Partner choice, Relationship Satisfaction and Oral Contraception: The Congruency Hypothesis

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Running head: The congruency hypothesis

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Abstract

Hormonal fluctuation across the menstrual cycle underpins temporal variation in opposite-sex attractiveness judgments. Use of combined oral contraceptives (COCs) could therefore influence both initial partner choice and intra-pair dynamics if contraceptive use subsequently changes. Associations between COC use and relationship satisfaction may thus be best understood by considering whether current use is congruent with use when relationships formed, rather than by considering current use alone. Here we test this congruency hypothesis in a survey of 365 couples. Controlling for potential confounds (including relationship duration, age, children, income), we find that congruency in current and previous COC use, but not current use alone, predicts women's sexual satisfaction with their partner. Congruency was not associated with women's non-sexual satisfaction, nor with satisfaction of male partners. Our results provide empirical support for the congruency hypothesis and suggest that women's sexual satisfaction is influenced by changes in partner preference associated with change in COC use.

Introduction

Psychological processes that shape the formation and maintenance of human romantic relationships are influenced by variation in hormonal levels. In women, for example, assessments of male attractiveness are sensitive to hormonal fluctuation across the menstrual cycle (reviews in (Gangestad & Thornhill, 2008; Jones et al., 2008; Roberts & Little, 2008). The use of exogenous hormones, such as those contained within combined oral contraceptives (COCs), might therefore alter women's mate preferences because they disrupt typical levels of, and cyclical variation in, sex steroid and other hormones (Alvergne & Lummaa, 2010; Jones et al., 2005; Puts, 2006; Roberts, Gosling, Carter, & Petrie, 2008; Wedekind, Seebeck, Bettens, & Paepke, 1995). Prospective tests have shown that initiating COC use alters women's partner preferences, at least for odor cues of

genetic dissimilarity (Roberts et al., 2008) and for facial masculinity (Little, Burriss, Petrie, Jones, & Roberts, 2013). COC use could therefore potentially influence both a woman's initial partner choice (if she uses COCs during relationship formation) and subsequent satisfaction with her choice (if she subsequently discontinues or initiates COC use; Roberts et al., 2012). Furthermore, as women's attractiveness to men also varies with menstrual cycle phase and COC use (Cobey, Buunk, Pollet, Klipping, & Roberts, 2013; Haselton & Gildersleeve, 2011; Havlicek, Dvorakova, Bartos, & Flegr, 2006; Kuukasjärvi et al., 2004; Puts et al., 2013), men's relationship satisfaction might also be influenced by changes in their partner's COC use.

Although the influence of menstrual cycle phase or COC use on attractiveness assessments is well-documented and can be measured relatively easily in the laboratory, the extent to which COC use plays a role in shaping relationship satisfaction in actual relationships has hardly been explored and tests of its influence are more challenging to design. However, one solution is to test the prediction that levels of satisfaction in romantic relationships are associated with *congruency* in COC use or non-use across time. If COC use has an influence beyond the laboratory, we would expect more positive assessments of relationship satisfaction in women (and/or their partners) whose current COC use or non-use matches her previous COC use (or non-use) specifically at the time of relationship formation, and particularly for sexual aspects of relationship satisfaction because these are more directly related to women's partner preferences (Roberts, Cobey, Klapilová, & Havlíček, 2013; Roberts et al., 2012).

The current study provides a direct test of the congruency hypothesis in a large sample of established couples. Both partners independently assessed their relationship satisfaction and women provided information about both current and previous COC use. The study design has three notable features. First, it compares the predictive power of women's previous COC use during partner choice, her current use, and the congruency between COC use at these two critical times, on aspects of current relationship satisfaction. Based on the congruency hypothesis (Roberts et al.,

2013), we predict the latter of these three effects will best explain variation in women's sexual satisfaction, but will not directly affect their non-sexual satisfaction. Second, the design allows us to compare differences in relative satisfaction associated with different routes to congruency in COC use. That is, in addition to testing effects of congruency *per se*, we could test for differences between women who met their partner using COC and who remain users versus women who were not using COC when they met their partner and who remain non-users. Finally, because we sampled both male and female partners in each couple, we could compare how congruency in COC use affects relationship assessments of both women and men. If effects are driven by changes in women's partner preferences rather than change in women's attractiveness to men, we would expect congruency-associated effects to be limited to women, or at least more evident in female than male partners.

