were significant predictors of injections or sub-dermal contraceptive implants use. Being in receipt of GMS was the strongest predictor of both LARCs methods. The multivariate models accounted for a moderate amount of variability in prescription contraception use as indicated by the Nagelkerke $R^2$ value.

Table 2
Respondents who agreed that ‘The contraceptive pill has dangerous side effects’ were significantly older (M=32.26, SD =7.83 years versus M= 31.42, SD=7.41 years, t = -2.06, p=0.04), as were respondents who agreed that ‘Taking a break from the long-term use of the contraceptive pill is a good idea ’ (M=32.61, SD=7.44 years versus M=29.87, SD=7.53, t = -6.60, p<0.01). In moderation analyses, there was no significant interaction between age and believing that the OCP had dangerous side-effects in predicting OCP use. However, there was a significant interaction between age and believing that taking a break from the long term use of the contraceptive pill was a good idea (Interaction term Beta= -0.05, p <0.01). These age-dependent associations are provided in Table 3 below. This table compares the strength of this association, i.e. Beta values, at 1 standard deviation above and below the mean value of the moderator variable i.e. age. In older women, i.e. those 1 standard deviation (SD) above the mean age of 31.85 years agreeing with this statement was strongly predictive of pill non-use, whereas this was not the case among younger women i.e. those 1SD below the mean age. This decomposition of the interaction into these three groups is recommended by statistical texts describing this analytical method. [22]

<table>
<thead>
<tr>
<th>Table 3</th>
</tr>
</thead>
</table>

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For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml
Table 1 Sample characteristics of study participants (n= 1,515) by OCP or LARCs user status

<table>
<thead>
<tr>
<th>Variable</th>
<th>OCP user</th>
<th>Non-user</th>
<th>Intrauterine contraception</th>
<th>Injections or sub-dermal contraceptive implant</th>
<th>Non-users</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=536</td>
<td>n=978</td>
<td>n=152</td>
<td>n=67</td>
<td>n=1302</td>
<td></td>
</tr>
<tr>
<td>(35%)</td>
<td>(65%)</td>
<td>(10%)</td>
<td>(4%)</td>
<td>(86%)</td>
<td></td>
</tr>
<tr>
<td>Age in years (SD)</td>
<td>29 (7)**</td>
<td>33 (8)</td>
<td>36 (6)**</td>
<td>28 (7)**</td>
<td>31 (8)</td>
</tr>
<tr>
<td>Married (%)</td>
<td>169 (32)**</td>
<td>502 (51)</td>
<td>110 (72)**</td>
<td>21 (31)*</td>
<td>542 (42)</td>
</tr>
<tr>
<td>Education (% Third level)</td>
<td>223 (42)</td>
<td>391 (40)</td>
<td>45 (30)**</td>
<td>20 (30)</td>
<td>551 (42)</td>
</tr>
<tr>
<td>General medical services (% yes)</td>
<td>120 (22)*</td>
<td>279 (29)</td>
<td>65 (43)**</td>
<td>31 (46)**</td>
<td>307 (24)</td>
</tr>
<tr>
<td>The OCP has dangerous side-effects (% Agree)</td>
<td>143 (27)**</td>
<td>404 (42)</td>
<td>59 (39)</td>
<td>18 (27)</td>
<td>472 (37)</td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea (% Agree)</td>
<td>339 (63)**</td>
<td>678 (71)</td>
<td>103 (68)</td>
<td>32 (48)**</td>
<td>886 (69)</td>
</tr>
<tr>
<td>Question</td>
<td>Non-user group</td>
<td>Pacific island user group</td>
<td>South American island user group</td>
<td>Western island user group</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------</td>
<td>---------------------------</td>
<td>----------------------------------</td>
<td>---------------------------</td>
<td></td>
</tr>
<tr>
<td>How difficult do you find it to get contraception (SD)</td>
<td>3.76 (0.59)*</td>
<td>3.83 (0.49)</td>
<td>3.86 (0.48)</td>
<td>3.85 (0.53)</td>
<td>3.79 (0.55)</td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality (% yes)</td>
<td>27 (5)**</td>
<td>24 (2.5)</td>
<td>4 (3)</td>
<td>2 (3)</td>
<td>47 (4)</td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services (% yes)</td>
<td>21 (4)</td>
<td>23 (2)</td>
<td>4 (3)</td>
<td>1 (2)</td>
<td>39 (3)</td>
</tr>
<tr>
<td>Cannot afford contraception/services (% yes)</td>
<td>21 (4)*</td>
<td>19 (2)</td>
<td>5 (3)</td>
<td>0 (0)</td>
<td>35 (3)</td>
</tr>
</tbody>
</table>

*<0.05; **<0.01: Comparisons are with the non-user group of the specified contraception; SD: Standard deviation
Table 2 Multivariable logistic regression predicting prescription contraception use (1 =Yes, 0 = No) among study participants (n= 1,515)

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>OCP Odds ratio</th>
<th>95% CI</th>
<th>Intrauterine contraception Odds ratio</th>
<th>95% CI</th>
<th>Injections or subdermal contraceptive implant Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years (continuous)</td>
<td>0.92**</td>
<td>0.91,0.94</td>
<td>1.10**</td>
<td>1.06, 1.13</td>
<td>0.92**</td>
<td>0.88, 0.97</td>
</tr>
<tr>
<td>Unmarried (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Married</td>
<td>0.67**</td>
<td>0.51,0.89</td>
<td>2.48**</td>
<td>1.62, 3.80</td>
<td>1.09</td>
<td>0.56, 2.13</td>
</tr>
<tr>
<td>Education at Third level No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Education at Third level Yes</td>
<td>0.83</td>
<td>0.65,1.07</td>
<td>0.74</td>
<td>0.49, 1.12</td>
<td>0.74</td>
<td>0.41, 1.32</td>
</tr>
<tr>
<td>General medical services- No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
<td>Reference</td>
<td>Other</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----------</td>
<td>-------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>General medical services- Yes</td>
<td>0.62**</td>
<td>0.46, 0.83</td>
<td>2.63**</td>
<td>1.76, 3.91</td>
<td>2.31**</td>
<td>1.33, 3.99</td>
</tr>
<tr>
<td>The OCP has dangerous side-effects-Other (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The OCP has dangerous side-effects-Agree</td>
<td>0.52**</td>
<td>0.43, 0.68</td>
<td>1.19</td>
<td>0.81, 1.76</td>
<td>0.84</td>
<td>0.47, 1.49</td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea-Other (Ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea-Agree</td>
<td>0.89</td>
<td>0.68, 1.15</td>
<td>0.73</td>
<td>0.49, 1.11</td>
<td>0.48**</td>
<td>0.28, 0.81</td>
</tr>
<tr>
<td>How difficult do you find it to get contraception (continuous)</td>
<td>0.80</td>
<td>0.56, 1.15</td>
<td>1.32</td>
<td>0.66, 2.66</td>
<td>0.92</td>
<td>0.44, 1.91</td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality-No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality-Yes</td>
<td>1.20</td>
<td>0.55, 2.63</td>
<td>1.13</td>
<td>0.26, 4.97</td>
<td>0.71</td>
<td>0.11, 4.45</td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services-No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services-Yes</td>
<td>0.69</td>
<td>0.32, 1.52</td>
<td>1.48</td>
<td>0.39, 5.68</td>
<td>0.16</td>
<td>0.01, 2.13</td>
</tr>
<tr>
<td>Cannot afford contraception/services-No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cannot afford contraception/services-Yes  

