

## Re: Validation of cross-sectional studies with longitudinal meta-analysis

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Dear Editor,

We thank Drs. Cure-Cure and Cure [1] for their interest in our recently published article [2]. We agree that well-designed cross-sectional studies are early, reliable, and cost-effective sources of information. Meta-analysis of high-quality cross-sectional studies should be encouraged. This analysis will facilitate the presentation of valuable and reliable evidence combined with findings of prospective studies.

In our previous meta-analyses, we searched for prospective and non-prospective (e.g., cross-sectional and case control) studies reporting the parity-related risk of osteoporotic fracture (OF) at any skeletal location, such as spine, wrist, and hip. Subgroup analysis based on non-prospective reports indicated that parous women exhibited a lower OF risk than nulliparous women, with the corresponding pooled OR of 0.725 (95 % confidence interval (CI)=0.614–0.836,  $I^2=57.3\%$ ,  $n=19$ ), 0.803 (95 % CI=0.730–0.876,  $I^2=0.0\%$ ,  $n=15$ ), and 0.612 (95 % CI=0.490–0.733,  $I^2=47.1\%$ ,  $n=14$ ) for at least 1, 1–2, and 3 or more parities, respectively. When the hip fracture risk was exclusively considered, the respective counterpart values were 0.797 (95 % CI=0.717–0.877,  $I^2=0.0\%$ ,  $n=12$ ), 0.835 (95 % CI=0.725–0.944,  $I^2=0.0\%$ ,  $n=10$ ), and 0.726 (95 % CI=0.610–0.843,  $I^2=0.0\%$ ,  $n=10$ ).

We hypothesize that the specific explanatory variable of interest (i.e., parity) contributes to the concurrent findings from prospective and non-prospective studies. Based on Hill's criteria for epidemiologic causal inference, time sequence of cause and effect is legitimate. That's the major limitation of cross-sectional study. Generally, deliveries occur before menopause, and women often suffer OF after menopause. Therefore, it's reasonable to assume that most OFs among women occur after delivery. That's why cross-sectional studies may also present reliable information on parity-related OF risk.

**Compliance with ethical standards**

**Conflict of interest** None.

### References

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