The Preferences of Women in Australia for the Features of Long-Acting Reversible Contraception: Results of a Discrete Choice Experiment

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PURPOSE: Long-acting reversible contraceptives (LARC), such as intrauterine devices (IUD) and implants, are highly effective. However, the uptake of LARC in Australia has been slow and the oral contraceptive pill (OC) remains the best known and most widely used contraceptive. Our aim was to investigate women's preferences for the features of LARC.

METHODS: We used a Discrete Choice Experiment (DCE) in which each respondent completed 12 choice tasks. We recruited a general population sample of 621 women in Australia aged 18-49 using an online survey panel. A mixed logit model was used to analyse DCE responses; a latent class model explored preference heterogeneity.

RESULTS: Overall, 391 (63%) of women were currently using contraception; 49.3% were using an OC. About 22% of women were using a LARC. Women prefer products that are more effective in preventing pregnancy, have low levels of adverse events (including negative effects on mood), and which their general practitioner (GP) recommends or says is suitable for them.

CONCLUSIONS: Women have strong preferences for contraceptive products that are effective, safe, and recommended by their GP. The results indicate which characteristics of LARCs need to be front and centre in information material and in discussions between women and HCPs.

Keywords: discrete choice experiment; patient preferences; long-acting reversible contraception, contraceptive choice, Australia

Introduction

Long-acting reversible contraceptives (LARC), defined as intrauterine devices (IUD) or implants, are highly effective. Implants and hormonal IUDs are subsidised by the Australian government. Rates of LARC use in Australia are slowly increasing (currently 10.8%) and recent data from the USA indicates similar rates (10%) [1]. in England, 29% of women using contraception are using a LARC (18% Implant, 11% IUD) [2]. In the Nordic countries, use of LARC is 10% in Iceland, 18% in Finland and 20% in Sweden [3].

LARCs are more effective than the most popular and widely used contraceptive in Australia, the oral contraceptive pill, have equal or lower rates of side-effects such as heavy or irregular bleeding and pelvic pain and are well accepted by women [4]. However, the process of obtaining a LARC is generally more time-consuming, and the up-front costs are higher than for the OC. In addition, discontinuation of a LARC requires removal by a health care professional.

While it is important not to allow enthusiasm for LARC to result in coercion to change contraception, it is also essential that health care professionals provide women with correct information regarding LARC and that structural barriers such as lack of access to providers of LARC and the high cost of insertion are removed for women who have made an informed choice to use LARC [5]. To further increase the acceptability and uptake of LARC, it is important from the perspective of both clinical practice and policy, to understand what features of LARC are preferred by women.

Methods

Study design

We used a discrete choice experiment (DCE) to investigate the features of LARC preferred by women. DCE are a popular stated preference tool used in health economics to address

policy questions or establish consumer preferences for health and health care. A DCE is designed as a hypothetical but realistic representation of an actual choice, operationalised as a survey. Typically, respondents are presented with a situation in which a choice must be made. They are shown sets of options and asked to choose their preferred option from each set presented to them. The options are described in terms of attributes (features); each attribute has a number of levels, chosen to vary over a plausible and policy-relevant range. The goal of the experiment is to estimate how the attribute levels affect respondent's choices, and the choices made reflect underlying preferences [6]. The advantage of DCE over traditional rating or ranking scales is that they force respondents to discriminate, or trade-off, between items [7].

We constructed a survey, including a DCE, which was completed online by an age-representative sample of women in Australia aged 18-49. The survey consisted of four sections: (1) background questions; (2) contraception questions; (3) choice tasks; and (4) follow-up questions. Each woman completed 12 choice tasks including 8 designed choice tasks and 4 choice tasks included to test comprehension and engagement with the tasks.

Sections 1 and 2 included introductory information, definitions, socio-demographic questions, questions about current and previous contraceptive use, family size and intention to have children.

In Section 3, respondents were asked to imagine that they were consulting their GP about contraception. This was followed by 12 choice tasks. Each task consisted of profiles of two different contraceptive options; respondents were asked to choose the option they preferred. After making each choice, respondents were asked whether they would swap from their current contraceptive to the option that they had just chosen.