<table>
<thead>
<tr>
<th></th>
<th>0.88</th>
<th>0.40, 1.92</th>
<th>2.31</th>
<th>0.63, 8.44</th>
<th>0.99</th>
<th>0.00, 0.00</th>
</tr>
</thead>
</table>

Nagelkerke $R^2$ for full model  

<table>
<thead>
<tr>
<th></th>
<th>0.17</th>
<th>0.18</th>
<th>0.11</th>
</tr>
</thead>
</table>

**<0.01; 1= Yes, 0 = No; 1= Agree, 0 = Other; 1= reference category for binary predictor variables, *numbers vary due to missing values on one or more variables in analyses.
Table 3 Association between agreeing that ‘taking a break from the oral contraceptive pill is a good idea’ and OCP non-use across younger, average and older age groups

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Beta</th>
<th>Standard error</th>
<th>95% CI Beta</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.23 (-1 SD)</td>
<td>0.09</td>
<td>0.15</td>
<td>-0.20, 0.39</td>
<td>0.53</td>
</tr>
<tr>
<td>31.85 (Mean)</td>
<td>-0.26</td>
<td>0.12</td>
<td>-0.50, -0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>39.46 (+1SD)</td>
<td>-0.61</td>
<td>0.19</td>
<td>-0.98, -0.24</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
DISCUSSION

The analysis provides a detailed description of the characteristics of prescription contraception users in RoI. Lower income, as indexed by having GMS, was the strongest predictor of both kinds of LARC use. These results highlight that concerns about the OCP are common and that these concerns are linked to prescription contraception use, with the strongest predictor of not using the OCP being the belief that ‘the contraceptive pill has dangerous side-effects’. The analysis also shows that the association between concerns and OCP use varied according to age, with the association being particularly strong among older women. This might be partly explained by exposure to historical reporting of specific health risks associated with the OCP that have since been shown to be unsupported. [5] It is also likely that the increased duration of exposure to the OCP that older users will have may also partly account for this. In the ICCP-2010 report [2] there was evidence indicating that contraception was a topic in the sex education of 70% of those between the ages of 18-25 years of age in the survey, but only 34% of those between the ages of 36-45 years of age said that contraception was mentioned. This might also partly explain the greater concerns about OCP reported by older women, as it is likely that access to accurate information about contraception was harder to access.

The independent links between prescription contraception use and age, marital status and having GMS i.e. having lower income, are consistent with observations seen in other countries. [10] The prevalence and predictive power of the two variables assessing concerns about the OCP suggests that concerns may continue to have an important role in contraceptive choice, as has been observed in earlier studies in other contexts. [23] The low numbers of respondents reporting barriers to access (≤ 5%) and the weak predictive power of ‘perceived difficulty’ of finding contraception measure suggest that access to contraception is no longer reported as a major problem among adults in RoI and probably not an important determinant of OCP use. However, it is important to acknowledge that there may be barriers to access in those under 18. [24] The findings
relating to sex education in ICCP-2010 [2] do indicate that contraception is more likely to be part of
the sex education of younger cohorts. However, it is not universally covered according to the data
and there is a relatively recent history of avoiding the topic in sex education [2], which may create
and reflect implicit social disapproval of contraception.

The predictive power of ‘concerns about the OCP’ and the potentially modifiable nature of
these beliefs suggest that reproductive health promotion needs to place particular emphasis on
shaping accurate beliefs about the OCP and indeed LARCs’ methods to optimise individual
contraceptive choices. In addition to this, it is clear that there are socio-economic determinants of
OCP use in that the current results show that OCP use was more common among those who did not
have GMS i.e. those with higher income, and LARCs use was more common among those who did
have GMS i.e. those with lower incomes. Therefore, although few people indicated that they could
not afford contraceptive services (<5%), it is likely that there are socio-economic barriers to
contraception use. Recent intervention studies, including natural experiments, suggest that
removing financial and other access barriers can have a substantial impact on uptake of
contraceptives, particularly LARCs. [25 26]

The OCP is currently a significantly less expensive option in the short term for those who do
not have GMS costing less than €20 per month. Therefore it is possible that LARCs methods, which
may cost up to €300 initially, are not financially feasible for those with incomes just above the
threshold that would entitle them to GMS. As a result, LARC use may predominate in those with
lowest incomes who do qualify for GMS and those with higher incomes in RoI, where the initial
higher cost is not a barrier. It is also worth noting that this socio-economic difference seen within RoI
reflects socio-economic differences between other countries in respect of LARC use. For example,
intrauterine contraception is more commonly used and often freely available in less economically
developed parts of the world, e.g. in Asia, there is a 27% prevalence among women using
contraception, whereas it is a relatively expensive option in many more wealthier regions e.g. 6%
prevalence in North America. [18] The socio-economic distribution of LARCs use in RoI is likely to reflect the non-universal coverage of prescription contraceptive costs for both the recipients and providers of contraceptive services.

Contraception has been a controversial socio-political topic in the RoI. Prescribing and having contraception of any description was illegal in the RoI until 1980 [27] and emergency contraception was not available without prescription until 2011. [28] This can be largely explained by the particular religious ethos that historically pervaded healthcare and politics in RoI. [29] This might also partly explain the greater concerns about OCP reported by older women in the present study. Given this cultural backdrop, policy measures such as providing free contraceptive services to all may be likely to receive resistance in RoI from religious lobby groups, even if evidence from health economic analysis in other contexts indicates that this investment may lead to health gain for the population. [30]

Limitations and strengths

There are a number of aspects of the methodology where alternative approaches would have been desirable. First, the data were entirely self-reported in the format of a telephone interview. This is subject to the usual problems of recall and social desirability biases in measurement. However this is a widely used approach with established reliability and validity that may be superior to face-to-face interviews for sensitive topics. [31] Second, the cross-sectional study design does not allow any causal inferences to be made from the data, as temporality in the relationships between variables cannot be established. Third, it would have been preferable to have psychometrically validated measures of concerns about the pill [15] and other related psychological constructs related to medication beliefs [14] and LARCs rather than the single item measures used in this study that only addressed the OCP. Fourth, there are a number of additional measures that were not included that would have provided useful information on contraceptive choice; for example,
whether the combined oral contraceptive or the progesterone only pill was used and/or whether the participant’s reason for using contraception was for contraception only or for other medical reasons. Finally, this is a unique health care context where funding models for contraceptive services differ from many other health care systems.

