Validating a Multi-criteria decision analysis (MCDA) framework for health care decision making

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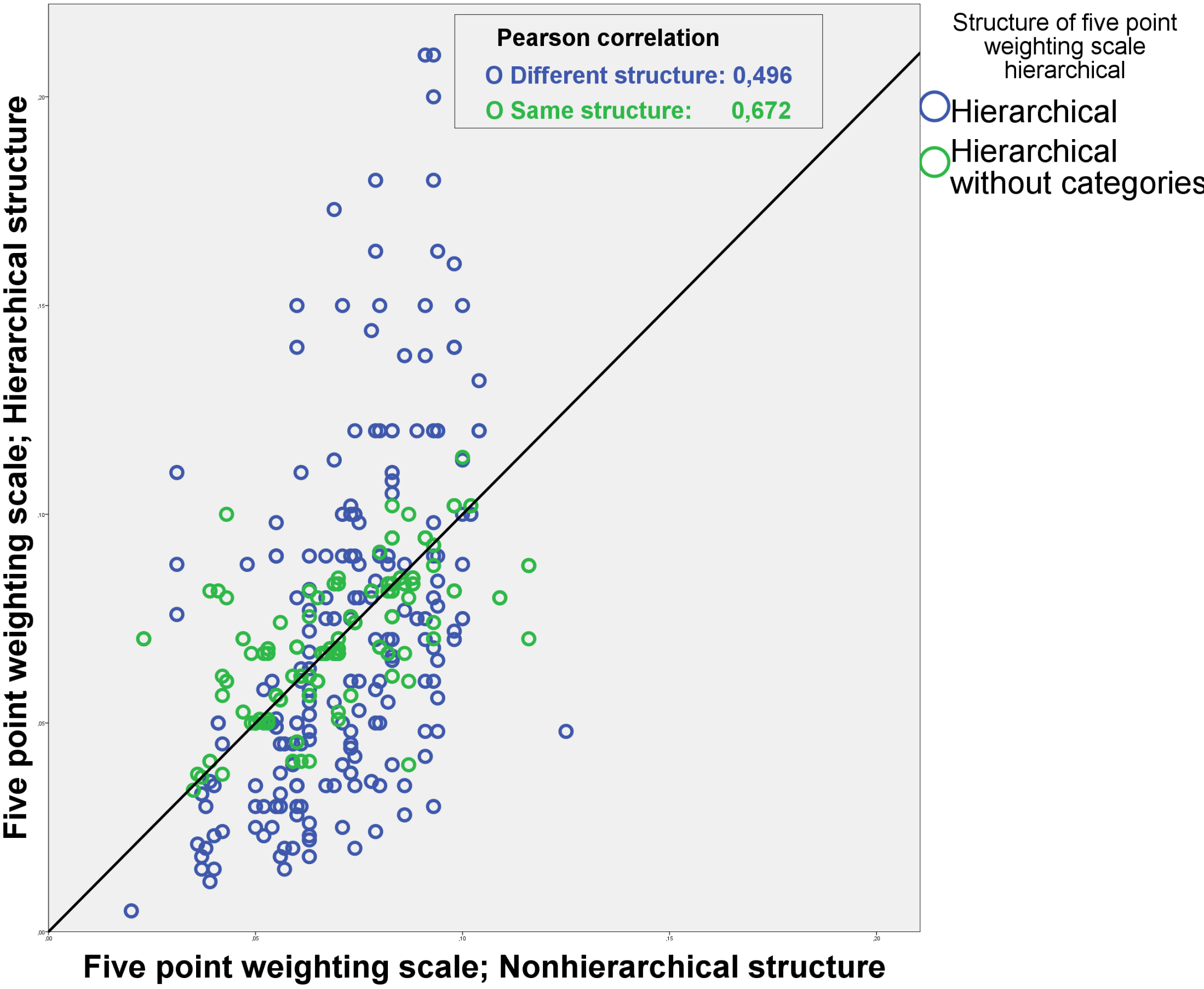
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Objective: The EVIDEM framework was developed to provide efficient MCDA-based solutions to healthcare decision making and priority setting. It includes a simple five-point weight elicitation technique, designed to be easily applicable by a broad range of users (figure 1). The validity of the EVIDEM framework to determine the value of health care innovations has to be established. The objective of this study was to compare the criteria weighting technique of the EVIDEM method with other MCDA weighting techniques.