The contraceptives were described by several attributes, each presented at one of a fixed number of levels. A list of potential attributes was identified based on a systematic

review by Coombe et al (2016) [8] and previous relevant DCE [9-13]. The final set of

attributes and associated levels used in the DCE were chosen using a multi-stage process,

outlined in Figure 1. The attributes and levels are shown in Table 1.

< Insert Figure 1 >

< Insert Table 1 >

An example of a choice task used in the survey is shown in Figure 2. A copy of the

full survey, including examples of choice tasks, is available in Section 1 of the supplementary

material.

 < Insert Figure 2 >

Ethics approval was granted by the University of Technology Sydney Human

Research Ethics Committee (HREC Reference No. ETH18-2507).

Design of DCE

The DCE consisted of 128 choice tasks divided into 16 blocks of eight. To avoid the

possibility that respondents made all their choices based on one attribute only, all respondents

saw some choice tasks in which one or more of the attributes were presented at the same level

in both options.

Following pilot work (see Figure 1, Stage 4), four tasks were added to the final DCE

to test respondents' engagement with the survey, and their consistency in responding.

Detailed information about the design of the DCE is available in Section 2 of the

supplementary material.

Follow-up questions

To gain additional information about the importance to women of specific characteristics of

contraceptive products, we asked respondents: a) which three factors were most important to

them in choosing a contraceptive (free text response); and b) which were the most and least

important factors, of those used in the DCE, when choosing between contraceptives.

At the end of the survey, respondents were asked to rate how difficult the tasks were on a five-point scale. Surveys with free text responses that were not English words were not included in the analysis.

Study Sample Selection

There are various approaches to determining the required sample size for a DCE, as summarised in [14]; we chose to collect at least 40 responses per choice set as this has been shown in [15] to give an acceptable estimate of the standard errors. Therefore, a total sample of 640 was required. A general population sample of 645 women in Australia aged between 18 and 49 was recruited through an online survey panel provider, Toluna Australia (https://au.toluna.com). Panel members complete surveys to earn points which can be exchanged for cash and/or rewards. Participants were invited to complete the survey and enrolled based on an age breakdown representative of Australian women of reproductive age. Respondents were asked to indicate consent at the end of the introduction to the survey and could end the survey at any point. Data for the final DCE were collected in September 2020.

Analysis of the choice questions

Initially a mixed logit model was used to analyse the responses to the DCE as it allows for preferences to vary across individuals and can account for correlation between parameters and between responses from the same individual. Marginal willingness to pay (mWTP) estimates were calculated to estimate the monetary value respondents placed on each attribute level.

Second, a latent class model was used to explore heterogeneity in women's preferences. A latent class model assumes there are Q latent classes with distinct preferences and predicts the probability of an individual belonging to each class. Respondents are

assigned to the class for which the predicted posterior probability of belonging is highest. This analysis was used to investigate the relationship between socio-demographic characteristics and respondents' preferences. The number of optimal classes was determined using the Bayesian Information Criterion (BIC). All models were estimated using Stata 16 [16, 17]. Further details of the models are provided in Section 4 of the supplementary material.

Results

Respondent demographics and contraceptive use

In total, 645 respondents completed the final version of the survey. Twenty-four surveys were excluded due to nonsensical responses (e.g., random words or phrases in free text responses), leaving a final sample of 621. Respondents were representative of Australian women in terms of age; however, they were better educated than average (Table 2). Further details about the respondents, including relationship and health information, can be found in Section 3 of the supplementary material.

< Insert Table 2 >

Overall, 391 (63%) of women were currently using contraception. Almost half (49.3%) were using an OC, followed by condoms (47.8%) and withdrawal (13.8%). The rate of LARC use (overall 22.5%: IUDs 11.0%; implants 11.5%) was more than double the Australian population rate (10.8) [18]. More than two-thirds (72.4%) reported that they had always used the same type of contraception (Table 3).

< Insert Table 3 >

Choice tasks comparing LARC with OC

The results of the mixed logit model show that women prefer products that are more

effective, have low levels of adverse events and which their GP recommends or says is suitable for them. Women look unfavourably on products which are more likely to cause irregular and/or heavy bleeding, have a negative effect on mood, cost more and which their GP says may not be suitable for them (Figure 3). The mWTP estimates indicate that women are willing to pay for contraceptive products that have a low risk of serious side effects and which their GP has recommended or said is a suitable method for them. However, women need to be compensated to use a less effective method of contraception or one that has negative effects on their mood (Figure 3). A further model using cost as a categorical variable demonstrated that high costs for IUDs and implants are regarded unfavourably compared to high costs for OC; further details in Sections 5 and 6 of the supplementary material. The results show significant heterogeneity in women's preferences for the type and cost of contraception, and this is investigated further using latent class modelling.

