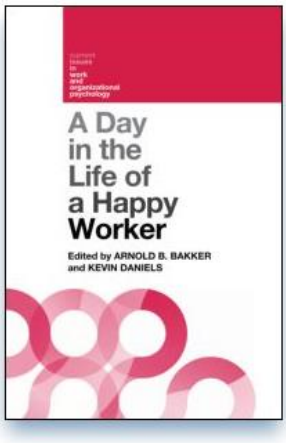
Supplemental material accompanying

Gross, S., Meier, L. L., & Semmer, N. K. (2012). Latent growth modeling applied to diary data: The course of vigor across a work week as an illustrative example. In A. Bakker & K. Daniels (Eds.), A day in the life of a happy worker (pp. 114-131).



Correspondence concerning the following syntaxes should be addressed to Sven Gross, sven.gross@cloud-solutions.net

1. Measurement Model without constraints (CFA1)

Mplus Syntax (!are comments to the syntax)

```
model:

!Measurement Model for vigor (lV = latent vigor, vig1_M = first item
measurement point t)
lV0 BY  vig1_M0
        vig2_M0
        vig3_M0;

lV1 BY  vig1_M1
        vig2_M1
        vig3_M1;

lV2 BY  vig1_M2
        vig2_M2
        vig3_M2;

lV3 BY  vig1_M3
        vig2_M3
        vig3_M3;

lV4 BY  vig1_M4
        vig2_M4
        vig3_M4;

lV5 BY  vig1_M5
        vig2_M5
        vig3_M5;

lV6 BY  vig1_M6
        vig2_M6
        vig3_M6;

!Covariances of Uniqueness
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
vig1_M0 with vig1_M4;
vig1_M0 with vig1_M5;
vig1_M0 with vig1_M6;

vig1_M1 with vig1_M2;
vig1_M1 with vig1_M3;
vig1_M1 with vig1_M4;
vig1_M1 with vig1_M5;
vig1_M1 with vig1_M6;

vig1_M2 with vig1_M3;
vig1_M2 with vig1_M4;
vig1_M2 with vig1_M5;
vig1_M2 with vig1_M6;

vig1_M3 with vig1_M4;
vig1_M3 with vig1_M5;
vig1_M3 with vig1_M6;

vig1_M4 with vig1_M5;
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```
vig1_M4 with vig1_M6;

vig1_M5 with vig1_M6;

!!
vig2_M0 with vig2_M1;
vig2_M0 with vig2_M2;
vig2_M0 with vig2_M3;
vig2_M0 with vig2_M4;
vig2_M0 with vig2_M5;
vig2_M0 with vig2_M6;

vig2_M1 with vig2_M2;
vig2_M1 with vig2_M3;
vig2_M1 with vig2_M4;
vig2_M1 with vig2_M5;
vig2_M1 with vig2_M6;

vig2_M2 with vig2_M3;
vig2_M2 with vig2_M4;
vig2_M2 with vig2_M5;
vig2_M2 with vig2_M6;

vig2_M3 with vig2_M4;
vig2_M3 with vig2_M5;
vig2_M3 with vig2_M6;

vig2_M4 with vig2_M5;
vig2_M4 with vig2_M6;

vig2_M5 with vig2_M6;

!!
vig3_M0 with vig3_M1;
vig3_M0 with vig3_M2;
vig3_M0 with vig3_M3;
vig3_M0 with vig3_M4;
vig3_M0 with vig3_M5;
vig3_M0 with vig3_M6;

vig3_M1 with vig3_M2;
vig3_M1 with vig3_M3;
vig3_M1 with vig3_M4;
vig3_M1 with vig3_M5;
vig3_M1 with vig3_M6;

vig3_M2 with vig3_M3;
vig3_M2 with vig3_M4;
vig3_M2 with vig3_M5;
vig3_M2 with vig3_M6;

vig3_M3 with vig3_M4;
vig3_M3 with vig3_M5;
vig3_M3 with vig3_M6;

vig3_M4 with vig3_M5;
vig3_M4 with vig3_M6;

vig3_M5 with vig3_M6;
```