Nevertheless, there are several strengths to the present study which help to mitigate these limitations, including the representative sample of the general population within the specified age band who provided anonymised data, the reporting of multivariable and moderation analyses to provide a more detailed and nuanced assessment of the relationship between a broad range of predictors and prescription contraceptive use, the separate analyses for two different classes of LARCs which are sometimes considered together, [16] and the use of relatively recently collected data on this topic. This is particularly important due to the changing nature of contraceptive use over the last 10-15 years in this [2] and other international contexts. [1]

Conclusion

Prescription contraceptive use is socio-demographically patterned with LARCs’ methods in particular being associated with lower incomes in RoI. Despite the established safety of the OCP, concerns remain prevalent in RoI, which may reflect the socio-cultural context surrounding contraception. These concerns are important and modifiable determinants of contraceptive-related behaviour that appear to more resonance in older users of contraception. The evidence from this study suggests that further efforts are required to clarify the health risks associated with the OCP and LARCs. Future work will also need to establish who (e.g. GP or nurse), where (e.g. primary care or educational settings) and how (e.g. during consultations or sex education classes), this can be optimally delivered.
Funding This study was funded by a project grant awarded by the Health Service Executive Crisis Pregnancy Programme and administered by the Irish Research Council in December 2013 to Dr Gerry Molloy (Principal Investigator), Dr Karen Morgan, Dr Molly Byrne and Dr Andrew Murphy (Co-Investigators). Professor Carmel Hughes, Professor Roger Ingham and Professor Richard Layte were members of the steering committee for this study. The original ICCP-2010 study was also funded by the Health Service Executive Crisis Pregnancy Programme.

Competing interests None.

Participant consent Obtained.

Ethics approval The original ICCP-2010 survey protocol received ethical approval from the Research Ethics Committee of the Royal College of Surgeons in Ireland (RCSI) and the programme of work that includes the present analysis received ethical approval from the NUI Galway Research Ethics Committee (Reference: 14/Jan/03).

Contributors GM, KM, MB and AM conceived the research. GM carried out the research, data analysis and drafted the paper. All authors commented on and approved the final manuscript.

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Provision of no-cost, long-acting contraception and teenage pregnancy. New England


31. True K, Bajos N, Bohet A, Moreau C. Timing of contraceptive initiation and association with

<table>
<thead>
<tr>
<th>Item No</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title and abstract</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(a) Indicate the study’s design with a commonly used term in the title or the abstract</td>
</tr>
<tr>
<td></td>
<td>(b) Provide in the abstract an informative and balanced summary of what was done and what was found</td>
</tr>
<tr>
<td><strong>Introduction</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Explain the scientific background and rationale for the investigation being reported</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>State specific objectives, including any prespecified hypotheses</td>
</tr>
<tr>
<td>4</td>
<td>Present key elements of study design early in the paper</td>
</tr>
<tr>
<td>5</td>
<td>Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection</td>
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<tr>
<td>6</td>
<td>(a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up</td>
</tr>
<tr>
<td></td>
<td>Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls</td>
</tr>
<tr>
<td></td>
<td>Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants</td>
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<td></td>
<td>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed</td>
</tr>
<tr>
<td></td>
<td>Case-control study—For matched studies, give matching criteria and the number of controls per case</td>
</tr>
<tr>
<td>7</td>
<td>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable</td>
</tr>
<tr>
<td>8*</td>
<td>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</td>
</tr>
<tr>
<td><strong>Bias</strong></td>
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<td>9</td>
<td>Describe any efforts to address potential sources of bias</td>
</tr>
<tr>
<td><strong>Study size</strong></td>
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<td>10</td>
<td>Explain how the study size was arrived at</td>
</tr>
<tr>
<td><strong>Quantitative variables</strong></td>
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<td>11</td>
<td>Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why</td>
</tr>
<tr>
<td><strong>Statistical methods</strong></td>
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<td>12</td>
<td>(a) Describe all statistical methods, including those used to control for confounding</td>
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<td>(b) Describe any methods used to examine subgroups and interactions</td>
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<td>(c) Explain how missing data were addressed</td>
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<td>(d) Cohort study—If applicable, explain how loss to follow-up was addressed</td>
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<tr>
<td></td>
<td>Case-control study—If applicable, explain how matching of cases and controls was addressed</td>
</tr>
<tr>
<td></td>
<td>Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy</td>
</tr>
<tr>
<td></td>
<td>(e) Describe any sensitivity analyses</td>
</tr>
</tbody>
</table>

Continued on next page
Results

Participants 13* (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
(b) Give reasons for non-participation at each stage
(c) Consider use of a flow diagram

Descriptive data 14* (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
(b) Indicate number of participants with missing data for each variable of interest
(c) Cohort study—Summarise follow-up time (eg, average and total amount)

Outcome data 15* Cohort study—Report numbers of outcome events or summary measures over time
Case-control study—Report numbers in each exposure category, or summary measures of exposure
Cross-sectional study—Report numbers of outcome events or summary measures

Main results 16 (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
(b) Report category boundaries when continuous variables were categorized
(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses 17 Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

Discussion

Key results 18 Summarise key results with reference to study objectives

Limitations 19 Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias

Interpretation 20 Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence

Generalisability 21 Discuss the generalisability (external validity) of the study results

Other information

Funding 22 Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

# Prescription contraception use: A cross-sectional population study of psychosocial determinants

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Prescription contraception use: A cross-sectional population study of psychosocial determinants

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Key words: contraception; contraception behaviour; contraceptive methods; contraception, female

Word count: 4,596
Objective

Many forms of contraception are available on prescription only e.g. the oral contraceptive pill (OCP) and long acting reversible contraceptives (LARCs). In this analysis we aim to identify key determinants of prescription contraceptive use.

Design

Cross-sectional population survey. Data on socio-demographic indices, concerns about the OCP and perceived barriers to access were collected.

