Published in final edited form as:

Arthritis Care Res (Hoboken). 2017 December ; 69(12): 1932–1933. doi:10.1002/acr.23186.

Reply to Riddle and Perera about modeling procedures and results in "Dietary intake of fiber in relation to knee pain trajectories"

Zhaoli Dai, PhD, MS¹, David Felson, MD, MPH^{1,2}, and Yuqing Zhang, ScD^{1,3}

¹Boston University School of Medicine, Department of Medicine, Clinical Epidemiology Research & Training Unit, Boston

²University of Manchester and Central Manchester Foundation Trust, Manchester UK

³Division of Rheumatology, Allergy, and Immunology, Department of Medicine, Massachusetts General Hospital, Harvard School of Medicine

Dear Editor

We appreciate the interest and comments by Riddle and Perera in our recent publication on "Dietary intake of fiber in relation to knee pain trajectories" (1).

We conducted group-based trajectory analyses described by Nagin and colleagues (2, 3). And we tested several possible combinations of functions including linear, quadratic and cubic as well as numbers of trajectory groups ranged from 3 to 5 to find the best model. The final model fit was determined by the Bayesian Information Criteria and the average posterior probabilities (2). We also requested that no less than 5% of the population in any trajectory group to minimize random errors. In our final model, it consisted of "no pain trajectory" with an intercept only, "mild pain trajectory" and "moderate pain trajectory" with an intercept and a linear term, and "severe pain trajectory" with intercept, linear and quadratic terms. We added fiber intake and other covariates when performing the trajectory analysis (2). The WOMAC trajectory patterns in the Osteoarthritis Initiative identified by us have also been reported by other investigators (4).

Riddle and Perera commented that trajectories of WOMAC pain appeared to be separated at baseline and suggested that we should examine the cross-sectional association between dietary fiber intake and WOMAC pain at baseline. We believe that WOMAC pain score at baseline and the WOMAC pain trajectories observed in our analysis reflect a phenomenon of "horse racing effect" described by Dr. Peto that "in a race between fast and slow horses... one would expect to find the faster horses out in front halfway through the race" (5), and consider that WOMAC pain, dietary fiber and most other risk factors at baseline occur at that "halfway point" before the start of the observational study. With a relatively short period of time and few strong time-varying risk factors for WOMAC pain change in our study, we expect that each WOMAC pain trajectory is relatively steady over time. The WOMAC patterns are similar to other trajectories defined by group-based modeling for depression (6) and gait speed (7). This phenomenon is further supported by Figure below, in which

WOMAC pain patterns starting at baseline are materially the same as started from the 12-month exam (1).

References

1. Dai Z, Lu N, Niu J, Felson DT, Zhang Y. Dietary intake of fiber in relation to knee pain trajectories. *Arthritis care & research*. 2016
2. Nagin DS, Odgers CL. Group-based trajectory modeling in clinical research. *Annu Rev Clin Psychol*. 2010; 6:109–138. [PubMed: 20192788]
3. Jones B. Traj - Group-based modeling of longitudinal data 2016. [cited 2016 July 14] Available from: <http://www.andrew.cmu.edu/user/bjones/index.htm>.
4. Collins JE, Katz JN, Dervan EE, Losina E. Trajectories and risk profiles of pain in persons with radiographic, symptomatic knee osteoarthritis: data from the osteoarthritis initiative. *Osteoarthritis and cartilage / OARS, Osteoarthritis Research Society*. 2014; 22(5):622–630.
5. Peto R. The horse-racing effect. *Lancet (London, England)*. 1981; 2(8244):467–468.
6. Marron MM, Anderson SJ, Garrity J, Reynolds CF 3rd, Lotrich FE. Association of Baseline Sleep Quality With Trajectories of Depressive Symptoms in Patients Undergoing Interferon Treatment. *Psychosom Med*. 2015; 77(8):911–920. [PubMed: 26407225]
7. White DK, Niu J, Zhang Y. Is symptomatic knee osteoarthritis a risk factor for a trajectory of fast decline in gait speed? Results from a longitudinal cohort study. *Arthritis care & research*. 2013; 65(2):187–194. [PubMed: 22899342]

Figure.

WOMAC knee pain trajectory groups over 8 years of follow-up among all eligible participants starting from baseline