< Insert Figure 3 >

The results of the latent class model indicate that two distinct groups of respondents (classes) explain the heterogeneity in preferences. The classes do not differ in terms of education, income, age, health status, state of residence or percentage using contraception. In Class 1 (N=179, 28.8%) are women whose preferences are highly influenced by a contraceptive's effectiveness, that is, its ability to prevent pregnancy. Members of Class 1 prefer products that do not negatively affect mood and have lower risk of adverse events; they are less likely to prefer products which their GP tells them may not be suitable for them. Class 2's (N=442, 71.2%) most noticeable characteristic is their positive preference for OC; members also prefer products which their GP says are suitable or recommends for them (Figure 4). Notably, all respondents (49; 7.9%) who appeared to not be engaged with the survey were members of Class 2. Models comparing only LARC can be found in Section 7 of the supplementary material.

< Insert Figure 4 >

Engagement and consistency

Removing respondents who were not consistent in their response to the repeated choice task, or who chose the inferior option in one of the dominated tasks did not change the overall results in terms of preferences. More details are provided in Section 8 of the supplementary material.

Results of follow-up questions

A follow-up question asked respondents which factors were least or most important to them when making their choices. Women indicated that the chance of pregnancy (27%), effect on mood (18%) and risk of serious adverse events (15%) were the most important factors. These directly stated preferences are consistent with the results of the analysis of the DCE.

Most respondents (78.6%) reported that they found the choice tasks either easy (51.2%) or extremely easy (27.4%) to understand; 5.8% indicated that these tasks were difficult (5.5%) or extremely difficult (0.3%). More details about the follow-up questions are available in Section 9 of the supplementary material.

Discussion

The results from this DCE, reinforced by respondents' direct rankings of product characteristics, show that women are guided by the recommendation of their GP and have strong preferences for contraceptive methods that are effective, safe and do not negatively affect their mood. High cost was a disincentive to product choice; this result was more pronounced for LARC compared to OC. The fact that some LARC products are subsidised by the Australian government does not make them free. Their administration and removal typically involve additional consultations, often involving upfront fees that can be

prohibitively high for disadvantaged women. Access to services may be very limited or not available at all to women not living in an inner metropolitan area.

Several published studies have reported the use of stated preference methods to investigate various aspects of preferences for contraceptives. Weisberg et al (2013) compared the preferences of women and providers in terms of features of contraceptive products [11]. They found that while both groups favoured the same features (longer duration of protection from pregnancy, lighter periods with less pain or amenorrhoea), they varied in terms of the least attractive features. Women disliked heavy, painful and/or irregular periods, decreased efficacy, and weight gain, while providers disliked higher rates of pregnancy and heavy periods. The current study reinforces these results for women, thus underlining which features of LARC (such as effectiveness, effect on bleeding, safety, or impact on mood) will be most useful for health care professionals in their discussions with women regarding LARC. The findings also point to which aspects of LARC are most suitable for inclusion in general information provided to women and in education designed for providers.

Knox et al (2013), investigating the effect of adverse information and positive promotion on women's preferences for contraceptive products, found that compared to basic information, adverse information did not affect preferences, but positive promotion had a modest positive effect on them. While the approach used is similar and the results are consistent in that women respond positively if their GP either recommends LARC or tells them that a specific LARC is suitable, our rigorous pilot work allowed us to include mood and adverse events as additional attributes [12].

This study has a number of strengths and novel features. The DCE was carefully designed using a combination of a thorough synthesis of qualitative research and pilot testing in two stages. We recruited a large, generally representative sample of women in Australia based on age quotas. However, a higher proportion of women with experience of LARC was

recruited. We can only speculate on the reasons for this as there was no mention of LARC in either the title or introduction to the survey. More LARC users than non-LARC users may not have dropped out of the survey. Our sample was more highly educated and richer than the Australian population; both characteristics are correlated with higher LARC use.