Setting

Dataset constructed from a representative population based telephone survey of community dwelling adults in the Republic of Ireland (RoI)

Participants

1,515 women aged between 18 and 45 years

Main outcome measure

Self-reported user of the OCP or LARCs (intrauterine contraception, contraceptive injections or sub-dermal contraceptive implants) in the previous 12 months

Results

For at least some of the previous year, 35% had used the OCP and 14% had used LARCs, while 3% had used two or more of these methods. OCP users were significantly younger, more likely to be unmarried and had higher income than non-users. Overall, 68% agreed with the statement ‘that taking a break from long term use of the contraceptive pill is a good idea’ and 37% agreed with the statement that ‘the OCP has dangerous side effects’ and this was the strongest predictor variable of non-use of the OCP. Intrauterine contraception users were significantly older, more likely to be married and had lower income than non-users. Injections or sub-dermal contraceptive implant users were significantly younger, less likely to be married, had lower income and were less likely to agree that taking a break from long-term use of the pill is a good idea than non-users.

Conclusions: Prescription contraceptive use is socio-demographically patterned, with LARCs in particular being associated with lower incomes in the RoI. Concerns about the safety of the OCP remain prevalent and are important and modifiable determinants of contraceptive-related behaviour.
Strengths and limitations of this study

- This is the first study to provide a detailed population level multivariable analysis of a range of psychosocial determinants of prescription contraceptive use, including concerns about the safety of the OCP, in a representative sample of over 1500 women in the Republic of Ireland.

- The study data were self-reported in a telephone interview and may be subject to recall and social desirability biases; however this is a widely used method to collect data on sexual health from large samples, and has established reliability and validity.

- The identification of both modifiable and non-modifiable determinants of prescription contraceptive use can inform targeted interventions to improve sexual and reproductive health.
INTRODUCTION

Many of the most effective and widely used methods of contraception usually require a prescription from a physician. [1] Data from the United Nations indicates that in more economically developed regions, the oral contraceptive pill (OCP), which is one such method, is second only to male condom use (18.4%) with an estimated international prevalence rate of 17.7% in women who are in a stable relationship. [1] OCP use has remained constant or has increased over the last 10 years in many countries, including Republic of Ireland (RoI) and the United Kingdom (UK). [2 3] The user-dependent nature of the OCP means that the failure rate of the OCP is substantially greater than long acting reversible contraception (LARCs) methods e.g. intrauterine contraception and subdermal contraceptive implants. [4] However, it is important to note that these methods are not suitable for all women. [5] There is also evidence that negative attitudes and misconceptions about specific types of LARC may be pervasive [6 7] including among health care providers [8 9]; therefore, use of these methods remains much lower than the OCP in many countries. [1]

Previous studies have shown that certain types of prescription contraception tend to be more widely used by certain demographic groups. However, these studies are somewhat dated, of variable methodological quality and from a limited range of socio-cultural contexts. [10] Additionally, these studies have not examined the independence of socio-demographic predictors in accounting for prescription contraception use. Some of these predictors become more closely related over time. For example, age and marital status have become more strongly associated with each other due to the increasing age at which people marry and the rapidly changing patterns of relationship stability in some countries. [11 12] It is also possible that there may be age-dependent beliefs about contraception, e.g. the OCP, which could determine its use. This may be due to the high profile reporting of health risks associated with earlier versions of the OCP to which older contraceptive users may have been exposed and the improved safety of more recent versions of the OCP. [5] In the context of RoI, there is also evidence that older contraceptive users may not have
received information on contraception as part of their formal sex education. [2] Analyses examining how beliefs about the OCP vary by age are necessary in order to elucidate under what conditions a range of factors explain patterns of OCP use.

Beliefs about the safety of medical treatments are of particular interest as these variables are potentially modifiable determinants of uptake and adherence to prescription contraception. There is a significant body of research focusing on the ‘Necessity-Concerns framework’ of treatment adherence over the last 15 years. [13 14] This approach emphasises the individual’s judgement of personal need for medication or other forms of treatment (necessity beliefs) and concerns about the potential adverse consequences of taking it e.g. side-effects and long-term use. Although much of this literature focuses on chronic illness, more recent work has identified similar associations between these treatment beliefs and adherence to the OCP, particularly concerns about the OCP. [15] This latter study was in a small sample of students (N=130) in the United Kingdom (UK), therefore the external validity of these findings is limited. In the present study, we examine whether a range of socio-demographic variables, including concerns about the OCP and barriers to access can account for prescription contraception use in a representative sample of women between the ages of 18-45 in the general population in RoI. Specifically, we examine OCP use and two types of LARC use, namely intrauterine contraception and contraceptive injections or sub-dermal contraceptive implants. Although some studies have combined these into one LARC user category [16], it is likely that the characteristics of users vary for these methods given the previous trends to avoid intrauterine contraception in nulliparous women. [17 18] Therefore, we assess intrauterine contraception use and contraceptive injections or sub-dermal contraceptive implants use separately in our analysis. Although these represent three distinct prescription contraception methods, the latter two methods are combined into one category in this study measure, due to the low frequency of use of contraceptive injections and sub-dermal contraceptive implants.
METHOD

Study design

Data were drawn from women who participated in the Irish Contraception and Crisis Pregnancy Study 2010 (ICCP-2010). [2] This was a nationally representative cross-sectional survey of men and women between the ages of 18 and 45 who were living in RoI (N=3,002; women n = 1,515). The study was designed to describe attitudes, knowledge and behaviours relating to sexual health and, in particular, contraception and crisis pregnancy. Crisis pregnancy in this context was defined as “a pregnancy that represents a personal crisis or an emotional trauma in either of the following circumstances: (a) a pregnancy that began as a crisis, even if the crisis was subsequently resolved or (b) a pregnancy that develops into a crisis before the birth due to a change in circumstances.” [2]

Setting and sample

This population-based telephone survey was conducted in 2010. The random digit dialling of both landline and mobile phones and the quota sampling technique that was used to ensure a representative sample of the general population within this age band are described in detail in the main report and a separate publication. [2 19] The overall response rate to the survey was 69%.

Recruitment and consent

A standardised introduction to the study was used to describe who was carrying out the survey, its confidential nature and how the telephone numbers had been randomly selected. Following confirmation that the respondent was over 18 years of age and verbal agreement to participate, the telephone interview began.

Questionnaire survey
The telephone-administered questionnaire collected information on the participant’s socio-demographic data, living arrangements, children, sex education, knowledge and attitudes about contraception, contraceptive use over the last year, sources of contraception and contraceptive services, sexually transmitted infections, most recent sexual partnership, experience of pregnancy and knowledge of crisis pregnancy services, including abortion. The full questionnaire and dataset are available on request from the Irish Social Science Data Archive. For the present study, we highlight ten variables in our main analyses; these psychosocial variables were selected based on previous literature and variables that capture aspects of an individual’s motivation, capability and opportunity to use prescription contraception, as defined by the behaviour change wheel approach for identifying factors for behaviour change interventions. [20]

Socio-demographic data

In addition to age in years, data were gathered on marital and relationship status (married, separated, divorced, widowed and never married), education (primary or incomplete secondary only, complete secondary and third level) and whether respondents were in receipt of general medical services (GMS). Such entitlement is based on an assessment of individual’s income and is therefore a reliable indicator of socio-economic status; individuals with GMS have lower incomes. In 2010, approximately 40% of the population in RoI had GMS eligibility. At the time of this survey patients with such eligibility receive all medications, including contraceptives, free of charge; non-GMS patients pay for all prescriptions up to a monthly limit of approximately €90.