Methods

Participants

We recruited 427 heterosexual couples from visitors to the Glasgow Science Centre, a public science exhibition venue. Of these, 62 couples were excluded because either women did not provide complete information about current or previous (i.e., when their relationship began) COC use (16 couples), were currently pregnant (or suspected they were) (8), had undergone a hysterectomy (3), or because either or both partners declined to answer questions on sexual satisfaction (35). For the remaining 365 couples (women's age: 34.1 ± 9.9; men's age: 36.1 ± 10.5), we coded women's responses about previous and current contraceptive use into three categories: 1) non-users of hormonal methods (includes couples not using any contraception, or those using condoms or other barrier methods, or sterilisation (sealing the fallopian tubes) or vasectomy), 2) users of combined oral contraceptives (COC), and 3) users of other hormonal methods (includes progesterone-only pill (mini-pill), hormonal intra-uterine

Table 1. Number of sampled couples according to the women's contraceptive method when the couple met and their current method.

Contraceptive method when couples met[1]	Current contraceptive method[2]			*Total*
	No HC	COC	Other HC	
No HC	**112**	19	16	*147*
COC	111	**47**	35	*193*
Other HC	4	3	**18**	*25*
Total	*227*	*69*	*69*	*365*

[1]No HC = women not using any form of hormonal contraception; COC = users of combined oral contraception; Other HC = women who used another form of hormonal contraception
[2] Numbers in bold indicate those whose previous and current contraceptive use is congruent (i.e. congruent n = 177, non-congruent n = 188)

devices, implants, injection). In cases where women used both a hormonal and a non-hormonal method, we coded according to the former. Sample sizes in each category are given in Table 1. Over several weekends of data collection at the Glasgow Science Centre, we aimed to collect approximately 150 couples who met while the woman was using COC and an equal number who met while using no hormonal contraception. We stopped data collection at the end of the weekend during which we reached this target.

Procedure

Participants were invited to take part in a study about relationship experiences. Having provided informed consent, couples were assigned a code number and each partner separately completed a sex-specific questionnaire. To ensure confidentiality and to facilitate honest responses, participants were told beforehand that they would be separated from their partner while they completed the questionnaires, and that questionnaires should then be folded and posted into a sealed ballot box. Female questionnaires contained items about both current contraceptive use and previous use (i.e. "When you began your relationship with your current partner, which forms of contraceptive methods did you use?"), and current pregnancy.

For men and women, we scored relationship satisfaction based on 4 items divided equally into measures of sexual and general (non-sexual) relationship satisfaction. The two sexually targeted items ("How satisfied are you with your partner's sexual adventurousness?", "How satisfied are you with your partner's ability to arouse you sexually?") were based on the study by Garver-Apgar, Gangestad, Thornhill, Miller, & Olp (2006), as were the two non-sexually targeted items ("How satisfied are you with your partner's financial provision/intelligence"). In both cases, these two item pairs were averaged to create an individual's composite sexual and non-sexual satisfaction scores. Although other items were potentially available from these studies, we chose only four due to the nature of the venue where data collection took place, which required a brief survey. The two sexually targeted items were key in Garver-Apgar et al.'s study and differed significantly between COC users and non-users in Roberts et al.'s study; in the current sample, they were highly correlated, $r(360) = .741$, $p < .0001$. The two non-sexual items differed most between COC users and non-users in Roberts et al.'s study, and in the current sample were also positively correlated, $r(359) = .474$, $p < .0001$.

To control for other potential influences on relationship satisfaction, we also included items on current income (on a 0-9 scale, where 0 = no income, 1 = <£20,000, 2 = £20,001-29,999, and so on up to 9 = £90,000 or more; scores were summed within couples for an estimate of household income), relationship duration (in years and months, converted to months), and whether or not they had at least one child with their partner. Occasional non-reporting of these control variables slightly reduced sample sizes in some analyses.

