



# The influence of hormone replacement therapy on mating psychology among post-menopausal women



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## ABSTRACT

Hormone replacement therapy (HRT) is a popular treatment for menopause-related symptoms and is associated with increased well-being and sexual function. Researchers have investigated the effects of synthetic hormones within hormonal contraceptives on preferences for masculine men, and on behaviors directed towards male partners. Yet, no studies have examined the impact of synthetic hormones in HRT on mate preferences or mate-directed behavior among post-menopausal women. Here we tested the influence of HRT on women's reported sexual motivation, partner-directed behaviors (i.e., jealousy and mate retention behaviors), and mate preferences. Post-menopausal women ( $N = 213$ ) responded to an online survey and completed a two-alternative, forced-choice face preference task where they rated the attractiveness of male images manipulated in sexual dimorphism. We found that HRT use was positively associated with sexual satisfaction, attitudes towards unrestricted sex, and sexual interest towards extra-pair men. There were no differences between users versus non-users in partner-directed behavior or masculinity preferences. This study highlights the need for further investigations into hormonal influences on mate preferences and behavior among post-menopausal women.

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## 1. Introduction

There is growing evidence that hormones across the menstrual cycle influence mate preferences and partner-directed behavior in women (reviewed in Gildersleeve, Haselton, & Fales, 2014a,b). Women exhibit increased preferences for masculinity (a putative cue to genetic health; Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 2006) during their reproductive years (Little et al., 2010) and during the late follicular phase of the menstrual cycle, when conception is most likely to occur (e.g., Gangestad, Thornhill, & Garver-Apgar, 2010; Welling et al., 2007). Preference shifts across the female menstrual cycle correlate with specific hormones, although there is still debate surrounding which hormones are responsible for these shifts (reviewed in Welling & Puts, 2014). For example, the increased attraction to masculine facial traits at mid-cycle has been linked to increased levels of salivary testosterone (Welling et al., 2007) and estradiol (Roney & Simmons, 2008, 2013). Recent work has found that in-pair interest was positively associated with progesterone levels and negatively associated with estrogen levels (representing the low-fertility phase), whereas extra-pair interest was associated with elevated estradiol levels (representing high fertility; Grebe, Thompson, & Gangestad, 2015). However, the fertility-related shift in mate preferences may

depend in part on whether the woman's primary partner exhibits cues to genetic fitness; women partnered with less masculine men show significantly more interest in, and fantasies about, extra-pair men at peak fertility, whereas those with highly masculine partners reported greater attraction to and fantasies about their partner during peak fertility (Gangestad et al., 2010; see also Haselton & Gangestad, 2006; Pillsworth & Haselton, 2006). Similarly, other researchers have noted a mid-cycle peak in libido more generally (e.g., Matteo & Rissman, 1984), which has been positively linked with estradiol and negatively linked with progesterone (Roney & Simmons, 2013). Thus, changes in preferences across the cycle could be positively associated with estradiol and/or testosterone, negatively associated with progesterone, or the result of complex interactions between hormones. It is important to note, however, that some studies failed to find fluctuating preferences across the menstrual cycle (reviewed in Havlicek, Cobey, Barrett, Klapilova, & Roberts, 2015), highlighting the need for additional research.

Women using hormonal contraceptives (HCs) do not exhibit the same patterns of behavior or preferences as regularly-cycling women (reviewed in Welling, 2013). For instance, the mid-cycle shift in masculinity preferences is absent among HC users (Penton-Voak et al., 1999). Moreover, the initiation of HCs negatively impacts women's preferences for male facial masculinity (Little, Burriss, Petrie, Jones, & Roberts, 2013), and extended HC use is associated with weaker preferences for facial (Little, Jones, Penton-Voak, Burt, & Perrett, 2002) and vocal

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masculinity (Feinberg, DeBruine, Jones, & Little, 2008). These preference changes may influence partner choice, with women who met the father of their first child while using HCs (versus not using HCs) reporting lower sexual satisfaction with their partners (Roberts et al., 2012). The synthetic hormones found in HCs may influence partner-directed behavior; synthetic estrogen has been linked with increased sexual jealousy (Cobey, Pollet, Roberts, & Buunk, 2011) and use of mate retention behaviors (i.e., behaviors used to keep a partner faithful; Welling, Puts, Roberts, Little, & Burriss, 2012) in young partnered women. The investigation into the psychobehavioral effects of hormonal contraceptives is relatively new, but it suggests that the synthetic hormones found in combined HCs may alter fundamental aspects of relationships.

Although previous research investigating the influence of synthetic hormones on preferences and relationship-relevant behaviors has compared naturally-cycling women to HC users or compared different dosages within HC users, no studies have considered the impact of hormone replacement therapy (HRT) on mate preferences, sexual desire, or mate-directed behavior among post-menopausal women. Menopause is characterized by the decline of circulating estrogen and progesterone levels and the permanent cessation of menstruation (Hunter, 1990). Many physicians prescribe HRT in the form of synthetic estrogen and progestin to help alleviate physical and psychological discomforts associated with menopause (Stadberg, Mattsson, & Milsom, 1997). Indeed, one study reported that post-menopausal HRT users (versus non-users) fared better in all aspects of their sex life, including libido, sexual activity, sexual satisfaction, sexual pleasure, and frequency of orgasms (Taavoni, Kafshgiry, Shahpoorian, & Mahmoudie, 2005). Others, however, found that HRT improved sexual function, but not desire and arousal (González, Viáfara, Caba, & Molina, 2004). Synthetic hormones appear to alleviate sexual dysfunction for post-menopausal women (Kingsberg, 1998), but further research is clearly needed to determine effects of HRT on sexual desire and behavior. Also, unlike HCs, no research has investigated how HRT influences mate preferences or partner-directed behaviors.

