

## Mplus Example of Correction for Measurement Error Attenuation (An illustration of the impact of measurement error on bivariate relations)<sup>1</sup>

```
title: Data from social exchanges pilot study;

data: file=c:\jason\spsswin\semclass\path1.dat; format=1f1.0,2f9.6;

variable: names = sex hostile negaff;

analysis: type=general;

! Assume reliability of hostile = .70, variance = .406;
! Assume reliability of negaff = .70, variance = .547;
! Sex is assumed to be perfectly reliable;

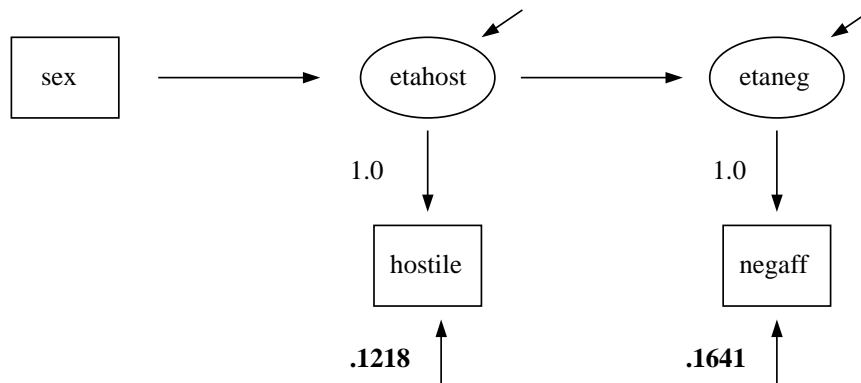
model: etahost by hostile@1;
      etaneg by negaff@1;
      etahost on sex;
      etaneg on etahost;

! Set variance to (1-reliability)(variance of each variable);
! Hostile measurement variance = (1 - .7)(.406) = .1218;
! Negaff measurement variance = (1 - .7)(.547) = .1641;

      hostile@.1218;
      negaff@.1641;

output: stdyx ;
```

### A Picture of the Model:



<sup>1</sup> Although error correction in path models may offer some advantages compared with regression analysis, I do not recommend this approach except for in relatively desperate circumstances. This example is solely for didactic purposes to illustrate the effects of measurement error. The two articles below provide good discussions of some of the issues and potential pitfalls involved in error correction in path models:

McDonald, R.P. (1996). Path analysis with composite variables. *Multivariate Behavioral Research*, 31, 239-270.

Deshon, R.P. (1998). A cautionary note on measurement error corrections in structural equation models. *Psychological Methods*, 3, 412-423.

### Uncorrected Results: Assumes No Measurement Error

(note: output format from an earlier version of Mplus, so it is formatted slightly differently)

MODEL RESULTS

	Estimates	S.E.	Est./S.E.	Std	StdYX
ETAHOST BY HOSTILE	1.000	0.000	0.000	0.636	1.000
ETANEG BY NEGAFF	1.000	0.000	0.000	0.738	1.000
ETANEG ON ETAHOST	0.344	0.067	5.109	0.296	0.296
ETAHOST ON SEX	0.006	0.078	0.077	0.009	0.005

Residual Variances

HOSTILE	0.000	0.000	0.000	0.000	0.000
NEGAFF	0.000	0.000	0.000	0.000	0.000
ETAHOST	0.405	0.035	11.640	1.000	1.000
ETANEG	0.497	0.043	11.640	0.912	0.912

R-SQUARE

Observed

Variable	R-Square
HOSTILE	1.000
NEGAFF	1.000

Latent

Variable	R-Square
ETAHOST	0.000
ETANEG	0.088

### Results Correcting for Measurement Error Attenuation

MODEL RESULTS

	Estimates	S.E.	Est./S.E.	Std	StdYX
ETAHOST BY HOSTILE	1.000	0.000	0.000	0.532	0.836
ETANEG BY NEGAFF	1.000	0.000	0.000	0.617	0.836
ETANEG ON ETAHOST	0.492	0.098	5.024	0.424	0.424
ETAHOST ON SEX	-0.009	0.077	-0.115	-0.017	-0.008

Residual Variances

HOSTILE	0.122	0.000	0.000	0.122	0.301
NEGAFF	0.164	0.000	0.000	0.164	0.301
ETAHOST	0.283	0.035	8.135	1.000	1.000
ETANEG	0.312	0.043	7.182	0.820	0.820

R-SQUARE

Observed

Variable	R-Square
HOSTILE	0.699
NEGAFF	0.699

Latent

Variable	R-Square
ETAHOST	0.000
ETANEG	0.180