

# Is Pelvic Organ Prolapse a Cause of Pelvic or Low Back Pain?

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**OBJECTIVE:** To test the null hypothesis that there is no association between pelvic organ prolapse and pelvic or low back pain.

**METHODS:** A total of 152 consecutive patients with pelvic organ prolapse completed a visual faces scale to quantify the amount of pelvic or low back pain present. Pelvic organ prolapse severity was graded by three techniques: 1) pelvic organ prolapse quantification staging; 2) descent of the leading edge of prolapse; and 3) dynamic cystoproctography. Linear and nonlinear associations of pelvic organ prolapse quantification staging, descent of the leading edge of prolapse, and dynamic cystoproctography findings with pelvic or low back pain were assessed. We also characterized the nature of any significant nonlinear associations.

**RESULTS:** Descent of the leading edge of prolapse was linearly associated with low back pain. Patients with greater descent of the leading edge of their prolapse reported less low back pain ( $r = -0.176$ ,  $P = .034$ ). Bladder descent during dynamic cystoproctography was nonlinearly associated with low back pain ( $P = .037$ ). Neither of these associations was statistically significant after controlling for patient age and prior prolapse surgery. There were no linear or nonlinear associations between pelvic organ prolapse and pelvic pain.

**CONCLUSION:** Based on the data, pelvic organ prolapse is not a cause of pelvic or low back pain. (Obstet Gynecol 2002;99:23–28. © 2002 by the American College of Obstetricians and Gynecologists.)

Pelvic organ prolapse has traditionally been considered in the differential diagnosis of chronic pelvic pain. *Novak's Gynecology*, 12th edition (1996)<sup>1</sup> and ACOG technical bulletin no. 223: Chronic pelvic pain (1996)<sup>2</sup> include pelvic organ prolapse in causes of chronic pelvic pain tables. We performed a MEDLINE search of the English literature from 1966 to 2001, to identify articles that focus on this association. We were unable to identify any such articles combining the key words "pelvic organ prolapse" or "uterine prolapse," with "pelvic pain."

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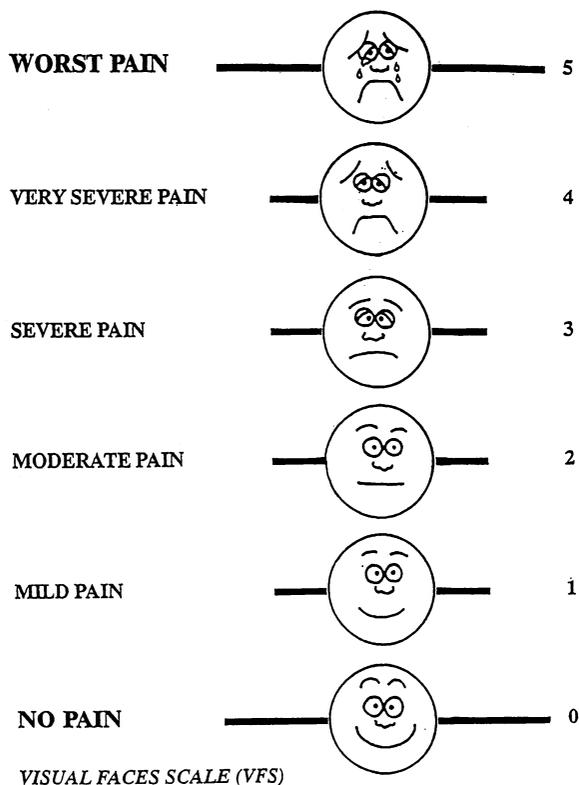
We designed this cross-sectional study to test the null hypothesis that there is no linear (monotonic) or nonlinear (threshold) association of pelvic organ prolapse severity with pelvic or low back pain.

