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## Self-reported shift work, recall bias, and belief about disease causation in a case-control study of breast cancer

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## ABSTRACT

**Background:** Recall bias is a potential source of misclassification in case-control studies. Studies have shown that the association between exposure and disease can differ according to participants' beliefs or knowledge about the effect of that exposure on disease. We investigated the association between belief about breast cancer causation and self-reported shift work exposure in a case-control study.

**Methods:** Women completed a questionnaire asking whether they believed that shift work caused cancer either before or after reporting their history of shift work. We measured: whether belief modified the association between reported shift work and disease; whether belief was associated with reported shift work exposure; and whether being prompted to recall shift work exposure was associated with an increased likelihood of believing that shift work increased breast cancer risk.

**Results:** There was a significant association between believing shift work increased breast cancer risk and reporting exposure to shift work. Being prompted to recall shift work was not associated with a belief that shift work increased risk.

**Conclusion:** The association between pre-existing belief about breast cancer risk and reported shift work is likely to be due to exposed individuals believing that exposure increases risk, rather than resulting from recall bias.

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### 1. Introduction

Recall bias is a potential form of differential misclassification in case-control studies, as cases may be more likely than controls to recall, and possibly overestimate their exposure to risk factors, as a result of rumination upon the aetiology of their disease. In many instances, but not all [1], this may lead to a spurious association between risk factors and disease.

Several studies have shown that the association between exposure and disease can differ according to participants' beliefs or knowledge about the effect of that exposure on disease [2–5]. Shaw

et al. found elevated associations between self-reported water consumption and congenital cardiac anomalies among women who believed that water in their community was related to birth defects [2]. Cockburn et al. noted that the association between sunbathing as a child and melanoma was higher among participants who believed that sunlight caused melanoma [3]. Yet the association between belief and reported exposure may not always be as expected; Bower et al. found that women who were aware of the protective effect of folic acid on neural tube defects were more likely to report folic acid supplementation if they had a child with a neural tube defect [4]. In addition, differences by belief or knowledge in the association between exposure and disease may be due to the experience of being diagnosed with disease. For example, in a study of breast cancer and exposure to chemicals, Zota et al. reported that odds ratios for exposure to cleaning products and pesticides were higher among women who believed that these factors contributed “a lot” to breast cancer. As the authors note, a similar result was seen for self-reported family history; as family history is an established breast cancer risk factor, Zota et al. suggest that the observed results are therefore not

*Abbreviations:* BCEES, Breast Cancer, Environment and Employment Study; LEQ, Lifestyle and Environment Questionnaire; RPQ, Risk Perception Questionnaire.

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necessarily due to recall bias, but could have occurred if exposed women's beliefs were modified after their breast cancer diagnosis [5]. Recall bias may also occur in a converse direction if cases under-report their exposure relative to controls. This could occur due to factors such as social desirability if, for example, mothers of infants with congenital birth defects under-reported prenatal exposure to smoking or alcohol [6–8], or if the disease being studied impaired participants' capacity to remember their past exposure.

We undertook a study to investigate the association between belief about breast cancer causation and self-reported shift work exposure in a case-control study. We used data from the Breast Cancer, Environment and Employment Study (BCEES), a case-control study in which participants reported their shift work exposure and their beliefs about the effect of shift work on breast cancer risk [9]. We measured: whether beliefs modified the association between reported shift work and disease; whether beliefs were associated with reported shift work exposure; and whether being prompted to recall shift work exposure was associated with an increased likelihood of believing that shift work increased breast cancer risk.

## 2. Methods

BCEES was a population-based case-control study investigating environmental and lifestyle risks for breast cancer in Western Australia [9].

