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Does activity level mediate or suppress the association between fear of falling and falls?

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In Wijnhuizen et al.'s (2007) paper the authors present their findings that fear of falling is not a significant zero order predictor of number of falls in their sample, but is significant after controlling for level of activity. Their conclusion is that activity level mediates the association between fear of falling and rate of falls. However, this conclusion is not consistent with the usual understanding of mediation, and we believe may be considerably misleading if presented in this way.

In classical mediation according to the method the authors have cited (Baron & Kenny, 1986) three criteria must be met: (1) the relationship between the independent variable (X) and the dependent variable (Y) must be significant before controlling for the mediator (M), (2) X must significantly predict M, and (3) M must significantly predict Y. If these criteria hold, the strength of the relationship between X and Y will be reduced after controlling for M.

In Wijnhuizen et al.'s (2007) paper very much the opposite of the above is evidenced. First, before controlling for activity level, fear of falling does not predict falls. Second, after controlling for activity level, the association between fear of falling and falls improves, rather than reduces.

The relationship presented by Wijnhuizen et al. (2007) instead describes what is usually referred to as suppression (that is, a mechanism by which a statistical relationship is masked by a measurable process). There is an association between fear of falls and falling, such that people who fear falling also fall more, but in this study it is masked by the fact that people who fear falling also curtail their activities.

MacKinnon et al. (2000, 2007) have argued that the term "inconsistent mediation" may be used to describe suppressor relationships in the restricted circumstance in which the causal nature of the effects has been established. That is, mediation precludes (1) any reciprocal causation (e.g., history of falls influences current fear of falls or activity level) or (2) any common unmeasured cause (e.g., any underlying factors that predispose to both fear of falls and rate of falls). The only remaining effect testable within a mediation framework is one in which X, either directly or indirectly, causes Y. That is, in order to explain the direct effect Wijnhuizen et al.

(2007) found between fear of falling and falls (controlling for activity) within a mediation model, it would be necessary to claim that fearing falls causes them to happen, which seems difficult to justify.

In the absence of a clear causal framework which eliminates reciprocal causation or common underlying causes, the data presented by Wijlhuizen et al. (2007) fit more clearly with the usual description of suppression. Theoretically this does not undermine the importance of their findings; the fact that the relationship between fear of falling and falls is masked by differences in activity level is an important consideration for all those studying falls. However interpreting this as mediation requires assumptions about the causal nature of the revealed effects which are not warranted given the nature of the data.

References

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