	1	2	3	4	5
D1: Disease severity	○	○	○	○	○
D2: Size of population	○	○	○	○	○
C1: Clinical guidelines	○	○	○	○	○
C2: Comparative interventions limitations	○	○	○	○	○
I1: Improvement of efficacy/ effectiveness	○	○	○	○	○
I2:Improvement of safety & tolerability	○	○	○	○	○
I3: Improvement of patient reported outcomes	○	○	○	○	○
T1: Public health interest	○	○	○	○	○
T2: Type of medical service	○	○	○	○	○
E1: Budget impact on health plan	○	○	○	○	○
E2: Cost-effectiveness of intervention	○	○	○	○	○
E3: Impact on other spending	○	○	○	○	○
Q1: Completeness and consistency of reporting evidence	○	○	○	○	○
Q2: Relevance and validity of evidence	○	○	○	○	○

Figure 1. Example of EVIDEM weighting technique

Methods: An online questionnaire was developed to compare the weight elicitation technique of the EVIDEM approach with four alternative techniques (pairwise comparison, best-worst scaling, ranking and allocating a budget of points). The effect of decision tree structuring and MCDM weight elicitation techniques on ratio scaled weights was determined. Comparison is made based on correlations of weights given to criteria. Higher correlation (above 0,5) between techniques represent a stronger similarities between the weights given to criteria. A convenience sample of 60 Dutch and Canadian students was asked to participate in the study. They provided weights for 14 criteria with two techniques, and feedback on ease of use and clarity of concepts of the different techniques.

Graph 1. Correlation between nonhierarchically structured and hierarchically structured decision tree weights
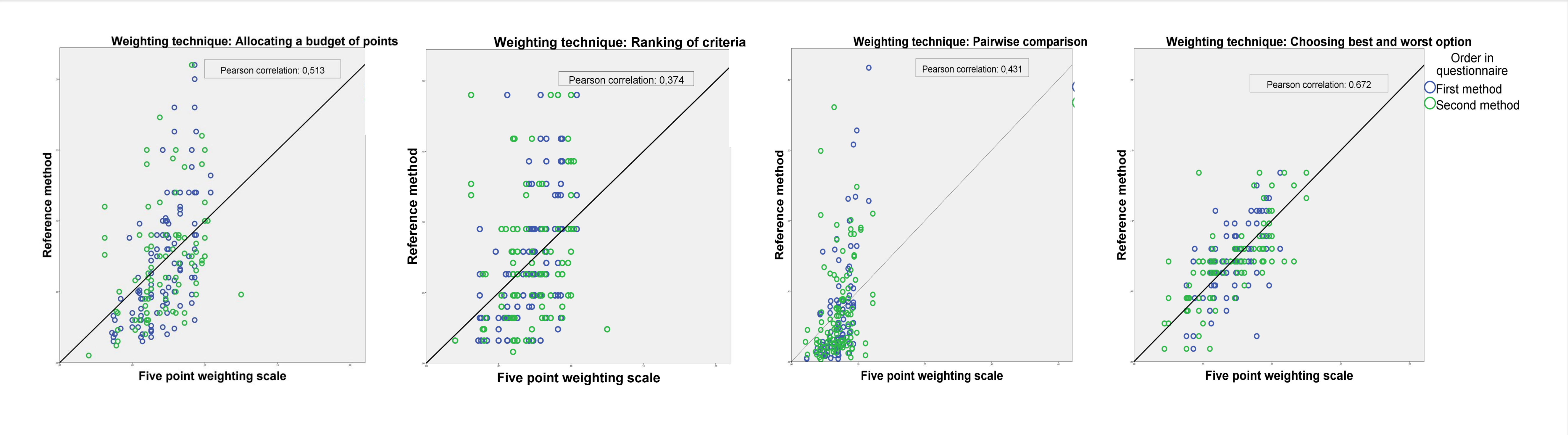
Graph 2. Correlation between (a) point allocation, (b) criteria ranking, (c) pairwise comparisons, (d) best worst scaling weights and five-point rating

Results: Pearson correlation test indicates a correlation of 0,665 between criteria weights elicited with best-worst scaling compared to weights elicited with the five-point rating scale. Rank order weights and five-point rating scale weights showed lowest correlation (0,374) (graph 2). Noteworthy, in criteria weights determined twice with the five-point rating within minutes by the same participant, again correlation is 0,672. If a hierarchical ordering of the criteria is added to the weight calculation, correlation of criteria weights is only 0,496(graph 1).

Conclusions: The results valid of this study show that difference in structuring of the decision tree results in the largest differences in weight range of the criteria. Weights obtained with different weight elicitation techniques are also considerable, although a strong correlation is found for weights elicitated with best-worst scaling compared to the five point weighting technique.

Practically, this finding has to be taken into account when interpreting the results of any MCDA, or comparing the results between studies. Whether criteria weights are elicited with the same technique or with different techniques does influence the weights for criteria. Sensitivity analysis of the influence of criteria weights on the outcome of the analysis should therefore be an important part of a MCDA with the EVIDEM framework.

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