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Presence of young children in the home may moderate development of hot flashes during menopausal transition

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Abstract

Objective—To determine the role of childcare on hot flashes. There are broad differences across cultures in the experience of vasomotor symptoms in perimenopausal women. Women in cultures where contact with young children is common report significantly fewer and less severe hot flashes than women in cultures where older women spend less time around children. Could these differences be related to the presence of young children?

Methods—We surveyed 117 healthy women undergoing prophylactic bilateral oophorectomy (removal of both ovaries to reduce the risk of gynecologic cancers). Participants provided demographic information, including pre-surgical menopausal status and number of children (aged < 13, 13 – 18, 18+ years) living at home. They were surveyed on menopausal symptoms 2 weeks prior to surgery, and then 2 months, 6 months, and one year following surgery.

Results—Women who were premenopausal at the time of surgery experienced a significant increase in vasomotor symptoms. Within this group, participants with young children at home reported significantly fewer vasomotor symptoms over time than women who did not live with young children. Women who were already menopausal at the time of surgery who had young children at home reported more vasomotor symptoms prior to surgery than did those without young children; however this effect did not remain significant across follow-ups.

Conclusion—These findings suggest that interactions with young children may mitigate hot flashes for women undergoing surgical menopause. These findings may be used to counsel women considering prophylactic oophorectomy about the likelihood of menopausal symptoms.

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Keywords

hot flashes; surgical menopause; oophorectomy; parenting; psychosocial factors

Introduction

Several cross-cultural studies have reported differences in the experience of hot flashes during menopause. Women in Westernized, urban environments report the highest number and severity of hot flashes while women in Asian and African societies report far fewer hot flashes¹. Within the United States, Euro-American women report more hot flashes than Asian-Americans². A number of explanations for these differences have been offered including ecological factors (e.g., local climates³), biological factors (e.g., population differences in average body composition⁴), and cultural factors (e.g., differences in symptom reporting or perceptions of aging⁵).

Another intriguing hypothesis proposes that some social interactions may buffer against troublesome menopausal symptoms either directly, through influences on important neuroendocrine systems or indirectly, e.g., via improvements in anxiety⁶ or social support⁷. Several studies have examined the role of social interactions, particularly with long-term relationship partners^{8, 9}, on menopausal women's hot flashes; however, there is little known about the effect of another primary relationship – that of women to their children and grandchildren. Considering the potential interactions between parity and nurturance that may play a role in regulating hormones relevant to menopause, this lack of attention seems a critical gap.

Recognition of the potential importance of parent-offspring relations emerges from the growing literature on evolutionary medicine¹⁰. Evolutionary anthropology predicts that social structures that promote offspring survival will, over time, be strengthened. The existence of “grandmothering” across cultures, and likely throughout *Homo sapiens*' evolutionary history, suggests there may be proximate benefits for interactions with young children. Specifically, those older women who interact with grandchildren may experience relief from menopausal symptoms (to the extent that our evolutionary ancestors experienced such symptoms), which in turn may promote and facilitate their care of these grandchildren, thereby increasing their long-term reproductive fitness. White women in Western societies tend to have less contact with young children during menopause than do African or Asian women¹¹, further suggesting that hot flashes may be moderated by the presence of young children.

Does the presence of young children in the home predict hot flash development during menopause? Also, given that women who undergo oophorectomy (also termed “surgical menopause”) report the highest rates of hot flashes¹², are there differential patterns across types of menopause? We examined these questions in a sample of women who underwent prophylactic oophorectomy. Of these, approximately half were perimenopausal or menopausal at the time of surgery – that is, had experienced a “natural” menopause – while the other half were premenopausal at the time of surgery – that is, experienced a “surgical

menopause”. Tracking hot flash symptoms in these two groups allowed us to compare the effects of slow vs. rapid declines in ovarian hormones.