The study was carried out with ethical permission from the University of Stirling Ethics Committee.

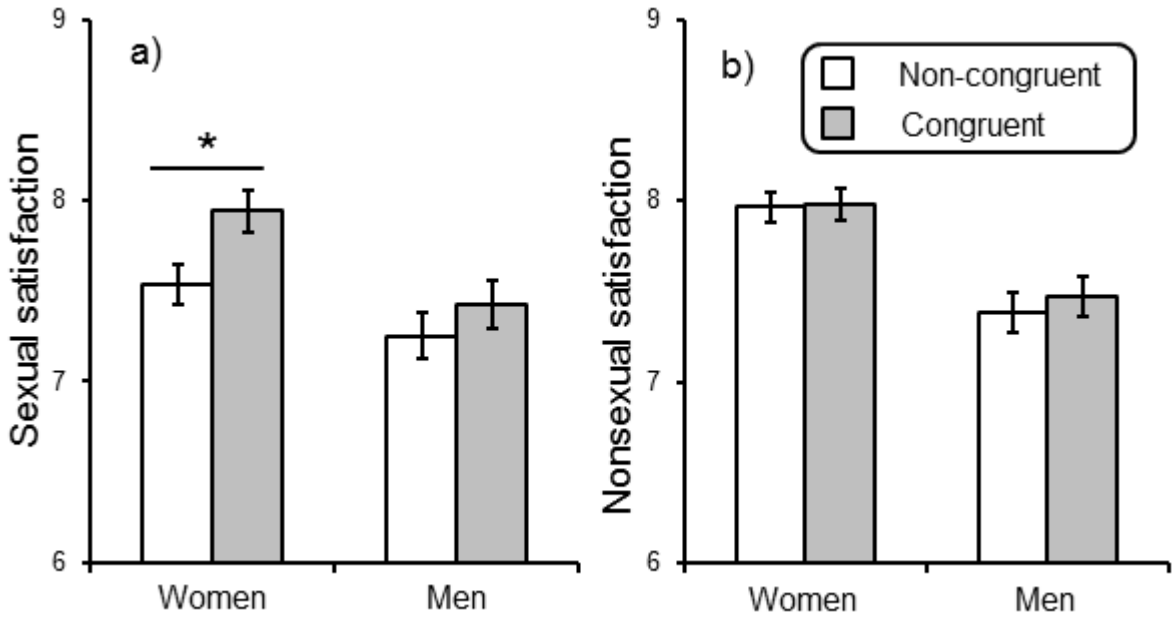
Results

Contraceptive congruency

We first tested whether relationship satisfaction was influenced by congruency in use or non-use of hormonal contraception; that is, whether a woman's current contraceptive method (as categorised in Table 1) matched (n = 177) or did not match (n = 188) her use at the time when the relationship began. For the two measures of relationship satisfaction, we carried out generalised linear models with congruency as a between-subject factor, finding a significant effect of congruency on women's sexual satisfaction, $F(1,363) = 6.54$, $p = .011$, $\eta_p^2 = .018$, but no significant effects for women's non-sexual satisfaction ($p = .871$), or for either satisfaction score in their male partners ($p = .341$ and .572, respectively) (Figure 1). This indicates that the congruency effect is specific to sexual satisfaction scores, and is restricted to women. Consistent with this, women's sexual satisfaction scores were significantly lower than their non-sexual satisfaction scores in the non-congruent group, paired $t(187) = -3.94$, $p < .001$, while there was no difference among the congruent group, $t(176) = -.39$, $p = .697$. In contrast, men's sexual satisfaction scores did not differ significantly from non-sexual satisfaction scores in either the non-congruent, $t(187) = -.99$, $p = .320$, or congruent group, $t(176) = -.33$, $p = .740$. Furthermore, while women reported higher sexual satisfaction scores than men in the congruent group, $t(176) = 3.60$, $p < .001$, this difference was not significant in the non-congruent group, $t(187) = 1.82$, $p = .070$. Finally, women's scores on non-sexual satisfaction were higher than men's, regardless of congruency (non-congruent, $t(187) = 4.11$, $p < .001$; congruent, $t(176) = 3.60$, $p < .001$).