## MATERIALS AND METHODS

Beginning in August 1996, 152 consecutive patients presenting with symptoms of pelvic organ prolapse were asked to complete two visual faces scales to quantitate the degree of pelvic or low back pain present. The visual faces scale is scored by the patient who circles the number or face which best reflects the degree of pain present: 0 (no pain), 1 (mild pain), 2 (moderate pain), 3 (severe pain), 4 (very severe pain), and 5 (worst pain) (Figure 1). Faces scales provide a more direct representation of the feelings involved in quality of life than does a verbal translation of the response to a conventional question. They may also be useful in patient populations who may have difficulty completing a questionnaire. The median validity and test-retest reliability coefficients of the faces scale are 0.82 and 0.70, respectively.<sup>3</sup>

Pelvic organ prolapse severity was graded by three techniques. Each patient's prolapse was staged in the dorsal lithotomy position with strain using the pelvic organ prolapse quantification (POP-Q) system endorsed by the International Continence Society.<sup>4</sup> The pelvic organ prolapse quantification system is used to stage prolapse by measuring the position of six points along the vagina in relation to the hymenal ring. The position of these points in centimeters above and below the hymenal ring are noted as (–) and (+) during a Valsalva maneuver. The reliability of this tool was established by repeated pelvic exam performed on 48 subjects from two centers in the United States. The interobserver and intraobserver (test-retest) reliability coefficients of the prolapse staging system were 0.702 and 0.712, respectively.<sup>4</sup>

The leading edge of the prolapse was measured in centimeters beyond the introitus with strain in the supine position. This tool was used to obtain an accurate measurement of prolapse severity in POP-Q stage three



**Figure 1.** Visual faces scale used to score pelvic or low back pain.

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patients whose prolapse can descend from greater than 1 cm beyond the introitus to 2 cm short of total vaginal length.

For both measurements, each patient was examined in the standing position with strain to make sure that maximum descent of their prolapse was visualized during the supine exam.

Finally, to assess for any association of structural descent with pain, dynamic cystoproctograms were obtained to identify the specific pelvic organ which descended maximally. Only patients who chose reconstructive pelvic surgery were subjected to dynamic cystoproctography. According to Bump et al,<sup>5</sup> identifying these structures by exam alone “provides an unrealistic certainty as to the structures on the other side of the vaginal bulge, particularly in women who have had previous prolapse surgery.” The instructions for performing dynamic cystoproctography for pelvic organ prolapse assessment have been published elsewhere in the medical literature.<sup>6</sup> During dynamic cystoproctography, descent of the leading edge of the prolapse was measured with a ruler in centimeters beyond the midfemur to the coccygeal line. We did not convert these

measurements to true centimeters based on a magnification factor from the radiologic image. The midfemur to the coccygeal line was used as a reference point rather than the pubococcygeal line because it was more readily identified on each exam. Rectocele width was measured along a line drawn perpendicular to the anal axis from the base to the apex of the anterior rectal wall.

Patients were excluded from analysis if their chart was lost or no pelvic organ quantification was performed. Only patients who chose reconstructive pelvic surgery to correct their prolapse underwent dynamic cystoproctograms. To reduce bias, demographic comparisons between excluded and included patients and patients with and without dynamic cystoproctograms were made with Student *t* tests for continuous variables and  $\chi^2$  tests for association and Fisher exact tests for categorical variables.

We identified age, vaginal parity, body mass index, presence of uterus or ovaries, prior continence surgery, and prior prolapse surgery, as potential confounders of an association of pelvic organ prolapse severity with pelvic or low back pain. Therefore, we tested the hypothesis that these potential confounders were associated with pain using one-way analysis of variance for continuous variables and  $\chi^2$  tests for association for categorical variables. Confounders of any association between pelvic organ prolapse severity and pelvic or low back pain were controlled for in a multivariate analysis using polytomous logistic regression.