2. Measurement Model with equal factor loadings (CFA2)

Mplus Syntax

```
model:

!Measurement Model for vigor (lV = latent vigor, vig1_M = first item
measurement point t, iv2 and iv3 are used to define, which factor loading
should be equal across time)

lV0 BY  vig1_M0
        vig2_M0 (iv2)
        vig3_M0 (iv3);

lV1 BY  vig1_M1
        vig2_M1 (iv2)
        vig3_M1 (iv3);

lV2 BY  vig1_M2
        vig2_M2 (iv2)
        vig3_M2 (iv3);

lV3 BY  vig1_M3
        vig2_M3 (iv2)
        vig3_M3 (iv3);

lV4 BY  vig1_M4
        vig2_M4 (iv2)
        vig3_M4 (iv3);

lV5 BY  vig1_M5
        vig2_M5 (iv2)
        vig3_M5 (iv3);

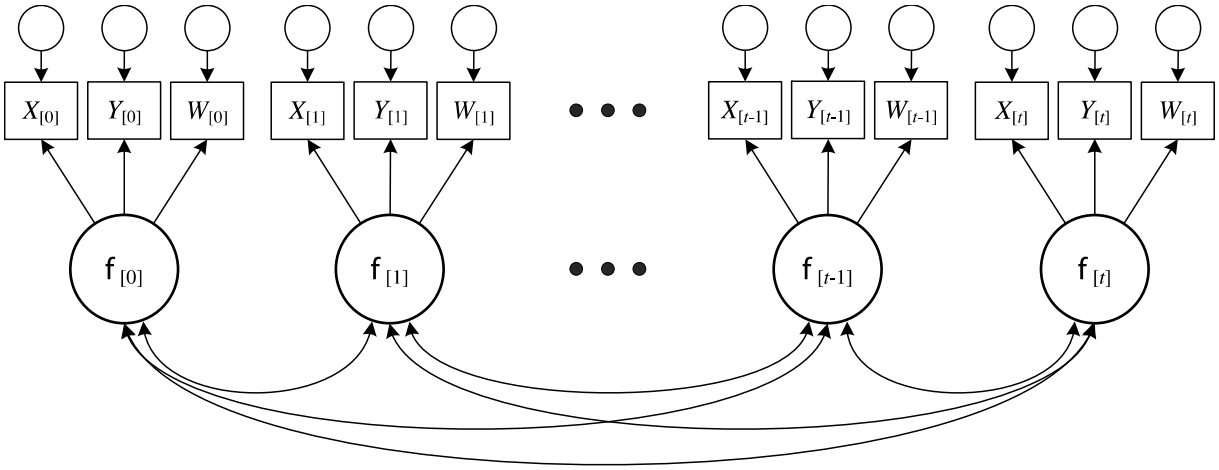
lV6 BY  vig1_M6
        vig2_M6 (iv2)
        vig3_M6 (iv3);

!Code for covariances of uniqueness is the same as in CFA1
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
vig1_M0 with vig1_M4;
vig1_M0 with vig1_M5;
vig1_M0 with vig1_M6;

...
```