To examine these effects further, controlling for other potential influences on satisfaction, we re-ran the models for sexual and non-sexual satisfaction, including one control factor (presence/absence of children) and several covariates (relationship duration, family income, and age). Sexual satisfaction scores were included as a covariate to

Fig. 1. Effect of congruency in use or non-use of hormonal contraception on mean (± standard error) scores for (a) sexual and (b) non-sexual satisfaction The asterisk denotes a significant main effect of congruency (p = .011). n = 188 couples in the non-congruent group, 177 couples in the congruent group.



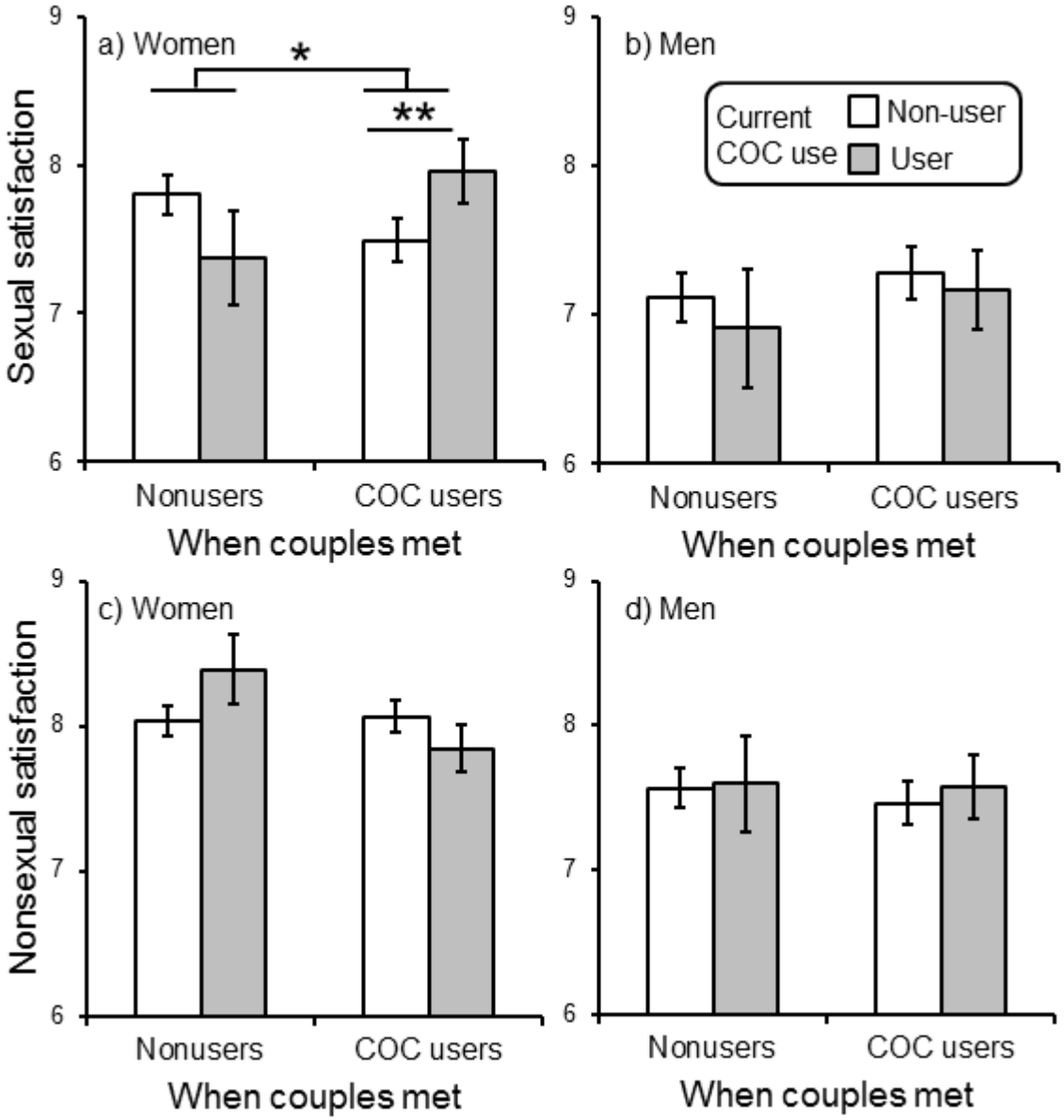
control for non-sexual satisfaction, and vice versa (c.f. Roberts et al., 2012). We again found a significant main effect of congruency for women's sexual satisfaction scores, $F(1,335) = 4.02$, $p = .046$, $\eta_p^2 = .012$, with higher scores reported by those whose current and previous contraceptive use was congruent, but there was no significant effect on women's non-sexual satisfaction. Furthermore, there was no significant effect of congruency on either satisfaction score in their male partners, even though sexual satisfaction scores within couples were positively correlated, $r(365) = .237$, $p < .0001$ (for means and full models, see Table S1 in the Supplemental Material online). In addition to the effect of congruency, women reporting higher sexual satisfaction were in newer relationships ($p = .024$), also reported higher non-sexual satisfaction ($p < .001$), and (although not significantly) were younger ($p = .069$). Full models are shown in Table S1.

