



# Pacific Rim International Journal of Nursing Research

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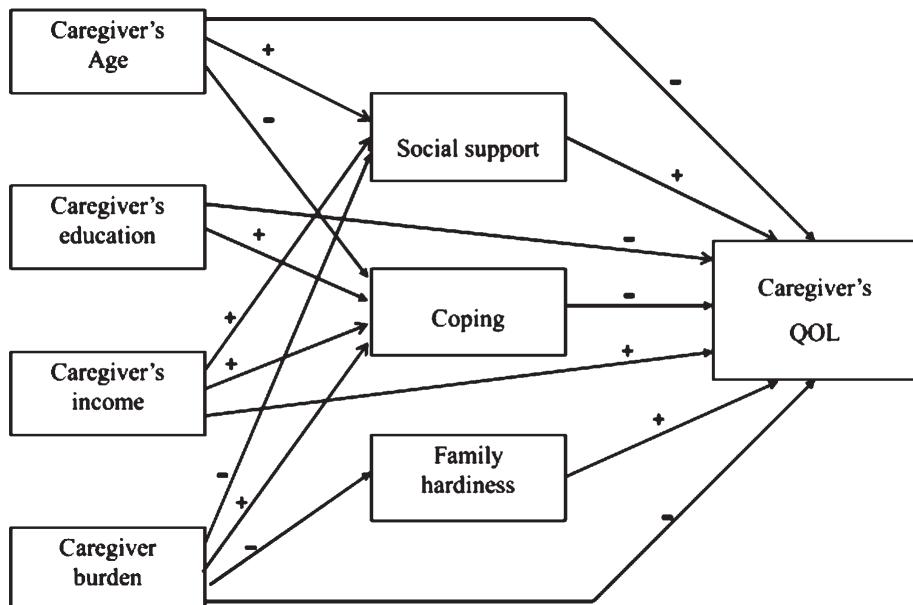
## Causal Modelling: Strategies for Publication

Causal modelling is a methodology used in many studies submitted for publication in *The Pacific Rim International Journal of Nursing Research*. In many manuscripts previously submitted models usually were complex and contained many variables and relationships among those variables. Thus the manuscripts submitted usually exceeded 5000 words and required many revisions before being accepted for publication. The purpose of this Editorial is to describe the nature of causal modelling and strategies to help authors publish their work within the length required by the Journal.

Causal modelling is a representation of a set of relationships in which the causal connections between several variables are examined simultaneously.<sup>1</sup> Such modelling is an important tool for knowledge development in social science, which is concerned with the complex social phenomena. Nursing science shares this similarity, since nursing has a very strong philosophical foundation in holistic care and holistic health of individuals, families and communities; thus, this approach is well accepted in the field, especially by those scholars who seek to understand the complex relationships among many variables to influence the desired outcomes. Causal modelling may provide stronger evidence about the direction and strength of cause-and-effect relationships hypothesized by the researcher,<sup>2</sup> since a causal model expresses more than correlation because correlation does not imply causation. Also, this modelling has a big advantage over ordinary multiple regression analysis in that it is possible to examine direct and indirect pathways to a dependent variable and therefore calculate the direct and indirect effects which independent variables have on the dependent variable.<sup>2</sup> The first step in constructing the model is the review related theories and researches thoroughly. The theories may contain more than one theory, and theories must be relevant to the phenomena of interest. If the content of literature review is not related to the topic/phenomena of interest, it is impossible to construct a good model. Some researchers construct the hypothesized model based upon only comprehensive empirical evidence without any theory. However, the evidence and the causal relationships in the hypothesized model must be plausible, and the constructed model needs to be tested against the data. Importantly there is a need to assess the degree of “fit” between model and data.

Testing the model then involves testing each of the implied hypotheses.<sup>2</sup> However, in a manuscript there is no need to present each hypothesis specifying each variable directly and indirectly influencing the dependent variable. You as author may just present the aim of the study and a very short hypothesis as in the following example:

Meecharoen *et al.*<sup>3</sup> constructed a causal model to examine causal relationships among caregivers' age, education, income, caregiver burden, family hardiness, coping, social support, and quality of life among family caregivers of patients with advanced cancer based on Stress Process Model and previous researches. They stated that the aim of the study was to test an hypothesized causal model depicting the relationships between caregiver age, education, income, burden, family hardiness, coping, social support, and QOL. The hypothesized model of factors influencing QOL among family caregivers of patients with advanced cancer is shown in Figure 1.<sup>3</sup>



**Figure 1:** Hypothesized Model of Factors Influencing Quality of Life among Family Caregivers of Patients with Advanced Cancer (Reprinted with permission from Pacific Rim International Journal of Nursing Research)

As you can see in this Model, it would take too long, and your manuscript would describe many redundancies, if you tried to explain the hypothesis of each variable directly and indirectly influencing the outcome, for example:

1. Caregivers' age has negative direct effect and positive indirect effect through social support and negative indirect effect through coping on caregivers' QOL.
2. Caregivers' education has both negative direct effect and positive indirect effect through coping on caregivers' QOL, and so on.

One way to avoid a long set of hypotheses is to describe only one hypothesis, which is “The hypothesized model fits the data.” Then those complex relationships would be presented in the model, and data analysis.

In the Result section of your manuscript, the findings regarding testing the hypothesized model must be presented with accepting criteria for fitness, for example:  $\chi^2/df$  value, GFI, AGFI, RMSEA, CN largest standard residual, Q plot and any relevant others. If the results are not consistent with the set criteria, then the model needs to be adjusted or modified until the criteria are met and the best model is achieved. Next, the modified model should be presented along with a table that shows the direct and indirect effect of each variable on other variables depicted in the best modified model.

Your discussion should be consistent with the aim and hypothesis of the study. If the hypothesis is “The hypothesized model fit with the data”, then the discussion will focus on the whole model, with the direct and indirect effects of each variable on the dependent variable. It would become lengthy if separate hypotheses were discussed.

There are limitations in causal inferences in most causal models because a cross sectional designed was used. Researchers should provide strong rationale for causal relationships, otherwise limitations should be mentioned.

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### **References**

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