3. State model or measurement model with equal factor loadings and equal Intercepts (CFA3)

3a Figure: Simplified State-Model



3b Mplus Syntax

```
model:

!Measurement Model
!First two code parts (definition of factors and covariances of uniqueness)
are the same as in CFA2
lV0 BY vig1_M0
        vig2_M0 (iv2)
        vig3_M0 (iv3);

lV1 BY vig1_M1
        vig2_M1 (iv2)
        vig3_M1 (iv3);

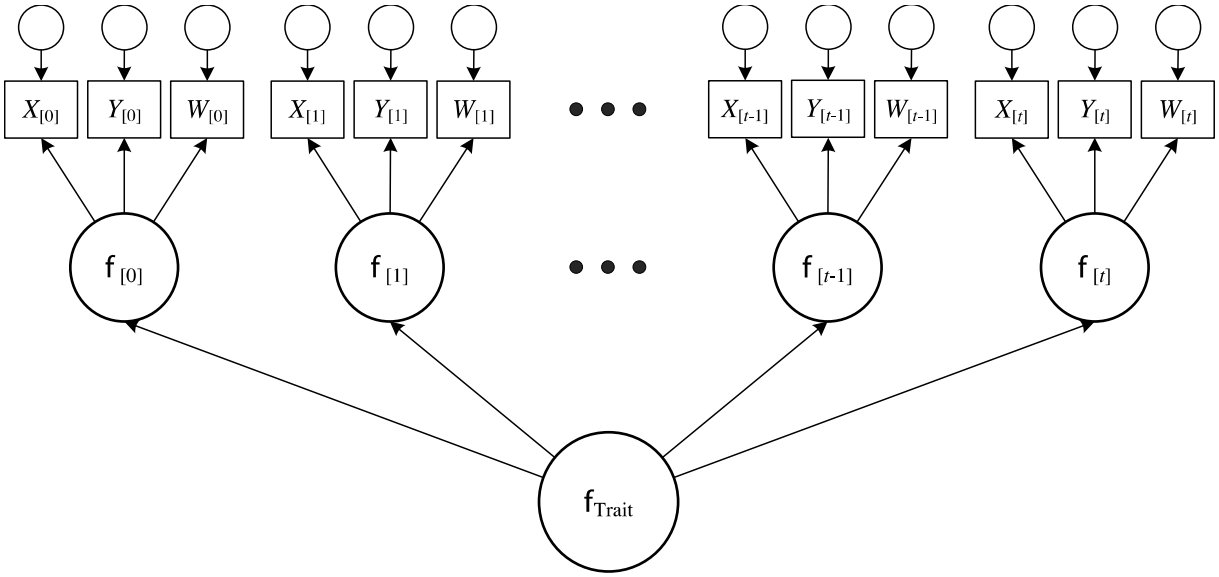
lV2 BY vig1_M2
…

!covariances of uniqueness
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
vig1_M0 with vig1_M4;
vig1_M0 with vig1_M5;
vig1_M0 with vig1_M6;
…

!Intercepts
!Estimating intercepts at the latent level
[lV0 lV1 lV2 lV3 lV4 lV5 lV6];
!Setting intercepts of the first indicator to zero
[vig1_M0@0 vig1_M1@0 vig1_M2@0 vig1_M3@0 vig1_M4@0 vig1_M5@0 vig1_M6@0];
!Setting intercepts of the second indicator to be equal across time
[vig2_M0 vig2_M1 vig2_M2 vig2_M3 vig2_M4 vig2_M5 vig2_M6] (ii2);
!Setting intercepts of the third indicator to be equal across time
[vig3_M0 vig3_M1 vig3_M2 vig3_M3 vig3_M4 vig3_M5 vig3_M6] (ii3);
```