Testing for engagement and consistency (in line with current best practice recommendations) found that 70%-80% of respondents were engaged with the DCE and consistent in their responses. The fact that engaged and consistent respondents were even more likely to prefer products that were effective, cheaper, and less likely to result in adverse events increases our confidence in the results.

The research also has some limitations. All DCE are limited by the small number of attributes that it is practical to include. Although the members of the respondent panel were generally representative of Australian women of reproductive age, the ones who answered our survey were better educated and fewer were from culturally and linguistically diverse communities.

There are some women who are very unlikely to consider changing to LARC; in this DCE approximately 25% of the women were clearly committed users of OC. This topic will be developed further in a subsequent publication.

Implications and Conclusions

The most interesting implication of our study is that to increase uptake, the cost of LARC would need to be reduced to below the average annual cost of OC. Policy makers would need to consider ways in which costs associated with acquiring a LARC might be reduced or eliminated, particularly for disadvantaged and/or vulnerable women if they wanted to encourage more women to use LARCs.

The implication from our finding that GPs can influence health behaviour is that their recommendation that a woman use a LARC is an effective means of increasing their use.

It is important that health care professionals, including GPs, practice nurses and community pharmacists, understand and communicate to women accurate information regarding LARC. The results reported in this paper reinforce which characteristics of LARC need to be emphasized in information materials and in discussions between women and health care professionals. For example, their higher rates of effectiveness may be particularly relevant to women when circumstances make it more likely that they will consider a LARC; such as, when a woman specifically requests a consultation to discuss her contraceptive needs (e.g., a young woman commencing contraception or a woman dissatisfied with her current product) and following emergency contraception, an unplanned pregnancy or abortion.

Cost is an important issue for women. Although the cost of some LARC products is subsidised by the Australian government, their administration and removal typically involve additional consultations, sometimes by a different clinician to their GP.

Disclosure statement

The authors report there are no competing interests to declare.

Data availability

The data that support this study will be shared upon reasonable request to the corresponding author.

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Table 1. The attributes and levels used in the DCE

Attributes	Intrauterine device (IUD) *Mirena®*	Subdermal implant *Implanon®, Nexplanon®*	Oral contraceptive *'the pill'*
Chance of becoming pregnant in one year	**1** in **1000** women will get pregnant **1** in **500** women will get pregnant **1** in **100** women will get pregnant	**1** in **1000** women will get pregnant **1** in **500** women will get pregnant **1** in **100** women will get pregnant	**1** in **100** women will get pregnant **7** in **100** women will get pregnant **10** in **100** women will get pregnant
Effect on mood	No effect on mood Positive effect on mood Negative effect on mood	No effect on mood Positive effect on mood Negative effect on mood	No effect on mood Positive effect on mood Negative effect on mood
Effect on bleeding	No change in monthly period High chance of no period in the <u>long term</u> Low chance of no period in the <u>long term</u> High chance of irregular bleeding in the <u>short term</u> Low chance of irregular bleeding in the <u>short term</u> High chance of heavy bleeding in the <u>short term</u> Low chance of heavy bleeding in the <u>short term</u>	No change in monthly period High chance of no period in the <u>long term</u> Low chance of no period in the <u>long term</u> High chance of irregular bleeding in the <u>short term</u> Low chance of irregular bleeding in the <u>short term</u> High chance of heavy bleeding in the <u>short term</u> Low chance of heavy bleeding in the <u>short term</u>	No change in monthly period High chance of no period in the <u>long term</u> Low chance of no period in the <u>long term</u> High chance of irregular bleeding in the <u>short term</u> Low chance of irregular bleeding in the <u>short term</u> High chance of heavy bleeding in the <u>short term</u> Low chance of heavy bleeding in the <u>short term</u>
Risk of serious adverse event	1 in 200 women 1 in 1000 women 1 in 10,000 women	1 in 200 women 1 in 1000 women 1 in 10,000 women	1 in 200 women 1 in 1000 women 1 in 10,000 women
Your GP	Recommends this product for you Says this may not be a good method for you Says this is a suitable method for you Makes no recommendation	Recommends this product for you Says this may not be a good method for you Says this is a suitable method for you Makes no recommendation	Recommends this product for you Says this may not be a good method for you Says this is a suitable method for you Makes no recommendation
Cost	$0 (fully subsidised) $41 now, nothing for 5 years $153 now, nothing for 5 years $364 now, nothing for 5 years $735 now, nothing for 5 years	$0 (fully subsidised) $41 now, nothing for 3 years $138 now, nothing for 3 years $258 now, nothing for 3 years $360 now, nothing for 3 years	$0 (fully subsidised) $41 per year $124 per year $287 per year $428 per year
Administration	Specialist inserts IUD in uterus GP inserts IUD in uterus Nurse inserts IUD in uterus	Specialist inserts implant in arm GP inserts implant in arm Nurse inserts implant in arm	Oral tablet taken daily
Reversibility	Specialist removes IUD GP removes IUD Nurse removes IUD	Specialist removes implant GP removes implant Nurse removes implant	You stop taking the pill