Methods

The present study was a secondary analysis of a previously collected dataset; full details can be found in McGregor, et al.¹³ and Lorenz, McGregor & Swisher¹⁴. One hundred nineteen women who were planning a risk-reducing salpingo-oophorectomy were recruited from gynecological clinics in Seattle. Risk-reducing salpingo-oophorectomy (RRSO) is the removal of both ovaries and fallopian tubes to reduce the risk of ovarian cancer; thus, although all women were at high risk of ovarian cancer due to family history or known mutation of the *BRCA1* or *BRCA2* genes, they were (at the time of surgery) cancer-free and healthy. Interested participants were given a survey packet by their gynecologist 2 weeks prior to surgery (baseline), and instructed to mail the packet to the study coordinator. Follow-up survey packets were mailed to participants 2 months, 6 months, and 1 year after surgery; 72% of participants completed all packets (9 did not complete the 2-month packet; 23 did not complete the 6-month packet, and 33 did not complete the 12-month packet; all participants' data were included in analyses below). Participants' data were identified by code number only and their physicians were not informed of their participation status. The study was approved by the Fred Hutchinson Cancer Research Center institutional review board. Two women were missing data on number of children (see below) and were dropped from the analyses (total sample = 117). Women who were menopausal or postmenopausal at baseline ($N = 69$, mean age = 52.14 years) were significantly older than women who were premenopausal at baseline ($N = 48$, mean age = 42.53 years, see Table 1), one-way ANOVA $F(1, 116) = 58.57, p < 0.001$, therefore, analyses were controlled for age.

Participants provided demographic information including number of children under 13, 13–18, and 18+ years of age living at home. Of the women who were premenopausal at baseline, 20 had no children and 28 reported at least one child; of the women who were menopausal or postmenopausal at baseline, 40 reported no children and 29 reported at least one child.

We measured hot flash/night sweat symptoms at each time point with a modified version of the Vasomotor subscale of the Menopausal Symptoms Scale¹⁵, a validated index of the most commonly experienced menopausal symptoms^{15, 16}. Each symptom (“hot flash”, “night sweats”) was rated on frequency within the last month on a five-point Likert response scale ranging from 0 (not at all) to 4 (extremely). Our modified version did not include “interrupted sleep” because in factor analyses this item loaded poorly with the other two items in our sample of premenopausal women prior to surgery (and instead loaded with insomnia/anxiety items). This contrasts with previous factor analyses in breast cancer survivors, in which “interrupted sleep” loaded strongly with other hot flash items¹⁶, further highlighting the difference in hot flash experience in “natural” vs. “surgically” menopausal women.

Finally, as anxiety is often cited as a trigger for hot flashes⁶, and thus a potential moderator, we measured anxiety using the State-Trait Anxiety Inventory¹⁷, a widely used, well

validated instrument. In analyses below, we used the Trait subscale, which is thought to reflect stable, clinically relevant anxiety as opposed to transient changes in mood.

We conducted a repeated measures mixed generalized linear model with vasomotor symptoms (hot flashes/night sweats) as the dependent variable, the presence of children and pre-surgery menopausal status (premenopausal vs. menopausal or postmenopausal), as well as their interaction, as independent variables, and assessment session as the repeated subjects variable. We controlled for age and use of hormone treatments, and included a subject-level random intercept. For analyses of anxiety as moderator, we repeated these analyses including the interaction of anxiety with independent variables. The generalized linear model is robust to missing data and thus we were able to use data from all participants including those who dropped out.

Results

The interaction between pre-surgery menopausal status and young children (<13 years old) was significant in predicting change in vasomotor symptoms across time ($F(3, 111.32) = 9.84, p = 0.002$). Women who were premenopausal prior to surgery experienced an increase in vasomotor symptoms 2 months following surgery that persisted through the 12-month follow-up (Figure 1). Within the group of women who were premenopausal prior to surgery, women who had young children reported fewer vasomotor symptoms at all time points after surgery than those who did not have young children, although this effect was marginally significant (contrast estimate = 0.53, $t(81.19) = 1.89, p = 0.06$).

Women who were menopausal or postmenopausal prior to surgery (with or without young children) reported no significant change in vasomotor symptoms over time (contrast estimate = -0.47, $t(51.29) = -1.46, p = 0.15$). For this group, having young children at home was associated with more vasomotor symptoms prior to surgery, and 2 months post-surgery ($t(26.12) = -2.02, p = 0.05$, and $t(14.98) = -2.37, p = 0.02$, respectively), but not at 6 or 12 months post-surgery ($t(20.06) = -1.04, p = 0.31$, and $t(13.77) = -0.60, p = 0.56$, respectively). In other words, for women who were post-menopausal, having young children at home was associated with more vasomotor symptoms, but this effect was not significant across time (see Figure 1).

Neither the main effect of older children (>13 years old) nor the interaction of pre-menopausal status and older children was significant in predicting change in vasomotor symptoms across time ($F(3, 153.88) = 0.72, p = 0.54$, and $F(3, 152.99) = 0.95, p = 0.42$, respectively). Finally, the interaction of young children, premenopausal status, and anxiety was marginally significant at $p = 0.07$ ($F(3, 259.38) = 3.41$). Although not a strong effect, anxiety appeared to increase vasomotor symptoms in women without young children at home, particularly if they were pre-menopausal at the time of surgery.