Prescription contraception use in the last year

In order to assess prescription contraception use, respondents were asked ‘Which of these methods of contraception or precautions to avoid pregnancy have you and any partner (s) used together in the last year?’ The first contraceptive mentioned on this list was ‘The contraceptive pill’. The fifth contraceptive method mentioned on the list was ‘Coil, intrauterine device or intrauterine system
(Mirena®)’. The eleventh method mentioned was ‘Injections (Depo Provera®) or Implanted contraceptive capsules’ (Implanon®). If respondents used these in the last year, they were scored as 1 and if not, they were scored as 0. It is important to note that this would not necessarily refer to continuous use of these methods. Participants were also asked which methods of contraception or precautions to avoid pregnancy had they ever heard of as part of this section.

**Concerns about the OCP**

Two items assessed concerns about the contraceptive pill. These were, ‘The contraceptive pill has dangerous side-effects’ and ‘Taking a break from the long-term use of the contraceptive pill is a good idea’. These were scored on a 5 point scale from 1 Strongly Agree to 5 Strongly Disagree. Higher scores related to lower concerns. There was a small to moderate positive correlation between these two items ($r=0.15, p<0.01$), which indicates that they can be treated as distinct but related aspects of concerns about the OCP. A “Don’t know” response that was not part of the 5 point scale was used by approximately 3% of the participants; therefore, the two concern variables were dichotomised into ‘Agree’ versus ‘Other’ to preserve cases in the analyses. Those scoring Strongly Agree and Agree were classified as ‘Agree’ and all other responses were classified as ‘Other’.

**Barriers to access**

Various barriers to accessing contraception were assessed in ICCP-2010. These included the following items: Do not know where to get contraception/services, cannot access contraception/services in your locality, are embarrassed about accessing contraception/services, cannot afford contraception/services. The responses to these items were ‘Yes’ or ‘No’. As less than 1% of the overall sample responded ‘Yes’ to the item ‘Do not know where to get contraception/services,’ this variable was not included in the analyses. Therefore, these four variables are binary variables where participants were classified as Yes or No. Participants were also
asked ‘How difficult do you find it to get contraception?’ Responses were provided on a 4 point scale from 1 Very difficult to 4 Not at all difficult.

Data analyses

Descriptive statistics were calculated for the main study variables in order to characterise the sample. Independent t tests and Chi square tests for independence were used to compare groups on continuous and categorical data respectively. Logistic regression analyses were used to test multivariable models. The final complete multivariable model allowed the statistical independence of the predictive variables to be established. Logistic regression provides odds ratios and 95% confidence intervals for each predictor of prescription contraception use, which calculates estimates of effect sizes for the study predictors. As there were 536 OCP users (35%) and 152 intrauterine contraception users (10%) in this sample (n= 1,515), there were sufficient numbers of events per variable to use our multivariable logistic regression with 10 predictors. [21] As there were only 67 women using injections or sub-dermal contraceptive implants (4%) this analysis could provide less reliable estimates with 10 predictors. Moderation analyses were carried out using the moderation script for SPSS developed by Hayes and Matthes. [22] Moderation analyses were used to assess whether there were age dependent associations between beliefs about the OCP and OCP use. This tested whether the strength of the association between beliefs about the OCP and OCP use varies for different age groups. All analyses were weighted to ensure that the results are representative of the population. Full details of the weighting parameters used are provided in the ICCP-2010 report. [2]

Ethical approval

The original ICCP-2010 survey protocol received ethical approval from the Research Ethics Committee of the Royal College of Surgeons in Ireland (RCSI) and the programme of work that
includes the present analysis received ethical approval from the NUI Galway Research Ethics Committee (Reference: 14/Jan/03).

RESULTS

Sample

An outline of the sample characteristics grouped by prescription contraception users and non-users of that method is provided in Table 1. Forty-four women (3%) had used 2 or more of the OCP, intrauterine contraception, contraceptive injections or sub-dermal contraceptive implants in the previous year, therefore the totals do not equal 1515 participants in Table 1. The three most widely used methods of contraception were condoms (39%), the OCP (35%) and the intrauterine contraception (10%). The ‘non-users of LARCs’ column in Table 1 refers to participants who neither used intrauterine contraception use nor sub-dermal contraceptive implants as a method of contraception in the previous year. Full details of the study sample are provided elsewhere. [2]

Eighty-three per cent had heard of the OCP, 76% had heard of intrauterine devices/systems and 72% had heard of injections or sub-dermal contraceptive implants. Only 5% of women had not used any method of contraception in the previous year. OCP users, compared with non-OCP users, were significantly younger, were less likely to be married, less likely to be in receipt of GMS, less likely to believe that the pill has dangerous side effects, less likely to believe that taking a break from the long-term use of the contraceptive pill is a good idea, more likely to report difficulty in getting contraception, more likely to report that they could not access contraception/services in their locality and more likely to say they could not afford contraception/services. Intrauterine contraception users were significantly older, more likely to be married, less likely to have third level education and more likely to be in receipt of GMS. Injections or sub-dermal contraceptive implants users were more likely to be significantly younger, more likely to be unmarried, more likely to be in receipt of GMS and less likely to believe that taking a break from the long-term use of the
contraceptive pill is a good idea. In the total sample (n=1515), 37% agreed with the statement that the OCP had dangerous side effects and 68% agreed that taking a break from long-term use of the contraceptive pill was a good idea. The proportion of participants in all groups who reported barriers to access was relatively low i.e. ≤ 5%

Table 1

In the multivariable analysis presented in Table 2, all study variables were included regardless of univariate associations in order to assess the statistical independence of these determinants. In this table, odds ratios less than 1 are associated with non-use of the method; for example, being married and having general medical services were associated with non-use of the OCP as shown in Table 2. The multivariable model shows that younger age, being unmarried, not being in receipt of GMS and not believing that the OCP has dangerous side effects emerged as significant independent predictors of OCP use. The strongest predictor was not agreeing with the statement that ‘The contraceptive pill has dangerous side-effects’. This overall pattern of findings did not change when the continuous measures of education and concerns about the OCP were included in place of the dichotomised variables. In Table 2 intrauterine contraception use and sub-dermal contraceptive implants use are compared with non-use of these methods. Older age, being married and being in receipt of GMS were significant predictors of intrauterine contraception use, while younger age, being in receipt of GMS and not agreeing that taking a break from the long-term use of the contraceptive pill is a good idea were significant predictors of injections or sub-dermal contraceptive implants use. Being in receipt of GMS was the strongest predictor of both LARCs methods. The multivariate models accounted for a moderate amount of variability in prescription contraception use as indicated by the Nagelkerke $R^2$ value.