Table 1 - Respondent summary statistics

	Respondents (N=621)	Australian Population
Nationality		
Australia	508 (81.8 %)	66.0 %
Other	113 (18.2 %)	34.0 %
Age[b]		
18-24 years	119 (19.2 %)	20.0 %
25-29 years	111 (17.9 %)	16.8 %
30-34 years	105 (16.9 %)	17.3 %
35-39 years	100 (16.1 %)	16.4 %
40-44 years	90 (14.5 %)	14.4 %
45-49 years	96 (15.5 %)	15.1 %
Education[c]		
Year 11 and below	22 (3.5 %)	23.2 %
Year 12	81 (13.0 %)	18.5 %
Post-high school (trade certificate/ diploma)	165 (26.5 %)	24.1 %
Bachelors' or honours degree	245 (39.5 %)	26.2 %
Post graduate degree (Masters / doctorate)	108 (17.4 %)	8.1 %
Household Income[d]		
Negative or zero income	8 (1.3 %)	0.4 %
$1 - $19,999 per year	32 (5.2 %)	4.5 %
$20,000 - $49,999 per year	76 (12.2 %)	24.4 %
$50,000 - $79,999 per year	111 (17.9 %)	17.8 %
$80,000 - $109,999 per year	111 (17.9 %)	15.0 %
$110,000 - $149,999 per year	97 (15.6 %)	11.4 %
$150,000 - $199,999 per year	76 (12.2 %)	14.4 %
$200,000 or more per year	64 (10.3 %)	12.0 %
Don't know / prefer not to say	46 (7.4 %)	-

Source: Australian Bureau of Statistics ([18]) [19] [20])

[a] Data obtained by the ABS is for females aged between 15 and 49

[b] Age groups were used as a quota for recruitment

[c] Data obtained by the ABS is for females between aged between 15 and 74

[d] Income breakdown is based on household income

Table 2 - Contraception use

	Respondents (N=621)
Current use of contraception	
Currently using contraception	391 (63.0%)
Not currently using contraception	217 (35.0%)
Don't know	13 (2.0%)
Current type of contraception[a]	
Oral contraception (pill, mini-pill[b])	193 (49.3%)
Hormonal IUD	43 (11.0%)
Copper IUD	19 (4.7%)
Diaphragm / cap	15 (3.8%)
Injection	24 (6.1%)
Implant	45 (11.5%)
Condom	187 (47.8%)
Don't know	1 (0.3%)
Other (ring, withdrawal, rhythm, surgical, abstinence)	115 (29.3%)
Respondent has always used this form of contraception	
Yes	283 (72.4%)
No	108 (27.6%)

