Measurement Challenges in Family-school Partership Research

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Introduction

- Measurement issues I will talk about fall into two related categories:
  - Level of aggregation
  - Generalizability across measures

Measurement Issues

- Measurement of constructs in the social sciences is challenging for many reasons, and these difficulties are likely to come into play in research into family-school partnerships.
- I will limit my remarks to two such issues: the level of aggregation of measures and the generalization of measures across differing operationalizations.

Level of Aggregation

- Recent methodological advances in areas such as structural equation modeling have brought the concept of constructs and their measurement to the forefront.
- Although it is often useful to model our measures as indicators of latent constructs, this may not always be the case.
- What I would like to talk about today is the appropriate level of aggregation for our research.

Level of Aggregation

- By this I mean, how broadly or narrowly do we want to define our constructs?
- The highest level of aggregation is the broad construct level.
  - G in intelligence
- The next highest level of aggregation is the subscale level.
- In some cases we might want to operationalize our constructs at the level of the individual.

Level of Aggregation

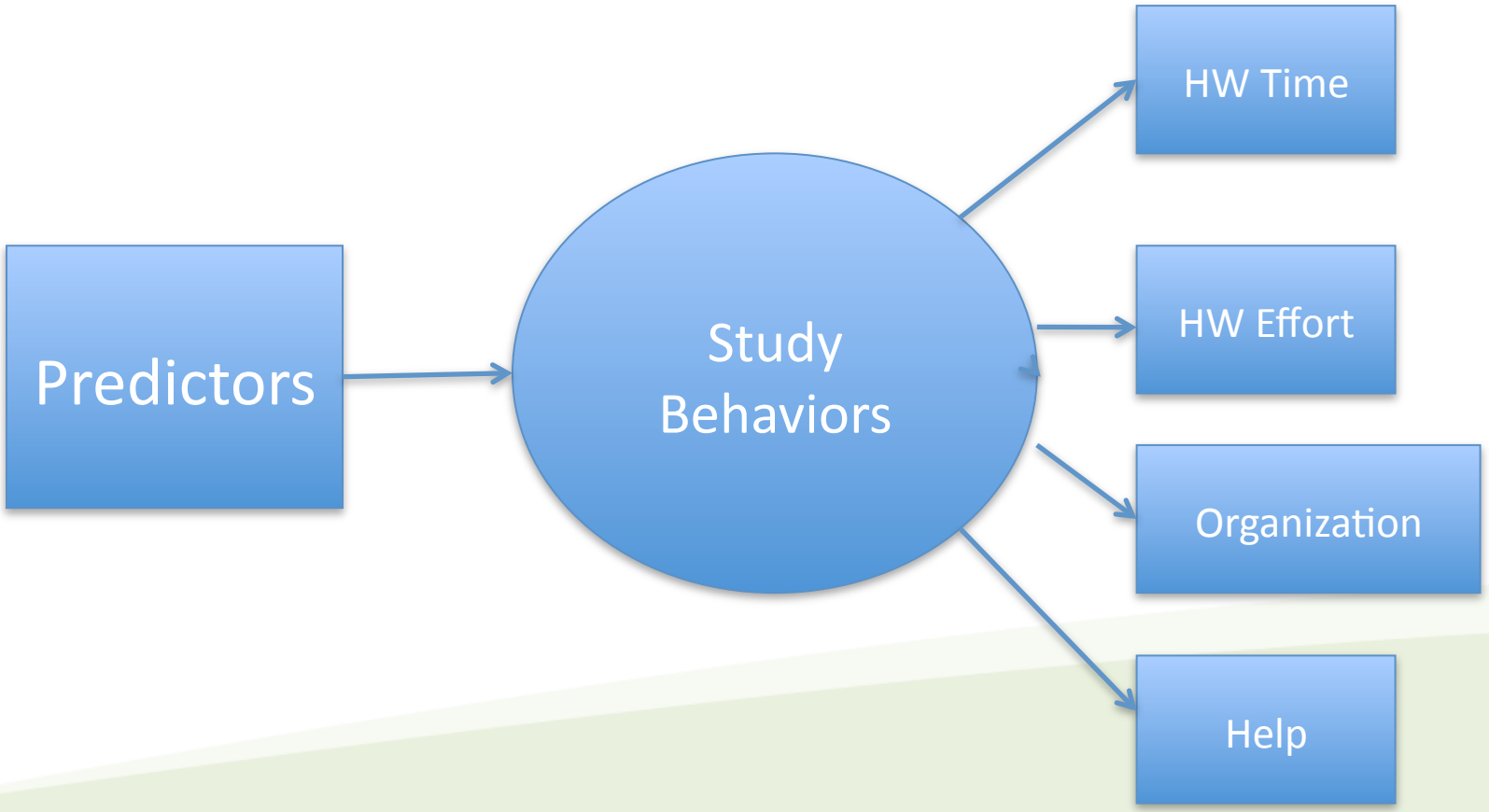
- Operationalizing constructs at the higher levels has certain advantages:
  - Triangulation on the construct of interest
  - Estimation of paths among constructs that are disattenuated for measurement error (in the sense of a lack of internal consistency).
- However, researchers rarely realize that, if the measures being combined to form the latent construct are not causally homogenous, in the sense of having similar antecedents or precedents, combining them into a single measure may do more harm than good.