Table 2
Respondents who agreed that ‘The contraceptive pill has dangerous side effects’ were significantly older (M=32.26, SD =7.83 years versus M= 31.42, SD=7.41 years, \( t = -2.06, p=0.04 \)), as were respondents who agreed that ‘Taking a break from the long-term use of the contraceptive pill is a good idea’ (M=32.61, SD=7.44 years versus M=29.87, SD=7.53, \( t = -6.60, p<0.01 \)). In moderation analyses, there was no significant interaction between age and believing that the OCP had dangerous side-effects in predicting OCP use. However, there was a significant interaction between age and believing that taking a break from the long term use of the contraceptive pill was a good idea (Interaction term Beta= -0.05, \( p <0.01 \)). These age-dependent associations are provided in Table 3 below. This table compares the strength of this association, i.e. Beta values, at 1 standard deviation above and below the mean value of the moderator variable i.e. age. In older women, i.e. those 1 standard deviation (SD) above the mean age of 31.85 years agreeing with this statement was strongly predictive of pill non-use, whereas this was not the case among younger women i.e. those 1SD below the mean age. This decomposition of the interaction into these three groups is recommended by statistical texts describing this analytical method. [22]

Table 3
Table 1 Sample characteristics of study participants (n= 1,515) by OCP or LARCs user status

<table>
<thead>
<tr>
<th>Variable</th>
<th>OCP user n=536 (35%)</th>
<th>Non-user n=978 (65%)</th>
<th>Intrauterine contraception n=152 (10%)</th>
<th>Injections or sub-dermal contraceptive implant n=67 (4%)</th>
<th>Non-users n=1302 (86%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years (SD)</td>
<td>29 (7)**</td>
<td>33 (8)</td>
<td>36 (6)**</td>
<td>28 (7)**</td>
<td>31 (8)</td>
</tr>
<tr>
<td>Married (%)</td>
<td>169 (32)**</td>
<td>502 (51)</td>
<td>110 (72)**</td>
<td>21 (31)*</td>
<td>542 (42)</td>
</tr>
<tr>
<td>Education (% Third level)</td>
<td>223 (42)</td>
<td>391 (40)</td>
<td>45 (30)**</td>
<td>20 (30)</td>
<td>551 (42)</td>
</tr>
<tr>
<td>General medical services (% yes)</td>
<td>120 (22)*</td>
<td>279 (29)</td>
<td>65 (43)**</td>
<td>31 (46)**</td>
<td>307 (24)</td>
</tr>
<tr>
<td>The OCP has dangerous side-effects (% Agree)</td>
<td>143 (27)**</td>
<td>404 (42)</td>
<td>59 (39)</td>
<td>18 (27)</td>
<td>472 (37)</td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea (% Agree)</td>
<td>339 (63)**</td>
<td>678 (71)</td>
<td>103 (68)</td>
<td>32 (48)**</td>
<td>886 (69)</td>
</tr>
<tr>
<td>Problem</td>
<td>Non-users</td>
<td>Users</td>
<td>Non-users</td>
<td>Users</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-------</td>
<td>-----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>How difficult do you find it to get contraception (SD)</td>
<td>3.76 (0.59)*</td>
<td>3.86 (0.49)</td>
<td>3.85 (0.53)</td>
<td>3.79 (0.55)</td>
<td></td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality (% yes)</td>
<td>27 (5)**</td>
<td>24 (2.5)</td>
<td>4 (3)</td>
<td>2 (3)</td>
<td>47 (4)</td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services (% yes)</td>
<td>21 (4)</td>
<td>23 (2)</td>
<td>4 (3)</td>
<td>1 (2)</td>
<td>39 (3)</td>
</tr>
<tr>
<td>Cannot afford contraception/services (% yes)</td>
<td>21 (4)*</td>
<td>19 (2)</td>
<td>5 (3)</td>
<td>0 (0)</td>
<td>35 (3)</td>
</tr>
</tbody>
</table>

*<0.05; **<0.01: Comparisons are with the non-user group of the specified contraception; SD: Standard deviation
Table 2 Multivariable logistic regression predicting prescription contraception use (1 =Yes, 0 = No) among study participants (n= 1,515)

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>OCP Odds ratio</th>
<th>95% CI</th>
<th>IOD Odds ratio</th>
<th>95% CI</th>
<th>Injections or subdermal contraception Odds ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years (continuous)</td>
<td>0.92**</td>
<td>0.91, 0.94</td>
<td>1.10**</td>
<td>1.06, 1.13</td>
<td>0.92**</td>
<td>0.88, 0.97</td>
</tr>
<tr>
<td>Unmarried (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Married</td>
<td>0.67**</td>
<td>0.51, 0.89</td>
<td>2.48**</td>
<td>1.62, 3.80</td>
<td>1.09</td>
<td>0.56, 2.13</td>
</tr>
<tr>
<td>Education at Third level No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Education at Third level Yes</td>
<td>0.83</td>
<td>0.65, 1.07</td>
<td>0.74</td>
<td>0.49, 1.12</td>
<td>0.74</td>
<td>0.41, 1.32</td>
</tr>
<tr>
<td>General medical services- No (Reference)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Question</td>
<td>Estimate 1</td>
<td>CI Low</td>
<td>Estimate 2</td>
<td>CI Low</td>
<td>Estimate 3</td>
<td>CI Low</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
<td>--------</td>
<td>------------</td>
<td>--------</td>
<td>------------</td>
<td>--------</td>
</tr>
<tr>
<td>General medical services - Yes</td>
<td>0.62**</td>
<td>0.46</td>
<td>0.83</td>
<td>2.63**</td>
<td>1.76</td>
<td>3.91</td>
</tr>
<tr>
<td>The OCP has dangerous side-effects - Other (Reference)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>The OCP has dangerous side-effects - Agree</td>
<td>0.52**</td>
<td>0.43</td>
<td>0.68</td>
<td>1.19</td>
<td>0.81</td>
<td>1.76</td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea - Other (Ref)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Taking a break from the long-term use of the OCP is a good idea - Agree</td>
<td>0.89</td>
<td>0.68</td>
<td>1.15</td>
<td>0.73</td>
<td>0.49</td>
<td>1.11</td>
</tr>
<tr>
<td>How difficult do you find it to get contraception - (continuous)</td>
<td>0.80</td>
<td>0.56</td>
<td>1.15</td>
<td>1.32</td>
<td>0.66</td>
<td>2.66</td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality - No (Reference)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Cannot access contraception/services in your locality - Yes</td>
<td>1.20</td>
<td>0.55</td>
<td>2.63</td>
<td>1.13</td>
<td>0.26</td>
<td>4.97</td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services - No (Reference)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Are embarrassed about accessing contraception/services - Yes</td>
<td>0.69</td>
<td>0.32</td>
<td>1.52</td>
<td>1.48</td>
<td>0.39</td>
<td>5.68</td>
</tr>
<tr>
<td>Cannot afford contraception/services - No (Reference)</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Cannot afford contraception/services-Yes</td>
<td>0.88</td>
<td>0.40, 1.92</td>
<td>2.31</td>
<td>0.63, 8.44</td>
<td>0.99</td>
<td>0.00, 0.00</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------</td>
<td>-----------</td>
<td>------</td>
<td>-----------</td>
<td>------</td>
<td>-----------</td>
</tr>
</tbody>
</table>