Discussion

In our sample, having young children appeared to protect against hot flash and night sweat symptoms during the menopausal transition in women undergoing surgical menopause, but not for women who reported undergoing natural menopause prior to surgery. The fact that

effects observed were limited to only women with children age <13 years suggests that parity was not sufficient to produce changes in hot flashes, and points instead to the increased nurturance needs of young children.

One possible mechanism for these effects is oxytocin, a hormone that coordinates maternal behaviors such as lactation and is released in response to nurturing care¹⁸. Oxytocin has thermoregulatory effects and can induce either increases or decreases of core temperature depending on the context¹⁹. Immediately postpartum, oxytocin has a hypothermic effect that prevents onset of fever²⁰. However, when caring for young, oxytocin may have a hyperthermic effect, promoting heat transfer to offspring²¹. Mothers who bind their infants to their breasts to promote heat transfer express significantly more oxytocin than mothers who touch their infants at a similar rate but do not engage in incubation behaviors²².

Most relevant to the present study, in the presence of moderate to low levels of estrogens, oxytocin appears to have *hyperthermic* effects^{23, 24} but when responding to dramatic decreases in circulating estrogen (such as immediately post-partum, or after removal of the ovaries), oxytocin may have a *hypothermic* effect^{25, 26}. This could explain why in our sample, the presence of young children had a different effect on women who underwent surgical menopause vs. natural menopause. Finally, oxytocin is also a powerful anxiolytic¹⁸. While our findings regarding anxiety were only suggestive, the trend in these data supported the hypothesis that in the presence of young children, anxiety may be a relatively less potent hot flash trigger.

We lacked the hormonal measures to directly test if oxytocin mediated the effect of children on hot flashes in our sample; however, our findings support further study of the role of oxytocin in menopausal symptoms. To date, the only data published on oxytocin as a treatment for menopausal symptoms are two patents documenting benefits of oxytocin agonists on hot flashes in small trials in ovariectomised rats (an analog for surgically menopausal women)^{27, 28}. It should be noted that the majority of studies examining oxytocin release in response to nurturance have been conducted in parent-infant dyads²⁹ or parent-toddler dyads³⁰ and thus the role of oxytocin in the care of older children is largely unknown.

Other potential mechanisms for these effects include differences between parents and non-parents in rates of physical activity³¹, diet³², use of alcohol or tobacco³³, or stress. Notably, employed women with a child at home secrete significantly more cortisol than women without children³⁴. Long term exposure to cortisol can dull sympathetic nervous system reactivity³⁵; as sympathetic inputs are the proximate trigger to vasodilation (sweating and flushing)³⁶, it is possible that women with children are only responsive to very high levels of sympathetic activity, leading to fewer hot flashes.

Limitations to the current study include lack of generalizability across races/ethnicities (due to the small sample of non-white women) and to women without high risk for cancer. Of note there may be some significant differences between the nature of the anxiety experienced pre- and post-surgery for this group of women with high cancer risk¹³. There was also limited specificity about the degree of contact with children (beyond presence/

absence). Another limitation is lack of information about time since last menstrual period among the group who reported being “menopausal” at baseline. Strengths include a prospective design and long-term follow-up.

Conclusion

These data support the hypothesis that interactions with young children may influence development of hot flashes in menopausal women. Future work will be necessary to examine potential mechanisms of these effects, such as oxytocin-mediated thermoregulation. The present findings support consideration of the influence of evolution in developing behavioral management strategies for menopausal symptoms.

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Figure 1.

Vasomotor symptoms pre- and post-surgery in 117 women undergoing risk-reducing salpingo-oophorectomy. Note: Stars indicate significant group-level contrasts; dagger indicates significant change between time points.

Table 1

Demographics and sample characteristics.

	Premenopausal prior to surgery	Menopausal or postmenopausal prior to surgery
Age <i>M(SD)</i>	52.21 (7.87)	42.53 (8.14)
% White	89%	91%
% married or in long term relationship	81%	75%
% At least one child < 13	44%	22%
% At least one child 13 – 18	32%	25%
% reporting at least some hot flashes/night sweats in the past month		
Prior to surgery	32%	64%
2 months post-surgery	70%	58%
6 months post-surgery	77%	55%
1 year post-surgery	72%	55%
% reporting HRT use		
Prior to surgery	13%	4%
2 months post-surgery	12%	45%
6 months post-surgery	17%	51%
1 year post-surgery	17%	41%