[a] Women could pick multiple forms of contraception – does not add to 100%; [b]29 respondents chose both the mini-pill and the pill.
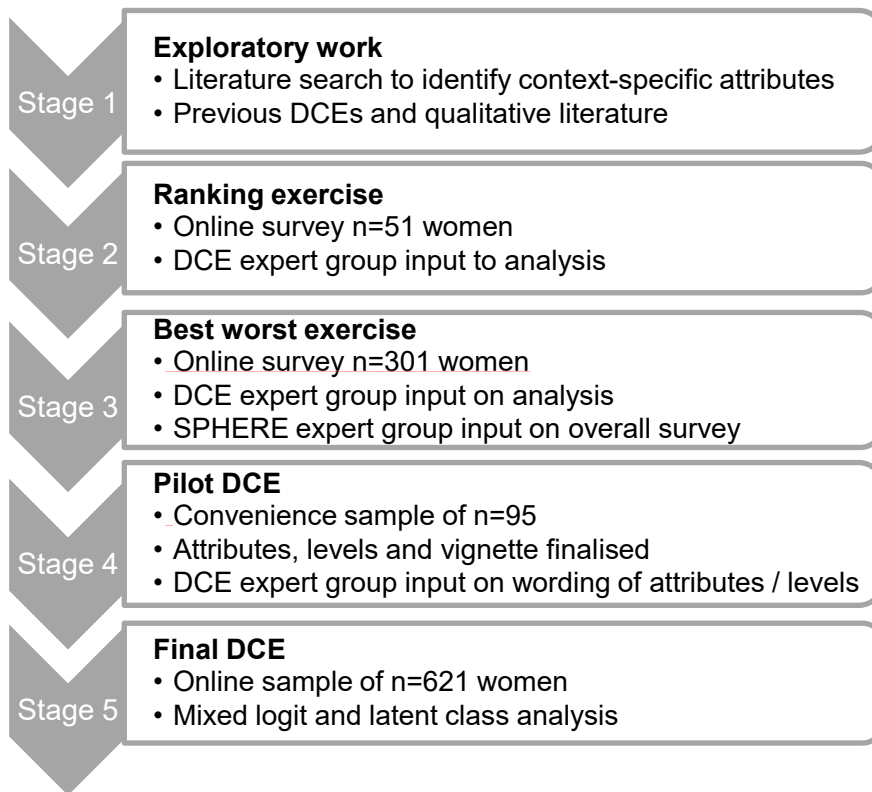
Stage 1

Exploratory work
• Literature search to identify context-specific attributes
• Previous DCEs and qualitative literature

Stage 2

Ranking exercise
• Online survey n=51 women
• DCE expert group input to analysis

Stage 3

Best worst exercise
• Online survey n=301 women
• DCE expert group input on analysis
• SPHERE expert group input on overall survey

Stage 4

Pilot DCE
• Convenience sample of n=95
• Attributes, levels and vignette finalised
• DCE expert group input on wording of attributes / levels

Stage 5

Final DCE
• Online sample of n=621 women
• Mixed logit and latent class analysis

Figure 1. The stages of the DCE process

Imagine you are consulting your GP about contraception. They have presented you with the following options. Which would you prefer?

	Intrauterine device (IUD) (Mirena®)	Oral contraceptive ("the pill")
Chance of becoming pregnant in one year	**1** in **100** women will get pregnant	**1** in **100** women will get pregnant
Effect on mood	No effect on mood	No effect on mood
Effect on bleeding	High chance of no period in the long term	High chance of irregular bleeding in the short term
Risk of serious adverse event	1 in 10,000 women	1 in 1000 women
Your GP	Says this is a suitable method for you	Recommends this product for you
Cost	$41 now, nothing for 5 years	$0
Administration	Specialist inserts IUD in uterus	Oral tablet taken daily
Reversibility	Specialist removes IUD	You stop taking the pill
What contraceptive method do you most prefer?	◯	◯

If the answer you chose above is not your current form of contraception would you be prepared to swap to the one you chose?
Select only one answer