Nagelkerke $R^2$ for full model | 0.17 | 0.18 | 0.11 |

**<0.01; 1= Yes, 0 = No; 1= Agree, 0 =Other; 1= reference category for binary predictor variables, *numbers vary due to missing values on one or more variables in analyses**
Table 3 Association between agreeing that ‘taking a break from the oral contraceptive pill is a good idea’ and OCP non-use across younger, average and older age groups

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Beta</th>
<th>Standard error</th>
<th>95% CI Beta</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.23 (-1 SD)</td>
<td>0.09</td>
<td>0.15</td>
<td>-0.20, 0.39</td>
<td>0.53</td>
</tr>
<tr>
<td>31.85 (Mean)</td>
<td>-0.26</td>
<td>0.12</td>
<td>-0.50, -0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>39.46 (+1SD)</td>
<td>-0.61</td>
<td>0.19</td>
<td>-0.98, -0.24</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
DISCUSSION

The analysis provides a detailed description of the characteristics of prescription contraception users in RoI. Lower income, as indexed by having GMS, was the strongest predictor of both kinds of LARC use. These results highlight that concerns about the OCP are common and that these concerns are linked to prescription contraception use, with the strongest predictor of not using the OCP being the belief that ‘the contraceptive pill has dangerous side-effects’. The analysis also shows that the association between concerns and OCP use varied according to age, with the association being particularly strong among older women. This might be partly explained by exposure to historical reporting of specific health risks associated with the OCP that have since been shown to be unsupported. [5] It is also likely that the increased duration of exposure to the OCP that older users will have may also partly account for this. In the ICCP-2010 report [2] there was evidence indicating that contraception was a topic in the sex education of 70% of those between the ages of 18-25 years of age in the survey, but only 34% of those between the ages of 36-45 years of age said that contraception was mentioned. This might also partly explain the greater concerns about OCP reported by older women, as it is likely that access to accurate information about contraception was harder to access.

The independent links between prescription contraception use and age, marital status and having GMS i.e. having lower income, are consistent with observations seen in other countries. [10] The prevalence and predictive power of the two variables assessing concerns about the OCP suggests that concerns may continue to have an important role in contraceptive choice, as has been observed in earlier studies in other contexts. [23] The low numbers of respondents reporting barriers to access (≤ 5%) and the weak predictive power of ‘perceived difficulty’ of finding contraception measure suggest that access to contraception is no longer reported as a major problem among adults in RoI and probably not an important determinant of OCP use. However, it is important to acknowledge that there may be barriers to access in those under 18. [24] The findings
relating to sex education in ICCP-2010 [2] do indicate that contraception is more likely to be part of
the sex education of younger cohorts. However, it is not universally covered according to the data
and there is a relatively recent history of avoiding the topic in sex education [2], which may create
and reflect implicit social disapproval of contraception.

The predictive power of ‘concerns about the OCP’ and the potentially modifiable nature of
these beliefs suggest that reproductive health promotion needs to place particular emphasis on
shaping accurate beliefs about the OCP and indeed LARCs’ methods to optimise individual
contraceptive choices. In addition to this, it is clear that there are socio-economic determinants of
OCP use in that the current results show that OCP use was more common among those who did not
have GMS i.e. those with higher income, and LARCs use was more common among those who did
have GMS i.e. those with lower incomes. Therefore, although few people indicated that they could
not afford contraceptive services (<5%), it is likely that there are socio-economic barriers to
contraception use. Recent intervention studies, including natural experiments, suggest that
removing financial and other access barriers can have a substantial impact on uptake of
contraceptives, particularly LARCs. [25 26]

The OCP is currently a significantly less expensive option in the short term for those who do
not have GMS costing less than €20 per month. Therefore it is possible that LARCs methods, which
may cost up to €300 initially, are not financially feasible for those with incomes just above the
threshold that would entitle them to GMS. As a result, LARC use may predominate in those with
lowest incomes who do qualify for GMS and those with higher incomes in RoI, where the initial
higher cost is not a barrier. It is also worth noting that this socio-economic difference seen within RoI
reflects socio-economic differences between other countries in respect of LARC use. For example,
intrauterine contraception is more commonly used and often freely available in less economically
developed parts of the world, e.g. in Asia, there is a 27% prevalence among women using
contraception, whereas it is a relatively expensive option in many more wealthier regions e.g. 6%
prevalence in North America. [18] The socio-economic distribution of LARCs use in RoI is likely to reflect the non-universal coverage of prescription contraceptive costs for both the recipients and providers of contraceptive services.

Contraception has been a controversial socio-political topic in the RoI. Prescribing and having contraception of any description was illegal in the RoI until 1980 [27] and emergency contraception was not available without prescription until 2011. [28] This can be largely explained by the particular religious ethos that historically pervaded healthcare and politics in RoI. [29] This might also partly explain the greater concerns about OCP reported by older women in the present study. Given this cultural backdrop, policy measures such as providing free contraceptive services to all may be likely to receive resistance in RoI from religious lobby groups, even if evidence from health economic analysis in other contexts indicates that this investment may lead to health gain for the population. [30]

Limitations and strengths

There are a number of aspects of the methodology where alternative approaches would have been desirable. First, the data were entirely self-reported in the format of a telephone interview. This is subject to the usual problems of recall and social desirability biases in measurement. However this is a widely used approach with established reliability and validity that may be superior to face-to-face interviews for sensitive topics. [31] Second, the cross-sectional study design does not allow any causal inferences to be made from the data, as temporality in the relationships between variables cannot be established. Third, it would have been preferable to have psychometrically validated measures of concerns about the pill [15] and other related psychological constructs related to medication beliefs [14] and LARCs rather than the single item measures used in this study that only addressed the OCP. Fourth, there are a number of additional measures that were not included that would have provided useful information on contraceptive choice; for example,
whether the combined oral contraceptive or the progesterone only pill was used and/or whether the participant’s reason for using contraception was for contraception only or for other medical reasons.