Routes to congruency and non-congruency

Next, we explored the different routes to congruency or non-congruency. For the two measures of relationship satisfaction, we ran generalised linear models with two candidate between-subject factors (COC use when the relationship began, current COC use), as well as the same control variables as in the previous analyses. In these analyses we excluded users of non-COC hormonal contraception, and their partners, because too few women used such methods to be able to investigate directional changes in their use; this left 159 women whose current and previous use was congruent, and 130 whose use was non-congruent (Table 1). The congruency hypothesis predicts a significant interaction between previous and current COC use, with higher satisfaction scores for respondents whose COC usage is congruent.

For women's sexual satisfaction, there was no significant main effect of current COC use, $F(1,261) = 0.01$, $p = .932$, nor of COC use during partner choice, $F(1,261) = 0.43$, $p = .515$. However, as predicted by the congruency hypothesis, we found a significant interaction between previous (i.e. during partner choice) and current COC use on women's sexual satisfaction with her partner, $F(1,261) = 4.58$, $p = .033$, $\eta_p^2 = .017$. Women whose previous and current COC use was congruent reported higher sexual satisfaction with their partner than those whose use was non-congruent (Fig.2a). The full model is given in Table S2. Figure 2a illustrates this interaction and shows that, although non-congruency via either route was associated with lower sexual satisfaction scores, the difference is greater among women who were using COC when they met their partner. This was confirmed by post-hoc independent-samples *t*-tests, in which the congruency effect was significant in women who met their partner while using COC, $t\ (156) = 2.78$, $p = .007$, such that women who were using COC when couples met and were still using COC reported higher scores than those who were no longer using COC. In contrast, there was no significant difference between women who were not using COC when couples met and who were either still non-users or were now using COC, $t\ (129) = 0.203$, $p = .84$.

Fig. 2. Association between relationship satisfaction scores and women's current and previous (i.e. when couples met) COC use or non-use. Sexual (a,b) and non-sexual (c,d) satisfaction scores are shown for women (a,c) and men (b,d) from the same couples. Means are estimated marginal means (± standard error). In a), * denotes a significant (p = .033) interaction between current and previous COC use; ** denotes a significant (p < .01) difference in post-hoc pair-wise tests.



As before, we found no significant main effects of current COC use or of COC use when couples met, and no interaction, on women's non-sexual satisfaction (Fig.2c) or either measure of satisfaction in male partners (Fig.2b,d; full models are in Table S3).

Finally, we again carried out a confirmatory analysis of women's sexual satisfaction without any control variables. This revealed no significant main effects of current or previous COC use, but yielded a similar interaction between previous and current use: $F(1,285) = 2.74$, $p = .099$. Although this only bordered on statistical significance, the analysis indicates that the congruency effect was clarified, but not produced, by including these control variables.