The purpose of this study is to examine the influence of HRT on (1) sexual motivation, (2) partner-directed behaviors, and (3) mate preferences among post-menopausal women. We predicted that the synthetic hormones in HRT would cause similar behavioral changes as the synthetic hormones found in HCs. Specifically, because of the presence of synthetic estrogen in HRT used to treat menopausal symptoms (Stadberg et al., 1997), and because of previous research on behavioral effects of synthetic estrogen in HCs (Cobey et al., 2011; Welling et al., 2012), we predicted that HRT use would be associated with increased jealousy and mate retention behaviors. However, the higher estrogen relative to progesterone ratio of post-menopausal HRT users versus non-users mimics the fertile late-follicular phase of the menstrual cycle (e.g., Ross, Paganini-Hill, Wan, & Pike, 2000), whereas HCs have lower estrogen relative to progesterone and mimic the nonfertile mid-luteal phase of the menstrual cycle (e.g., Alvergne & Lummaa, 2009). Thus, as per previous research among naturally-cycling women tested at high and low fertility (e.g., Grebe et al., 2015; Penton-Voak et al., 1999; Roney & Simmons, 2008, 2013), we predicted that masculinity preferences and sexual motivation would be higher among HRT users versus non-users.

## 2. Methods

### 2.1. Participants

Heterosexual post-menopausal women ( $N = 213$ ) who reported currently being in a committed, exclusive relationship participated in this online study. The reported racial composition was 54.92% White, 29.10% Asian Indian, 5.16% American Indian, 4.69% Black, 4.20% mixed race, and 1.93% Other. In order to hold age relatively constant, participation was limited to those between the ages of 45 and 65 years. Eighty reported using some form of HRT (age:  $M = 50.52$  years,  $SD = 4.31$ ,

range = 45–63). However, participants who listed an unrecognized HRT brand ( $N = 7$ ), reported HRT use but listed non-hormonal supplements ( $N = 3$ ), or used testosterone-only HRT ( $N = 1$ ) were excluded from analyses, resulting in a final sample size of 69 HRT users (age:  $M = 51.83$ ,  $SD = 5.08$ ). Within HRT-users, 29 reported using combined estrogen and progesterone treatments (age:  $M = 51.01$ ,  $SD = 3.93$ ) and 29 reported using estrogen-only (age:  $M = 50.87$ ,  $SD = 4.17$ ). One hundred and thirty-three participants reported not using any hormonal supplements (age:  $M = 51.87$  years,  $SD = 5.14$ , range = 45–64), however two participants were excluded who reported having experienced menstrual bleeding within the past year. This yielded a final sample of 131 non-users.

### 2.2. Stimuli

Ten pairs of male faces were made using previously established computer graphics methods (Tiddeman, Burt, & Perrett, 2001) for use in the 2-alternative forced choice face preference tasks outlined below. Briefly, composite male and female faces were made by averaging the shape, color, and texture of 60 Caucasian men and 60 Caucasian women, respectively. Next,  $\pm 50\%$  of the differences in face shape between these composites was added to or subtracted from corresponding points on ten male identities (age:  $M = 22.62$  years,  $SD = 2.27$ ), leaving us with 10 pairs of faces where each pair consisted of a masculinized and a feminized version of the same individual (see Fig. 1). These manipulations have been shown to influence perceptions of masculinity in the predicted way (Welling et al., 2007).

### 2.3. Procedures

Participants were recruited online through social media (e.g., Facebook, Reddit) and Amazon's Mechanical Turk (MTurk). MTurk participants were compensated \$3.15 for their time (approximately 45 min). After clicking on the survey link, participants were directed to Qualtrics, an online survey platform. First, participants completed a basic demographics questionnaire (i.e., age, ethnicity, relationship status, sexual orientation), which included questions on last menstruation, HRT use, and HRT brand/dosage (if applicable). Next, participants completed a series of questionnaires in a random order. We investigated sexual motivation using three operational definitions: scores on the Revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008), scores on the Arizona Sexual Experience Scale (ASEX; McGahuey et al., 2000), and responses to Gangestad et al.'s (2010) measures of in-pair versus extra-pair interest. We investigated partner-directed behaviors using two operational definitions: the Revised Anticipated Sexual Jealousy Scale (Buunk, 1997) and the Mate Retention Inventory-Short Form (MRI-SF; Buss, Shackelford, & McKibbin, 2008).

#### 2.3.1. Sociosexual orientation

The SOI-R measures an individual's openness to uncommitted sexual relationships. It consists of nine items, representing three facets: behavior ( $\alpha = 0.78$ ) attitude ( $\alpha = 0.81$ ), and desire ( $\alpha = 0.82$ ; overall  $\alpha = 0.83$ ). Scores are averaged, and higher scores indicate an unrestricted sociosexual orientation (i.e., a high willingness to engage in sexual activities with an uncommitted partner; Penke & Asendorpf, 2008).

#### 2.3.2. Sexual experience

The ASEX is a five-item rating scale ( $\alpha = 0.94$ ) that quantifies sex drive, arousal, vaginal lubrication, ability to reach orgasm, and satisfaction from orgasm. Higher average scores indicate higher sexual dissatisfaction (McGahuey et al., 2000).

#### 2.3.3. In-pair versus extra-pair interest

Following Gangestad et al. (2010), participants responded to two questions assessing their sexual attraction to their primary partner ("I

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