Level of Aggregation

- To take an example ,we could operationalize student study behaviors as consisting of
  - Time & effort on HW
  - Organizational skills
  - Seeking outside help

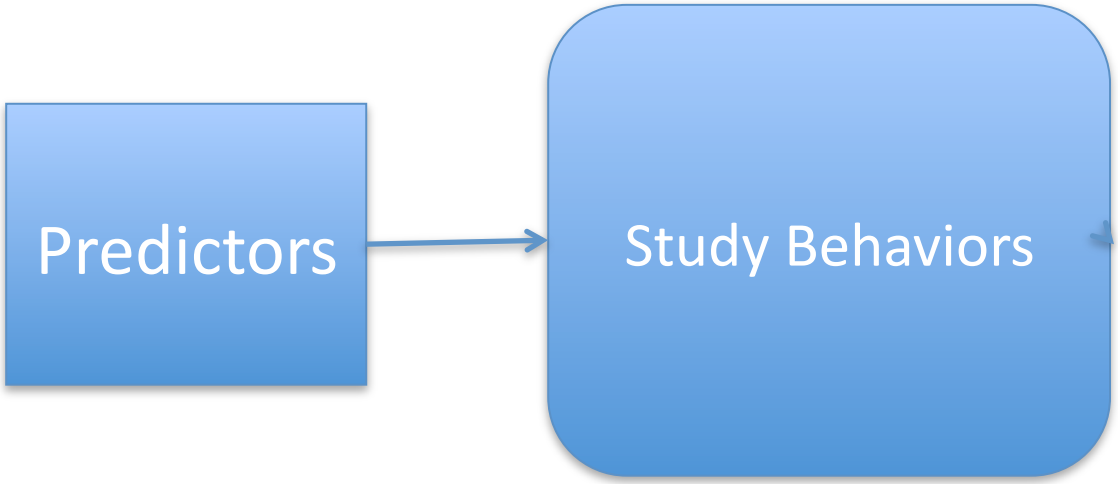
Level of Aggregation

- In this case, a simple model might look like this:



Level of Aggregation

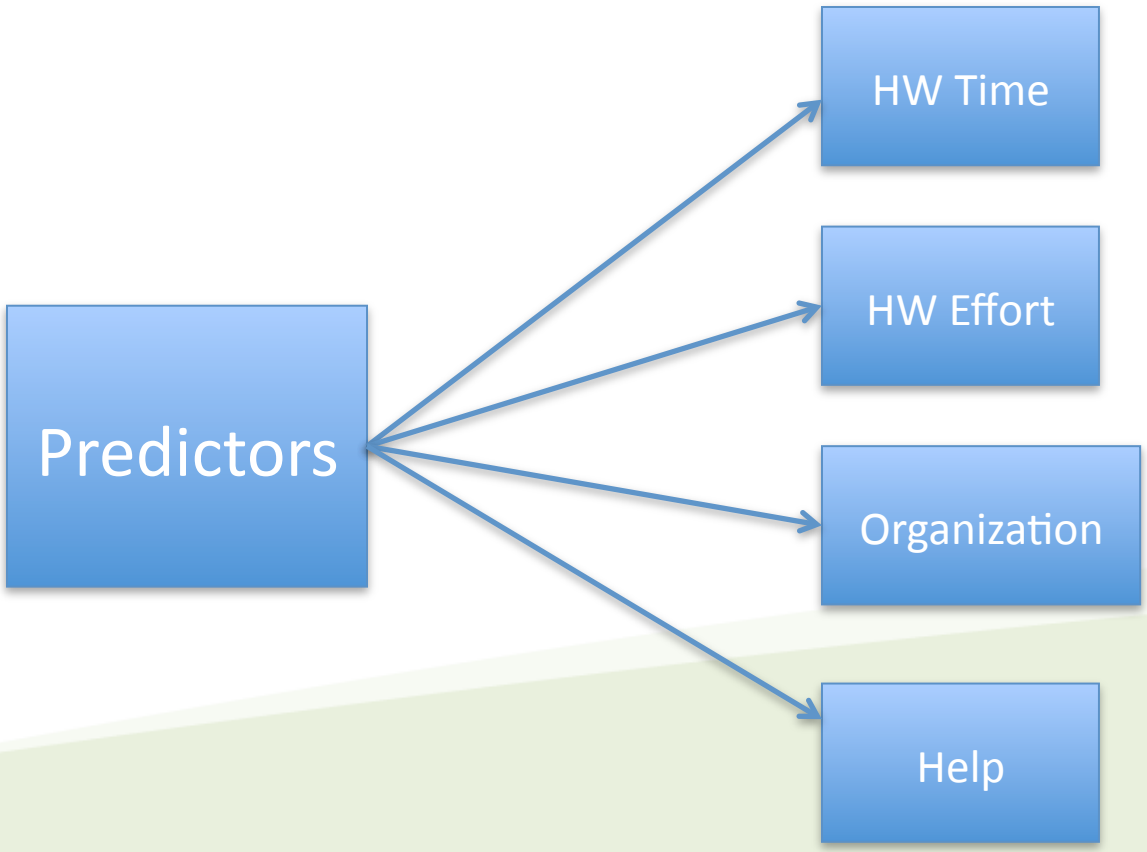
- Or this:



- treating study behaviors as an observed composite variable, as in ANOVA or regression.

Level of Aggregation

- Alternatively, we could model the effects of our predictors on each of the observed study behavior variables separately:



Level of Aggregation

- Which one is right?
- This depends on whether the predictors are hypothesized to have the same type of effect, in terms of sign and magnitude, on all of the measures of study behavior and whether the different study behaviors are expected to have the same effects on other outcomes..
- Note that in the model in which study behavior is treated as a latent construct, the predictors only affect the individual measures indirectly, through the construct.

Level of Aggregation

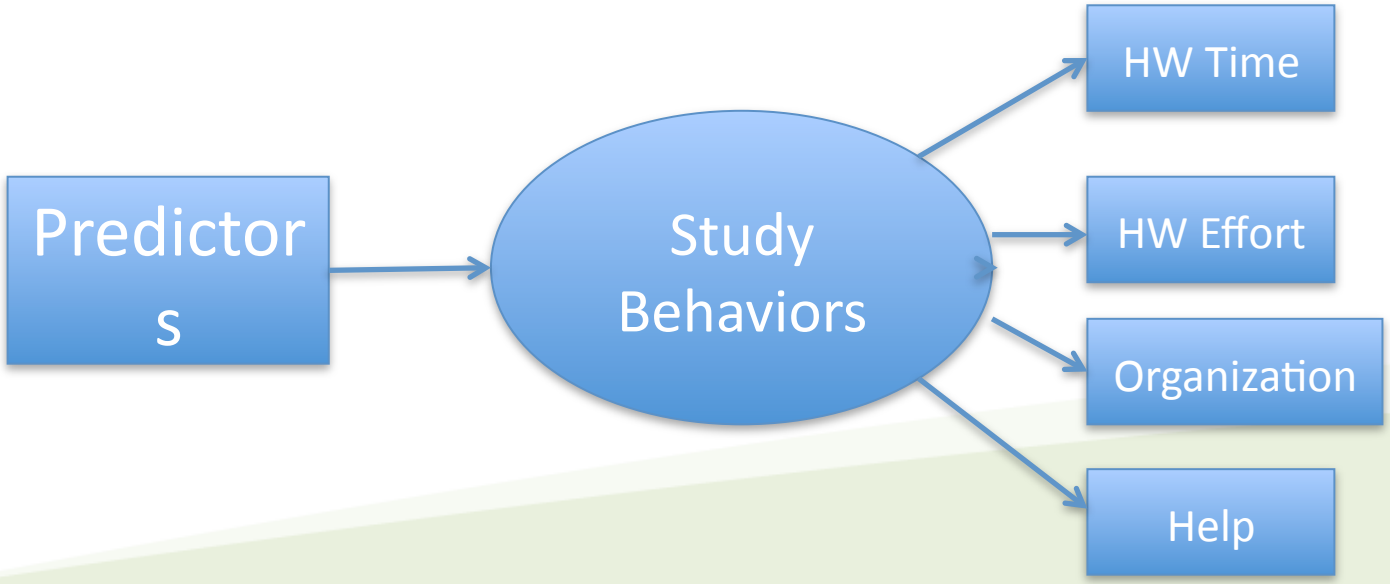
- If the predictors have the same effects on all the measures, this model should work well.
- However, if the predictors have differential effects on the measures, treating them as a composite or latent variable may actually obfuscate the effects of the predictors.

