

NRES-D-07-00107

“Bayesian Data Analysis: Estimating the Efficacy of Tai Chi as a Case Study”

Original Submission

Sheila Alexander, PhD (Reviewer 1)

Reviewer Recommendation Accept With Minor Revisions

Term:

Overall Reviewer Manuscript Rating: 80

Rate Reviewer: (Select 1-100)

Comments to Editor:

(1) Answer yes or no for each of the questions below:

Do you have a conflict of interest in reviewing this paper?

Yes No

Do you perceive a conflict of interest for the authors within the paper? Yes No

Do you agree to hold its contents confidential?

Yes No

Does this paper meet the IRB standards?

Yes No

Comments to Author:

The Authors set out to apply Bayesian inference techniques to the analysis of their data. They have provided a strong case for the potential benefits of using Bayesian data analysis techniques in clinical research. The literature review describes the concept and strengths of Bayesian statistics. Bayesian data analysis is then applied to the author’s data. There is considerable discussion about the application of Bayesian data analysis in this situation and how using this method may have altered their results. There is no discussion about the clinical relevance of their findings, however the purpose of this paper, while not stated, appears to be focused on describing Bayesian inference techniques and providing their data as an example. The strengths and limitations of Bayesian techniques as applied to the presented data are well described. The paper is well organized and fairly easy to read despite being a complex topic.

While this manuscript would be of great interest to the readers of this journal, there are weaknesses that need to be addressed:

This purpose or problem statement is not clearly described which makes the entire paper difficult to follow. Inclusion of a single sentence stating the purpose of this paper should be added.

The literature review is a bit confusing as well. The literature related to Bayesian theory appears to be well discussed, but the literature related to T'ai Chi is sparse. The authors only reference the paper they go on to use in their analysis. While this may be adequate as the authors use this study to illustrate the use of Bayesian model techniques, some statement regarding other literature (or lack thereof) would be helpful to the reader. There is additional work exploring effectiveness of T'ai Chi (Brismee et al., 2007 *Clinical Rehabilitation*, 21(2), 99-111.; Hartmann et al., 2000 *Journal of the American Geriatrics Society* 48(12) 1553-9). given that these are RCT's, it is unclear why the authors would not also use them to demonstrate the Bayesian data analysis technique. If the strength of Bayesian models is that they allow increased strength because they combine prior knowledge with observed data, it seems that including these would strengthen the analysis and the paper.

The research design is acceptable if the purpose of the paper is to illustrate Bayesian data analysis and the strength of this analytic technique. If the authors purpose was to provide evidence to the use of T'ai Chi as an intervention for osteoarthritis there should be more description of their methods and the Song study (and any other study that will be included as a priori analysis to be used to generate probability distributions).

The data analysis technique is well described and an asset to this paper. Some additional discussion of how the 'prior probability distributions' (page 3) were obtained from the data in the Song study would increase enthusiasm for this paper as others could then use this method to analyze data using Bayesian data analysis. On page 6, lines 5-21 describe how the three possible probability distributions were obtained, but it is unclear how the samples were chosen and how exactly this probability was calculated. As currently written, it is unclear how these distributions were generated and therefore the reader is not able to repeat the analysis independently. Some statement clarifying the similarity of the sample/studies (Song and proposed study) should be added as this would be important to know if the work is comparable and therefore appropriate.

The discussion is well written and a strength of this paper. On page 8, line 22-23, the authors state that sensitivity analysis across various priors helps to minimize limitations but they do not explain this statement. Some discussion of the limitations of this method, and how it is minimized would make this clearer. The conclusions

are clear regarding using Bayesian analysis, however some mention in the discussion and conclusion about the efficacy of T'ai Chi in the OA population would be a nice addition. Further, showing the findings of 'traditional' statistical analysis and comparing them to the findings of the Bayesian analysis would show the true strengths of Bayesian technique.

Manuscript Rating Question(s): Scale Rating

Problem Statement: [1-3] 2
Attention to relevant literature [1-3] 1
Theoretical framework: [1-3] N/A
Research design: [1-3] 1
Data analysis: [1-3] 1
Discussion of results: [1-3] 2
Organization: [1-3] 1
Writing Style: [1-3] 1
Value of topic: [1-5] 5
Probable reader interest in topic: [1-5] 5
Importance of present contribution: [1-5] 4
Priority of topic for publication: [1-5] 5
Rank this manuscript for its value: [1-5] 4

NRES-D-07-00107

“Bayesian Data Analysis: Estimating the Efficacy of Tai Chi as a Case Study”

Original Submission

Yow-Wu Bill Wu, PhD (Reviewer 4)

Reviewer Recommendation Accept With Minor Revisions

Term:

Overall Reviewer 95

Manuscript Rating:

Rate Reviewer: (Select 1-100)

(1) Answer yes or no for each of the questions below:

Do you have a conflict of interest in reviewing this paper?

Yes _____ No _____

Comments to Editor:

Do you perceive a conflict of interest for the authors within the paper? Yes _____ No _____

Do you agree to hold its contents confidential?

Yes _____ No _____

Does this paper meet the IRB standards?

Yes No

This is a very well written methodology paper. The authors used easy to understand language to explain how the Bayesian Data Analysis can be applied to nursing research. It is an important topic for nursing researchers.

The readers of this journal may not be all familiar with some statistical terminology in this paper, such as single likelihood function (ln 23, p. 6), sensitivity analysis (ln 22, p.8). It will be helpful if the authors explain a little bit more on these terms or add references.

Comments to
Author:

From line 16 to line 20 on page 5, the authors explained three distributions in Figure 1. Readers may wonder how these distributions were constructed. It would be very useful to help them understand conceptually, if the authors can use several sentences to explain how these distributions were derived. For example, what kind of software and how to calculate the data from the original study to plot the distribution are required. The purpose of this is to enhance the researchers understand better how does the Bayesians data analysis work conceptually rather than asking them to do it by themselves.

Another two parts need more explanation are (1) how does the likelihood function was derived conceptually? (ln 1 , p. 7), and (2) how to combine each prior distribution with the likelihood function to compute the posterior distribution? (ln 7-9, p. 7) I think it is important that readers understand the ideas how these distributions were derived conceptually rather than mathematically.

This is a very good paper and researchers will benefit from it by understanding more about how to use this method in their future research.

Manuscript Rating Question(s): Scale Rating

Problem Statement:	[1-3] 1
Attention to relevant literature	[1-3] 1
Theoretical framework:	[1-3] 1
Research design:	[1-3] N/A
Data analysis:	[1-3] 1
Discussion of results:	[1-3] 1
Organization:	[1-3] 1

Writing Style: [1-3] 1
Value of topic: [1-5] 5
Probable reader interest in topic: [1-5] 5
Importance of present contribution: [1-5] 5
Priority of topic for publication: [1-5] 5
Rank this manuscript for its value: [1-5] 5