◯ Yes, I would swap

◯ No, I prefer my current method

Figure 2. Example of a choice task as it appeared in the survey
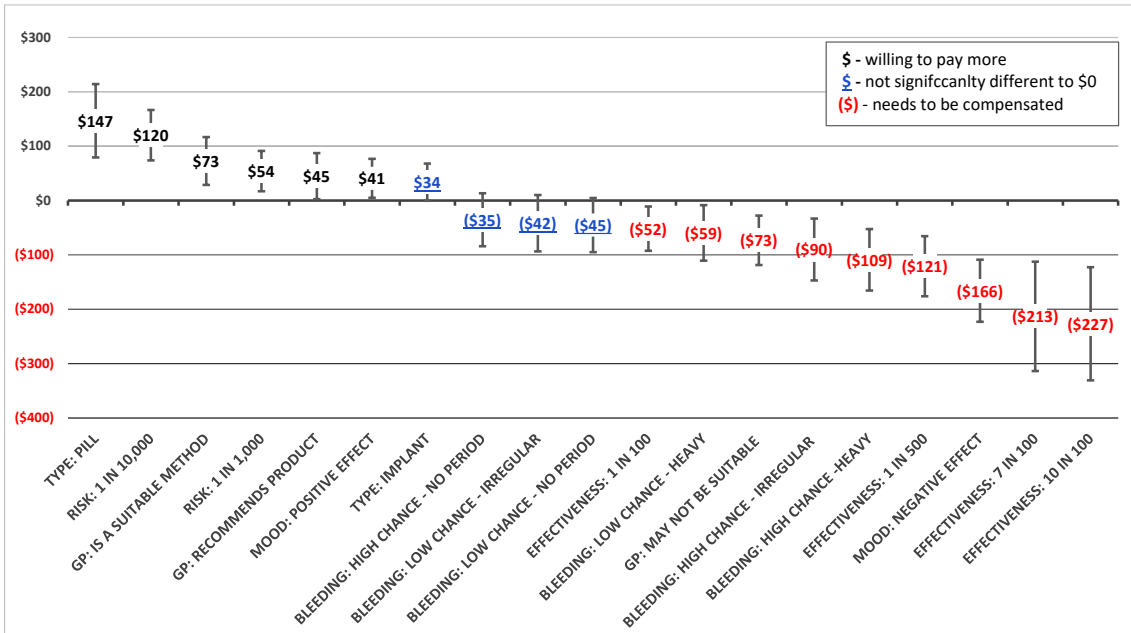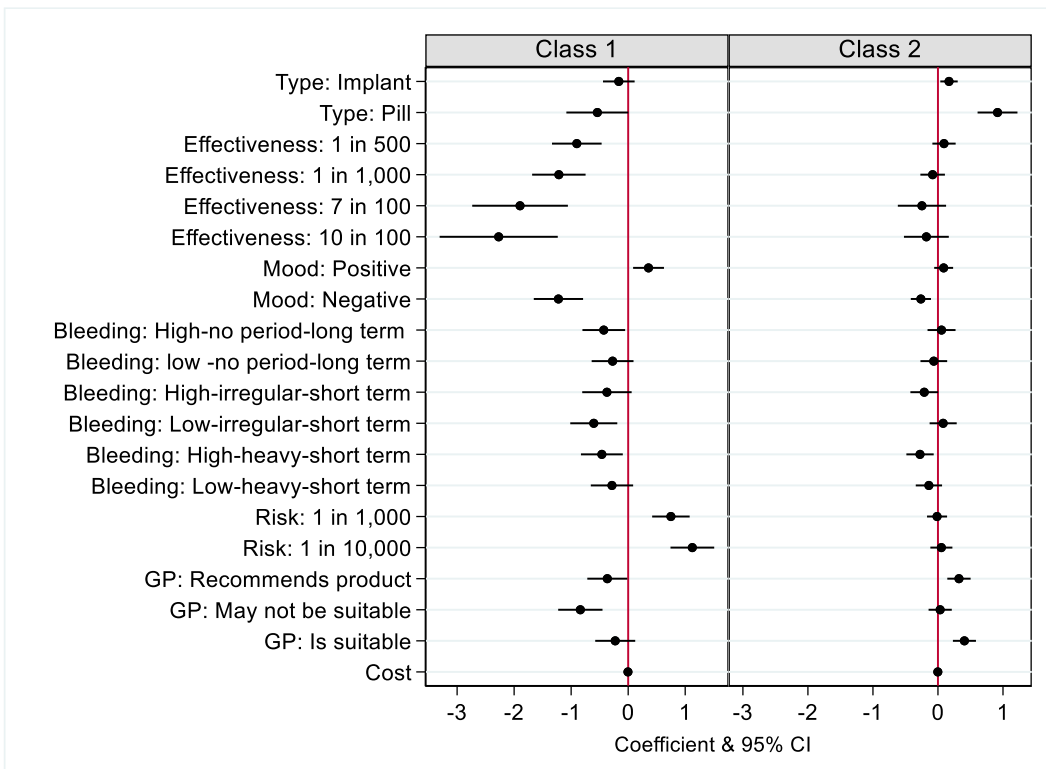
Figure 3. Willingness to pay estimates from the mixed logit model

Figure 4. Latent class analysis