Discussion

Our study is the first to compare relationship satisfaction of men and women in the light of current COC use, COC use when the relationship began, and congruency in COC use between these times. Our results indicate that congruency in COC use specifically predicts women's sexual (not non-sexual) satisfaction with their partner. Furthermore, the effects of COC congruency were evident only in women's, and not in their male partner's, satisfaction. According to our prediction, this indicates that the congruency effect on women's sexual satisfaction is likely underpinned by changes in women's partner preference due to COC use, rather than by changes in men's attraction to their partners as a result of their partners' COC use.

Our results are consistent with previous findings indicative of a congruency effect, where sexual satisfaction was higher among women who neither used COC when they met their partner nor at the time of sampling, compared with women who used COC during partner choice but had since discontinued use (Roberts et al., 2012). The current study extends these findings to include the alternative route to COC congruency, in which women used COC at both critical times. The results reveal that while COC congruency (via either route) generally predicts higher sexual satisfaction, sexual dissatisfaction associated with non-congruency was particularly evident in women who met their partner while using COC. Women who began their relationship using COC and subsequently discontinued use, reported

lower satisfaction than those who maintained COC use throughout the relationship. Recent studies indicate that change in COC use influences women's preferences for the odor of genetically dissimilar men (Havlicek & Roberts, 2009; Roberts et al., 2008; Wedekind et al., 1995) and men's facial masculinity (Little et al., 2013). Such changes could be responsible for our observed results, either because COC-discontinuation leads to a woman's preference realigning to a different, 'baseline' state, or because it leads to resumption of cyclical changes in preference, in which the degree of women's attraction to her partner may vary recurrently (Gangestad & Simpson, 2000; Gangestad & Thornhill, 2008; Penton-Voak et al., 1999).

While we frame our study in the context of an emerging literature on hormonal influences on women's partner preferences, and potential disruption of these effects by use of hormonal contraception, it is important to note that there are several alternative explanations for our results. For example, a change in use of hormonal contraception might influence sexual satisfaction through other ways than by acting on women's attraction to her partner, such as by influencing other aspects of sexual functioning (e.g., re-establishment of menses, levels of vaginal lubrication). Alternatively, as our analysis is correlational, non-causal explanations are possible, such that lower sexual satisfaction may cause, rather than result from, a change in use of hormonal contraception, or that another variable (e.g., a change in overall physical health) could influence both sexual satisfaction and use of hormonal contraceptives. It might also be that there is a correlation between women's levels of behavioral consistency, influencing their decisions to both switch between contraceptive methods and vary in their reports of sexual satisfaction. Further work is required to test these alternative explanations.

What is clear from our results is that use (or non-use) of hormonal contraception at the time of relationship formation, as well as subsequent changes in use, may both be necessary to reach an understanding of the influence of hormonal contraception on women's

relationship satisfaction. Neither current COC use, nor COC use at the time couples met, predicted sexual satisfaction independently. It is only when current use and previous use are considered together that significant effects emerge. Recognising the importance of this congruency effect may elucidate associations between COC use and a range of relevant behaviors. For example, congruency in hormonal contraceptive use also predicts women's relationship jealousy (Cobey, Roberts, & Buunk, 2013), and this may explain previously reported differences between users and non-users in mate retention behavior (Welling, Puts, Roberts, Little, & Burriss, 2012). Congruency in hormonal contraceptive use could thus influence a suite of behaviors, beginning with a woman's attraction to, and sexual satisfaction with, her partner, and leading onto other aspects of relationship functioning including jealousy and even, potentially, to relationship dissolution. We hope that our results will stimulate further tests of the congruency hypothesis and lead to better understanding of the effects of hormonal contraception on women's mating psychology and behavior.

Authorship

S.C. Roberts, A.C. Little and M. Petrie developed the study concept. All authors contributed to the study design. Testing and data collection were performed by R.P. Burriss and K.D. Cobey. S.C. Roberts and K.D. Cobey performed the data analysis. S.C. Roberts drafted the paper, and all authors provided critical revisions. All authors approved the final version of the paper for submission.

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