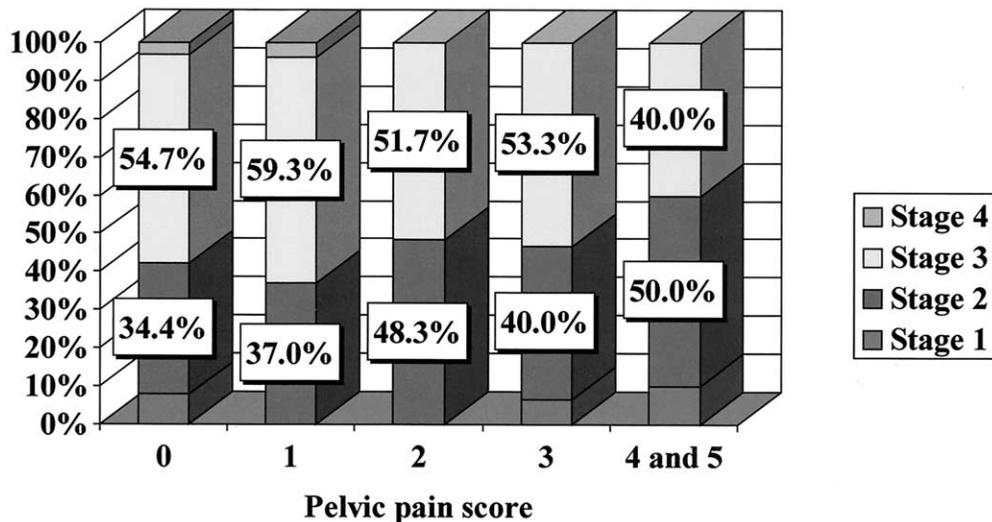
We analyzed the associations of prolapse severity with pain using two hypothesized models, as described below. Our null hypothesis was that we would find no linear or nonlinear association of prolapse severity with pain.

#### Model 1

Model 1 consisted of a positive linear association of prolapse severity with pain. In this model, patients with the greatest amount of pelvic organ prolapse would experience the greatest amount of pain.

#### Model 2

Model 2 consisted of a nonlinear association of prolapse severity with pain. In this model, patients with the least and greatest amount of pelvic organ prolapse would experience less pain than patients with intermediate amounts of prolapse who would experience more pain. This hypothesized model assumes that patients with the least amount of prolapse have normal afferent innervation but experience less pain because of their prolapse severity. Patients with an intermediate amount of prolapse have normal afferent innervation and experience the greatest amount of pain. Patients with the most severe prolapse have afferent denervation, which limits



**Figure 2.** The percentage of patients with POP-Q stage reporting pelvic pain score. *Heit. Prolapse and Pain. Obstet Gynecol 2002.*

the amount of pain they can perceive. Alternatively, a threshold effect could exist beyond which patients would perceive similar amounts of pain.

Linear associations of POP-Q staging, descent of the leading edge of prolapse, rectocele width, descent of the bladder, small bowel, and vaginal apex with pelvic or low back pain were assessed with Spearman correlation coefficients. Nonlinear associations of POP-Q staging, descent of the leading edge of prolapse, rectocele width, descent of the bladder, small bowel, and vaginal apex with pelvic or low back pain were assessed with Kruskal-Wallis tests.  $P < .05$  was considered significant.

Any significant findings for each of the Kruskal-Wallis tests were further evaluated with Mann-Whitney tests. We adjusted our significance level using the Bonferroni method to account for multiple comparison testing. To reduce the loss of power caused by these adjustments, we set our overall significance level at 0.10. After reviewing the data, we decided that ten comparisons needed to be made, so we divided our overall significance level by ten to obtain a Bonferroni adjusted significance level of 0.010.<sup>7</sup> This study was approved by the Human Studies Committee at our institution.

