Supplementary Material 1:
Grace JB, Steiner M (2021) A protocol for modeling generalized biological responses using latent variables in structural equation models. One Ecosystem.

Latent Variable Structural Equation Modeling (LVSEM) Mathematical Notation

The following is adapted from: Bollen (1989) Structural equations with latent variables. John Wiley & Sons, New York, NY, USA – pp 14 and 20.

Table S1.1. Notation for latent variable structural equation models.

Relationships among Latent Variables $\boldsymbol{\eta = B\eta + \Gamma\xi + \zeta}$		
Symbol	Name	Definition
η	eta	latent endogenous variables
ξ	xi	latent exogenous variables
ζ	zeta	errors for endogenous latent variables
B	beta	coefficient matrix for effects of η variables on other η variables
Γ	gamma	coefficient matrix for effects of ξ variables on η variables
Φ	phi	matrix of covariances among ξ variables
Ψ	psi	matrix of covariances among latent errors, ζs
Relationships between Latent Variables and their Indicator Variables $\mathbf{x} = \boldsymbol{\Lambda}_x\boldsymbol{\xi} + \boldsymbol{\delta}$ $\mathbf{y} = \boldsymbol{\Lambda}_y\boldsymbol{\eta} + \boldsymbol{\varepsilon}$		
Symbol	Name	Definition
x	x	observed indicators of ξ
y	y	observed indicators of η
δ	delta	measurement errors for x variables
ε	epsilon	measurement errors for y variables
Λ_x	lambda x	coefficients relating exogenous latent variables to their indicators
Λ_y	lambda y	coefficients relating endogenous latent variables to their indicators
Θ_δ	theta-delta	covariances among errors for x variables
Θ_ε	theta-epsilon	covariances among errors for y variables