Level of Aggregation

- What about reliability?
- Aren't we supposed to model variables as latent so that we can disattenuate predictive path values for measurement error?
- Yes, but the measurement error in these applications is lack of internal consistency.
- In other words, when we model the effects of predictors on latent constructs, the path values will only reflect the effect of the predictor on the shared variance among the components.

Level of Aggregation

- In our example, the path from the predictors to study behaviors would only reflect the effects of the predictors on the shared variance among the 4 measures.



Level of Aggregation

- If, on the other hand, the 4 measures were strongly related and were affected in a similar manner by the predictors, modeling them as indicators of a latent construct would increase our power to detect this effect .
- In other words, in this scenario we would have greater power to detect the effects of the predictors by modeling effects on the latent construct than by looking at the individual effects of the predictors on the individual measures.

Level of Aggregation

- Because differences between the two ways of modeling measures can be substantial, it is worth considering which of the two scenarios is most likely to hold.
- It seems to me that a useful program of research would be to study the extent to which measures of a construct have different antecedents and consequences.
- This could lead us to an understanding of whether different operationalizations of a construct are likely to generalize.

Generalizability of constructs

- Constructs such as motivation, self-efficacy for learning, and parental involvement mean different things to different people, and this is likely one reason that research findings in the social sciences are often difficult to replicate.
- On the other hand, being able to generalize findings across different operational definitions of a construct provides strong evidence for the robustness of those findings.

Generalizability of constructs

- However, researchers don't usually use different operationalizations in a systematic way, in order to investigate the degree to which findings will generalize.
- Instead measures are chosen for other reasons.
- These reasons are often very good, but if we want to learn more about the extent to which different measures of the same construct will yield similar results, we will have to study this systematically.

Generalizability of constructs

- I suggest that researchers think carefully about the *theoretical* reasons that findings would or would not be expected to generalize across different operational definitions of the construct, and talk about this as part of their instrumentation section.
- To me, a useful research article would be one in which such issues were discussed.

Generalizability of constructs

- The less generalization is expected, the more the initial operationalization of the construct becomes important.
- However, if generalization across definitions is expected, it may be productive to consider the expansion of the research program to include study of the conditions under which this would happen.

Generalizability of constructs

- This issue may be particularly salient to longitudinal or developmental studies.
- In such studies, we often track student progress over time in relation to changes in some other construct(s).
- However, if the operationalization of these constructs changes over time, such changes would be confounded with any “true” change in students’ scores.

Generalizability of constructs

- Changes in operationalization over time can happen for various reasons:
  - Changes in our knowledge about the construct.
  - Development of new measures.
  - Changes in our knowledge about how the construct relates to other outcomes of interest at different ages.
  - Changes in the actual meaning of the construct as children age.

Generalizability of constructs

- For example, Dr. Pomerantz's research suggests that different types of parental involvement are beneficial at different ages.
- Thus, our measurement of the construct may change over time to reflect the most salient aspects of parental involvement at different ages.
- It is also possible that our definition of the construct itself may change over time.

Generalizability of constructs

- These two possibilities have different implications for measurement.
- In developmental studies it may therefore be fruitful to devote careful thought to which (if either) of these may be operating and how this could be modeled.
- One way of doing this is through the use of multiple group methods in SEM in which the measurement parameters can be tested for invariance over time.
- If the construct itself is thought to change over time, development could still be modeled by using anchor items that are constant across time periods.

THANK YOU