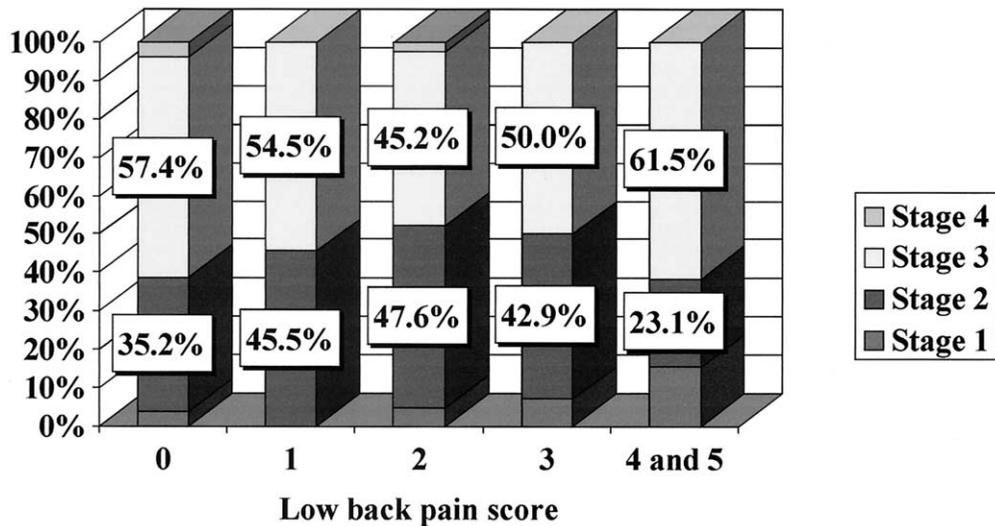
## RESULTS

A total of 152 consecutive patients with symptoms of pelvic organ prolapse completed the visual faces scale. Six patients were excluded from the study because of a lost chart ( $n = 1$ ) or no pelvic organ prolapse quantification ( $n = 5$ ) performed. These six excluded patients did not clinically differ from the 146 study participants with

respect to weight, height, vaginal parity, preoperative pelvic or low back pain score, prescribed pain medication, prior hysterectomy, prior prolapse surgery, prior continence surgery, or presence of ovaries. Excluded patients were younger than participants ( $44 \pm 12.55$  versus  $62.32 \pm 12.65$ ,  $P = .002$ ).

Of the total sample, 71 (48.6%) patients underwent dynamic cystoproctograms. Patients who underwent dynamic cystoproctograms did not clinically differ from patients who did not, with respect to age, weight, height, vaginal parity, preoperative pelvic or low back pain scores, prescribed pain medication, or presence of ovaries. Patients who underwent dynamic cystoproctograms were more likely to have undergone prior hysterectomy (80.3% versus 57%,  $P = .002$ ), prior prolapse surgery (40.8% versus 25.3%,  $P = .043$ ), and prior continence surgery (57.1% versus 29.1%,  $P = .001$ ). They also had more severe pelvic organ prolapse as measured by leading edge of prolapse measurements ( $2.83 \pm 2.56$  versus  $1.64 \pm 2.27$  cm,  $P = .003$ ), and POP-Q staging ( $P = .013$ ).

The mean age, body mass index, and vaginal parity of the study participants were  $62 \pm 12.7$  years (range 21–88),  $26.5 \pm 4.8$  kg/m<sup>2</sup> (range 18–44.6), and  $3.23 \pm 2.1$  (range 0–10), respectively. Based on a physical exam, cystoceles, rectoceles, enteroceles, or uterovaginal/vaginal vault prolapse were identified in 65%, 41%, 55%, and 88% of the participants, respectively. Only 3.4–4.8% of the study population reported their pelvic or low back pain as 4 or 5. To increase the power of our analysis, data for patients who scored their pain as 4 or 5



**Figure 3.** The percentage of patients with POP-Q stage reporting low back pain score. *Heit. Prolapse and Pain. Obstet Gynecol 2002.*

were combined. Figure 2 illustrates the percentage of patients with each POP-Q stage reporting a pelvic pain score. Figure 3 illustrates the percentage of patients with each POP-Q stage reporting a low back pain score.

Table 1 provides demographic data for each reported pain score. Age ( $P = .021$ ) and prior prolapse surgery ( $P = .035$ ) could confound an association of pelvic organ prolapse severity with low back pain. Using the Tukey method for multiple comparisons, we found that patients who reported their low back pain as 0 were older than patients who reported their low back pain as 3 (mean age difference

9.34 years, 95% confidence interval 0.24, 18.44). More patients with previous prolapse surgery reported their low back pain as 4 and 5 than patients who reported their low back pain as less than 4 (69.2% versus 28.8%,  $P = .005$ ).

Descent of the leading edge of prolapse was linearly associated with low back pain. Patients with greater descent of the leading edge of their prolapse reported less low back pain ( $r = -0.176$ ,  $P = .034$ ). Bladder descent during dynamic cystoproctography was nonlinearly associated with low back pain ( $P = .037$ ). By applying our Bonferonni-adjusted significance level to our findings,