4. State - Trait Model

4a Figure: Simplified State-Trait Model



4b Mplus – Syntax

```
model:

!Measurement Model
!First three code parts (definition of factors, covariances of
uniqueness,intercepts) are the same as in the state-model
lV0 BY vig1_M0
        vig2_M0 (iv2)
        vig3_M0 (iv3);
…

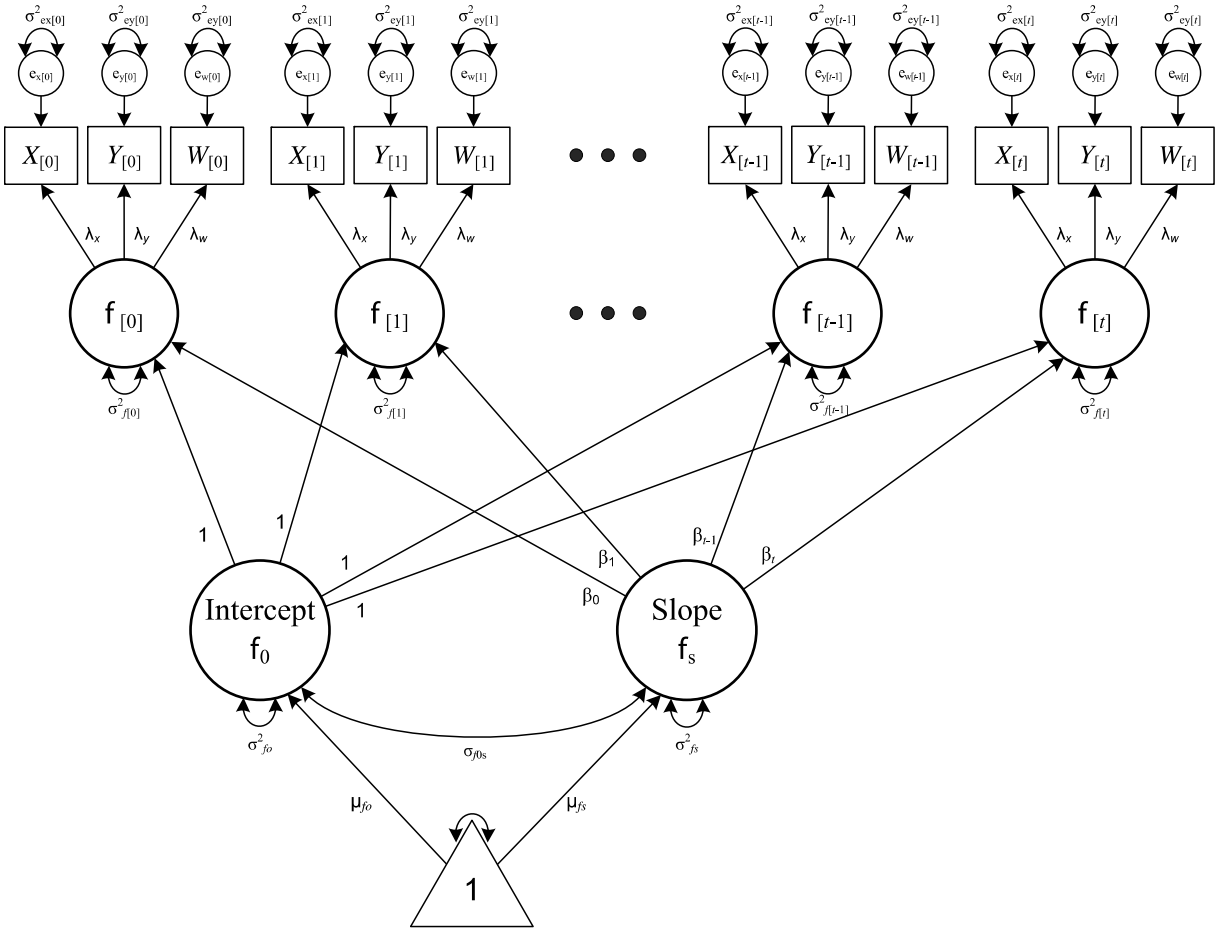
!covariances of uniqueness
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
…

!Intercepts
 [lV0 lV1 lV2 lV3 lV4 lV5 lV6];
[vig1_M0@0 vig1_M1@0 vig1_M2@0 vig1_M3@0 vig1_M4@0 vig1_M5@0 vig1_M6@0];
…


!Structural Part
!Trait (tVig = latent Trait Vigor)
ltVig by lV0-lV6;
```

5. Linear LGM

5a Figure: Linear LGM. Depicted in the figure are most of the parameters that are estimated. The triangle represents a constant to estimate the means and intercepts. Parameters that are estimated but not depicted in this figure are the covariances of uniqueness and the intercepts of the manifest variables.



5b Mplus Syntax

```
model:

!Measurement Model
!First two code parts (definition of factors and covariances of uniqueness)
are the same as in the state-model
lV0 BY vig1_M0
        vig2_M0 (iv2)
        vig3_M0 (iv3);
…

!covariances of uniqueness
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
…
```