### 2.1. Participants

Cases were identified through the Western Australian Cancer Registry if they were female, aged between 18 and 80 years at the time of diagnosis, resided in Western Australia, and had incident breast cancer (ICD-10 C50) reported between 1st May 2009 and 31st January 2011. Controls were women randomly selected from the Western Australian electoral roll, who resided in Western Australia during the same period and who were aged between 18 and 80 years of age. Controls were frequency matched on five-year

age groups and were excluded if they had previously been diagnosed with invasive breast cancer. Cases were excluded if their diagnosis was ductal carcinoma in situ only, or if their pathology diagnosis date was greater than six months prior to recruitment. Cases and controls were excluded if morbidities or insufficient English language precluded them from completing the BCEES questionnaires.

### 2.2. Questionnaires and interviews

Participants were initially sent the Lifestyle and Environment Questionnaire (LEQ), along with an invitation letter and information sheet. The information sheet advised that participation would involve completion of one questionnaire about "lifestyle, work, and environment", and that participants may be contacted by telephone to "ask some more detailed questions about your jobs"; participants were not made aware that these questions would be about shift work. In the 32-page LEQ, participants reported their lifetime exposure to a range of factors, including reproductive history and lifestyle. In the occupational history section of the LEQ, participants were asked eleven questions about each job they had ever had, one of which was: "Did this job involve night work, shift work, or work at unusual hours?" Participants who responded positively to this question for one or more jobs were subsequently invited to participate in a telephone interview. Participants who responded negatively to the shift work question but whose profession was likely to have involved shift work—for example, a driver or nurse—were also invited to be interviewed.

Interviews took place between one and 36 weeks (median six weeks) after the LEQ was returned. During the interview, participants were asked between one and 29 questions about the nature, timing, and frequency of shift work for each relevant job; the total number of interview questions was determined by their specific responses and by the number of jobs that involved shift work. Shift work exposure was determined from interview responses only: women were deemed as having ever done shift work if they reported having worked any number of hours in a graveyard shift between midnight and 0500 [9].

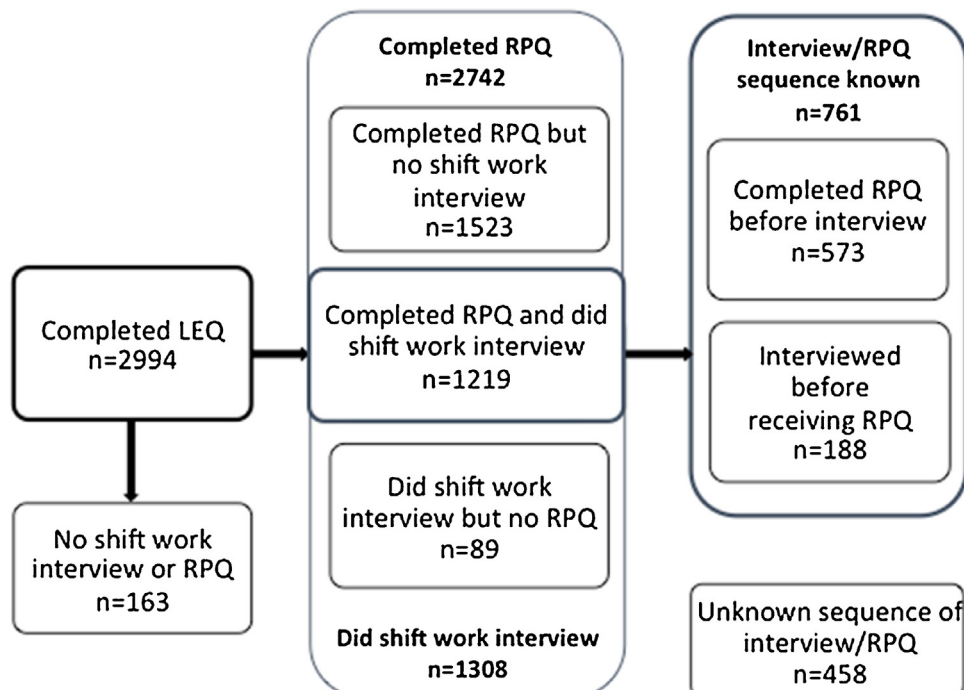


Fig. 1. Flow Chart of LEQ, RPQ and Interview Completion by BCEES Participants.

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