**Table 1.** Demographic Data for Each Reported Pain Score

	Pain score					<i>P</i>
	0	1	2	3	4 and 5	
<b>Pelvic pain</b>						
Age	63.6 ± 12.7	61.4 ± 12.2	60.1 ± 13.6	64.0 ± 12.48	59.8 ± 12.4	NS
Vaginal parity	3.2 ± 1.9	3.7 ± 2.7	3.0 ± 1.9	3.4 ± 2.3	2.4 ± 1.4	NS
Body mass index	26.0 ± 4.3	27.6 ± 5.4	25.8 ± 5.1	25.8 ± 3.6	29.3 ± 5.4	NS
Taking pain medication	12 (20.3%)	2 (8.3%)	5 (18.5%)	2 (15.4%)	3 (33.3%)	NS
Prior hysterectomy	40 (62.5%)	17 (63.0%)	22 (75.9%)	11 (73.3%)	9 (90.0%)	NS
Ovaries present	46 (73.0%)	20 (74.1%)	19 (65.5%)	11 (73.3%)	6 (60.0%)	NS
Prior prolapse surgery	16 (25.0%)	9 (33.3%)	10 (34.5%)	6 (40.0%)	6 (60.0%)	NS
Prior incontinence surgery	24 (37.5%)	9 (33.3%)	15 (53.6%)	8 (53.3%)	5 (50.0%)	NS
<b>Low back pain</b>						
Age	66.1 ± 11.3	58.9 ± 15.3	60.0 ± 10.2	56.7 ± 16.5	65.5 ± 12.2	0.021
Vaginal parity	3.4 ± 2.4	3.3 ± 1.6	3.2 ± 1.9	2.5 ± 1.1	3.23 ± 2.71	NS
Body mass index	25.7 ± 4.4	27.0 ± 3.66	27.0 ± 5.9	25.3 ± 3.5	28.0 ± 5.4	NS
Taking pain medication	10 (20.8%)	3 (15.0%)	7 (17.5%)	1 (7.7%)	3 (27.3%)	NS
Prior hysterectomy	32 (59.3%)	13 (59.1%)	33 (78.6%)	10 (71.4%)	11 (84.6%)	NS
Ovaries present	39 (72.2%)	19 (86.4%)	27 (65.9%)	10 (71.4%)	7 (53.8%)	NS
Prior prolapse surgery	14 (25.9%)	5 (22.7%)	15 (35.7%)	4 (28.6%)	9 (69.2%)	0.035
Prior incontinence surgery	20 (37.0%)	7 (31.8%)	21 (75.0%)	5 (35.7%)	9 (69.2%)	NS

NS = not significant.

we found that patients who scored their low back pain as 3 had greater bladder descent ( $37.5 \pm 3.87$  cm) than patients who scored their low back pain as 1 ( $16.69 \pm 9.99$  cm,  $P = .006$ ), or 2 ( $17.71 \pm 14.39$  cm,  $P = .004$ ). Descent of the bladder did not differ among patients who scored their low back pain as 0, 3, or 4. No patient with bladder descent scored their low back pain as 5.

To determine whether descent of the leading edge of prolapse was linearly associated with low back pain scores after taking into account age and prior prolapse surgery, polytomous logistic regression was done with the preoperative low back pain score as the dependent variable, and descent of the leading edge of prolapse, age, and prior prolapse surgery as the independent variables. Descent of leading edge of prolapse was not statistically significant in this model, and, thus, did not have a linear association with low back pain scores, once age and prior prolapse surgery were taken into account. Similarly, bladder descent during dynamic cystoproctography was not nonlinearly associated with the low back pain scores after age and prior prolapse surgery were taken into account. As measured in our study, we were unable to identify any linear or nonlinear association of pelvic organ prolapse severity with pelvic pain.

## DISCUSSION

Because we were unable to identify any linear or nonlinear association of pelvic organ prolapse severity with pelvic or low back pain, it would be inappropriate to apply any of the Hill<sup>8</sup> criteria to distinguish causal from noncausal associations. Comparing prolapse rates in patients with pain (cases) with patients without pain (controls) is an alternative study design to test for an association. Even if we were able to establish an association using this study design, this does not prove causation. It would still be necessary to determine if a biologic gradient existed as was done in this study. Therefore, based on the data from this study, we are unable to conclude that pelvic organ prolapse is a cause for pelvic or low back pain. It is our experience that patients with pelvic organ prolapse present with a pulling or pressure sensation accepting the fact that this association has yet to be proven.