Finally, this is a unique health care context where funding models for contraceptive services differ from many other health care systems.

Nevertheless, there are several strengths to the present study which help to mitigate these limitations, including the representative sample of the general population within the specified age band who provided anonymised data, the reporting of multivariable and moderation analyses to provide a more detailed and nuanced assessment of the relationship between a broad range of predictors and prescription contraceptive use, the separate analyses for two different classes of LARCs which are sometimes considered together, [16] and the use of relatively recently collected data on this topic. This is particularly important due to the changing nature of contraceptive use over the last 10-15 years in this [2] and other international contexts. [1]

Conclusion

Prescription contraceptive use is socio-demographically patterned with LARCs’ methods in particular being associated with lower incomes in RoI. Despite the established safety of the OCP, concerns remain prevalent in RoI, which may reflect the socio-cultural context surrounding contraception. These concerns are important and modifiable determinants of contraceptive-related behaviour that appear to more resonance in older users of contraception. The evidence from this study suggests that further efforts are required to clarify the health risks associated with the OCP and LARCs. Future work will also need to establish who (e.g. GP or nurse), where (e.g. primary care or educational settings) and how (e.g. during consultations or sex education classes), this can be optimally delivered.
Funding This study was funded by a project grant awarded by the Health Service Executive Crisis Pregnancy Programme and administered by the Irish Research Council in December 2013 to Dr Gerry Molloy (Principal Investigator), Dr Karen Morgan, Dr Molly Byrne and Dr Andrew Murphy (Co-Investigators). Professor Carmel Hughes, Professor Roger Ingham and Professor Richard Layte were members of the steering committee for this study. The original ICCP-2010 study was also funded by the Health Service Executive Crisis Pregnancy Programme.

Competing interests None.

Participant consent Obtained.

Ethics approval The original ICCP-2010 survey protocol received ethical approval from the Research Ethics Committee of the Royal College of Surgeons in Ireland (RCSI) and the programme of work that includes the present analysis received ethical approval from the NUI Galway Research Ethics Committee (Reference: 14/Jan/03).

Contributors GM, KM, MB and AM conceived the research. GM carried out the research, data analysis and drafted the paper. All authors commented on and approved the final manuscript.

REFERENCES


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24. Bankole A, Malarcher S. Removing barriers to adolescents' access to contraceptive information and services. Studies In Family Planning 2010;41(2):117-24


    Provision of no-cost, long-acting contraception and teenage pregnancy. New England

31. True K, Bajos N, Bohet A, Moreau C. Timing of contraceptive initiation and association with
STROBE Statement—checklist of items that should be included in reports of observational studies

<table>
<thead>
<tr>
<th>Item No</th>
<th>Recommendation</th>
</tr>
</thead>
</table>
| **Title and abstract** | 1  
(a) Indicate the study’s design with a commonly used term in the title or the abstract  
(b) Provide in the abstract an informative and balanced summary of what was done and what was found |
| **Introduction** | 2  
Explain the scientific background and rationale for the investigation being reported |
| **Objectives** | 3  
State specific objectives, including any prespecified hypotheses |
| **Methods** | 4  
Present key elements of study design early in the paper |
| **Setting** | 5  
Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection |

| Participants | 6  
(a) **Cohort study**—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up  
(b) **Case-control study**—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls  
(c) **Cross-sectional study**—Give the eligibility criteria, and the sources and methods of selection of participants |
| **Variables** | 7  
Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable |
| **Data sources/measurement** | 8*  
For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group |
| **Bias** | 9  
Describe any efforts to address potential sources of bias |
| **Study size** | 10  
Explain how the study size was arrived at |
| **Quantitative variables** | 11  
Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why |
| **Statistical methods** | 12  
(a) Describe all statistical methods, including those used to control for confounding  
(b) Describe any methods used to examine subgroups and interactions  
(c) Explain how missing data were addressed  
(d) **Cohort study**—If applicable, explain how loss to follow-up was addressed  
**Case-control study**—If applicable, explain how matching of cases and controls was addressed  
**Cross-sectional study**—If applicable, describe analytical methods taking account of sampling strategy  
(e) Describe any sensitivity analyses |

Continued on next page
### Results

<table>
<thead>
<tr>
<th>Participants</th>
<th>13*</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed</td>
<td></td>
</tr>
<tr>
<td>(b) Give reasons for non-participation at each stage</td>
<td></td>
</tr>
<tr>
<td>(c) Consider use of a flow diagram</td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>Descriptive data</th>
<th>14*</th>
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<tbody>
<tr>
<td>(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders</td>
<td></td>
</tr>
<tr>
<td>(b) Indicate number of participants with missing data for each variable of interest</td>
<td></td>
</tr>
<tr>
<td>(c) <strong>Cohort study</strong>—Summarise follow-up time (eg, average and total amount)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome data</th>
<th>15*</th>
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</thead>
<tbody>
<tr>
<td><strong>Cohort study</strong>—Report numbers of outcome events or summary measures over time</td>
<td></td>
</tr>
<tr>
<td><strong>Case-control study</strong>—Report numbers in each exposure category, or summary measures of exposure</td>
<td></td>
</tr>
<tr>
<td><strong>Cross-sectional study</strong>—Report numbers of outcome events or summary measures</td>
<td></td>
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<table>
<thead>
<tr>
<th>Main results</th>
<th>16</th>
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</thead>
<tbody>
<tr>
<td>(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included</td>
<td></td>
</tr>
<tr>
<td>(b) Report category boundaries when continuous variables were categorized</td>
<td></td>
</tr>
<tr>
<td>(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Other analyses</th>
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<tbody>
<tr>
<td>Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses</td>
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</tbody>
</table>

### Discussion

<table>
<thead>
<tr>
<th>Key results</th>
<th>18</th>
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<tbody>
<tr>
<td>Summarise key results with reference to study objectives</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limitations</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Interpretation</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Generalisability</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discuss the generalisability (external validity) of the study results</td>
<td></td>
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</tbody>
</table>

### Other information

<table>
<thead>
<tr>
<th>Funding</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based</td>
<td></td>
</tr>
</tbody>
</table>

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.
Prescription contraception use: a cross-sectional population study of psychosocial determinants
Gerard J Molloy, Leigh-Ann Sweeney, Molly Byrne, Carmel M Hughes, Roger Ingham, Karen Morgan and Andrew W Murphy


Updated information and services can be found at: http://bmjopen.bmj.com/content/5/8/e007794

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