Pelvic or low back pain is a nonspecific symptom with many causes, which may explain why it is so difficult to treat successfully. We attempted to control for potential confounders of the relationship between pelvic organ prolapse severity and pain, but other causes do exist. Even if we identified additional causes for analysis, they could not confound the relationship of pelvic organ prolapse severity with pelvic or low back pain because this association did not exist. Ultimately, the only way to

determine if pelvic organ prolapse is a cause of pelvic or low back pain is to surgically correct it and prove that symptoms are relieved by comparing postoperative pain scores to preoperative values. This is the objective of our follow-up study. However, first we needed to characterize pain scores in patients with surgically correctable pelvic organ prolapse. Secondly, we needed to calculate the number of patients required to detect changes in pain scores after reconstructive pelvic surgery. The present study met these two objectives.

The inclusion of 194 subjects will ensure an 80% chance of detecting a one-level change between the preoperative and postoperative pain scores, based on a two-tailed paired sign test with a 0.05-significance level, if the population percentage of patients who improve or worsen is 60%.<sup>9</sup>

Before our conclusions are accepted, readers should consider several limitations of our study design. It is possible that the lack of association of pelvic organ prolapse severity with pelvic or low back pain may be from a Type II statistical error because of our small sample size. However, there were no studies in the medical literature that could be used to calculate an appropriate sample size for our investigation.

The nonprobability sampling technique used in this study may introduce selection bias, which could affect the internal validity of our findings. Selection bias was minimized by having our nurse provide patients with the visual faces scale before their exams. The examining physician was unaware of pain scores when assessments of pelvic organ prolapse severity were made.

Pain thresholds vary, making it difficult to detect differences when scores from individual patients are averaged. Single-factor repeated measures analysis would be the most accurate way of detecting an association of prolapse severity with pain, if one truly exists. However, it is unrealistic and possibly unethical to measure pain scores from the same individual over time whose prolapse worsens without therapy.

Study participants differed from excluded patients with respect to age. Because of their younger age, it is possible that, if measured, excluded patients had milder prolapse than participants. Yet, excluded patients and participants did not differ with respect to pelvic or low back pain scores, making an association between these two variables unlikely. The greater percentage of prior hysterectomy, prior continence surgery, prior prolapse surgery, and greater prolapse severity in the dynamic cystometrogram group reflects this population's predilection for surgery to correct recurrent symptoms. Despite their differences in prolapse severity, pelvic or low back pain scores did not differ in patients who under-

went dynamic cystoproctograms from those who did not, providing further support for our null hypothesis.

Based on the results of this study, we do not support the belief that pelvic organ prolapse is a cause of pelvic or low back pain. Yet, gynecologic textbooks and ACOG monographs still list pelvic organ prolapse as a cause for chronic pelvic pain. We urge editors of gynecologic textbooks or monographs to revise their work to reflect our findings. Other causes of pelvic or low back pain should be sought before clinicians can attribute these symptoms to pelvic organ prolapse. Surgeons should not counsel patients that reconstructive pelvic surgery will relieve pain until prospective studies are completed with an adequate sample size using our visual faces scale.

## REFERENCES

1. Berek J, Adashi E, Hillard P. Novak's gynecology. 12th ed. Baltimore, MD: Lippincott, Williams & Wilkins, 1996.
2. American College of Obstetricians and Gynecologists. Chronic pelvic pain. ACOG technical bulletin no. 223. Washington, DC: American College of Obstetricians and Gynecologists, 1996.
3. McDowell I, Newell C. Measuring health. 2nd ed. New York, NY: Oxford University Press, 1996.
4. Hall A, Theofrastous J, Cundiff G, Harris R, Hamilton L, Swift S, et al. Interobserver and intraobserver reliability of the proposed International Continence Society, Society of Gynecologic Surgeons, and American Urogynecologic Society pelvic organ prolapse classification system. *Am J Obstet Gynecol* 1996;175:1467-71.
5. Bump RC, Mattiasson A, Bo K, Brubaker LT, DeLancey JOL, Klarksor P, et al. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. *Am J Obstet Gynecol* 1996;175:10-7.
6. Kelvin F, Malinte D, Benson JT, Brubaker L, Smith C. Dynamic cystoproctography: A technique for assessing disorder of the pelvic floor in women. *AJR* 1994;163:368-70.
7. Shott S. Statistics for health professionals. Philadelphia, PA: WB Saunders, 1990.
8. Hill AB. The environment and disease: Association or causation? *Proc R Soc Med* 1965;58:295-300.
9. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates, 1988.

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