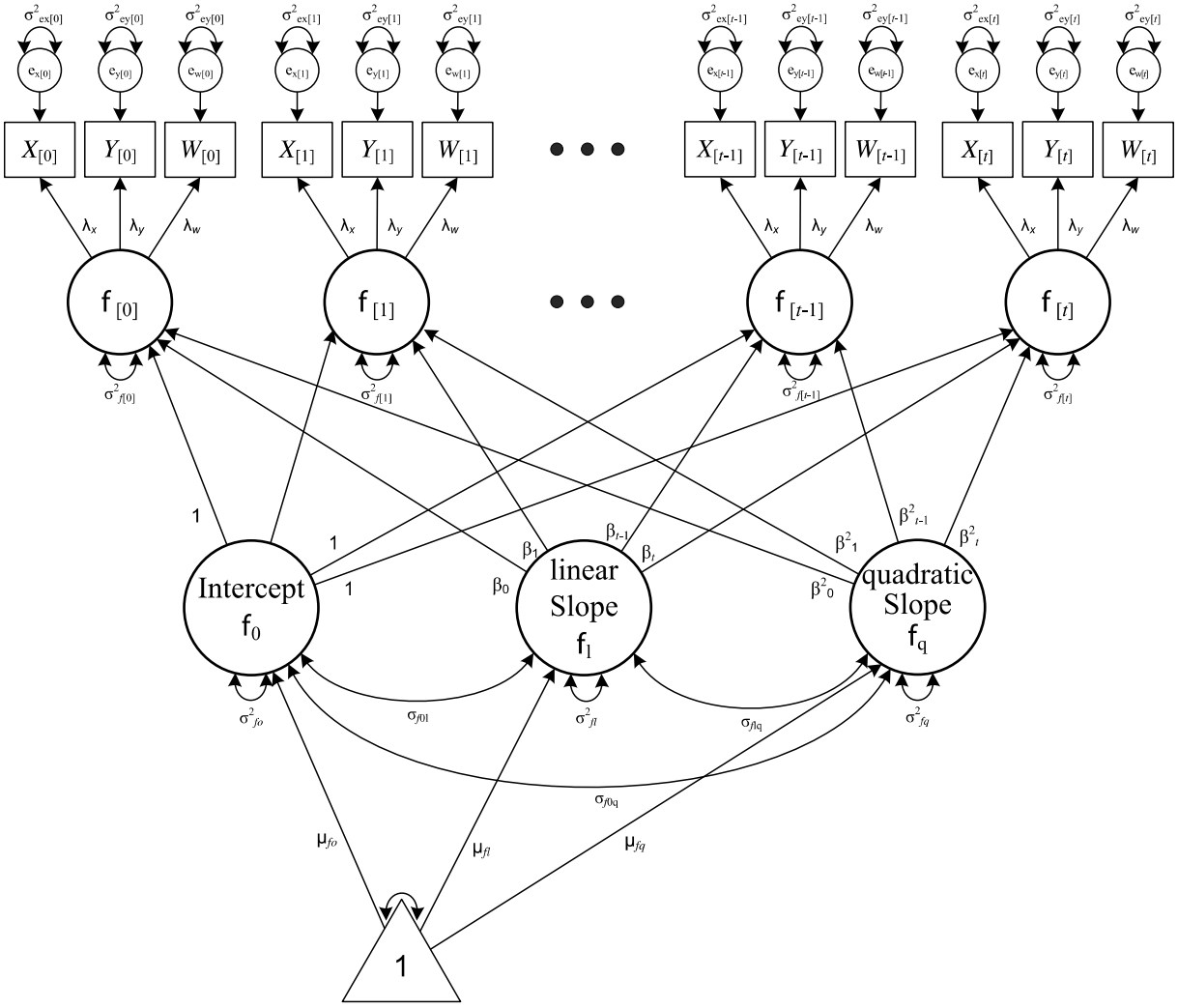
```
!Intercepts
!Estimating means of the growth parameter
[i s];
! Setting intercepts of the latent vigor factors to zero
[lV0@0 lV1@0 lV2@0 lV3@0 lV4@0 lV5@0 lV6@0];
!Setting intercepts of the first indicator to zero
[vig1_M0@0 vig1_M1@0 vig1_M2@0 vig1_M3@0 vig1_M4@0 vig1_M5@0 vig1_M6@0];
!Setting intercepts of the second indicator to be equal across time
[vig2_M0 vig2_M1 vig2_M2 vig2_M3 vig2_M4 vig2_M5 vig2_M6] (ii2);
!Setting intercepts of the third indicator to be equal across time
[vig3_M0 vig3_M1 vig3_M2 vig3_M3 vig3_M4 vig3_M5 vig3_M6] (ii3);



!Structural Part
!linear LGM (i = intercept factor, s = linear slope factor)
i s | lV0@0 lV1@1 lV2@2 lV3@3 lV4@4 lV5@5 lV6@6;
```

6. Quadratic LGM without TICs

6a Figure: quadratic LGM. Depicted in the figure are most of the parameters that are estimated. The triangle represents a constant to estimate the means and intercepts. Parameters that are estimated but not depicted in this figure are the covariances of uniqueness and the intercepts of the manifest variables.



6b Mplus Syntax

```
model:

!Measurement Model
!First two code parts (definition of factors and covariances of uniqueness)
are the same as in the state-model
lV0 BY vig1_M0
        vig2_M0 (iv2)
        vig3_M0 (iv3);
...
```

```
!covariances of uniqueness
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
…

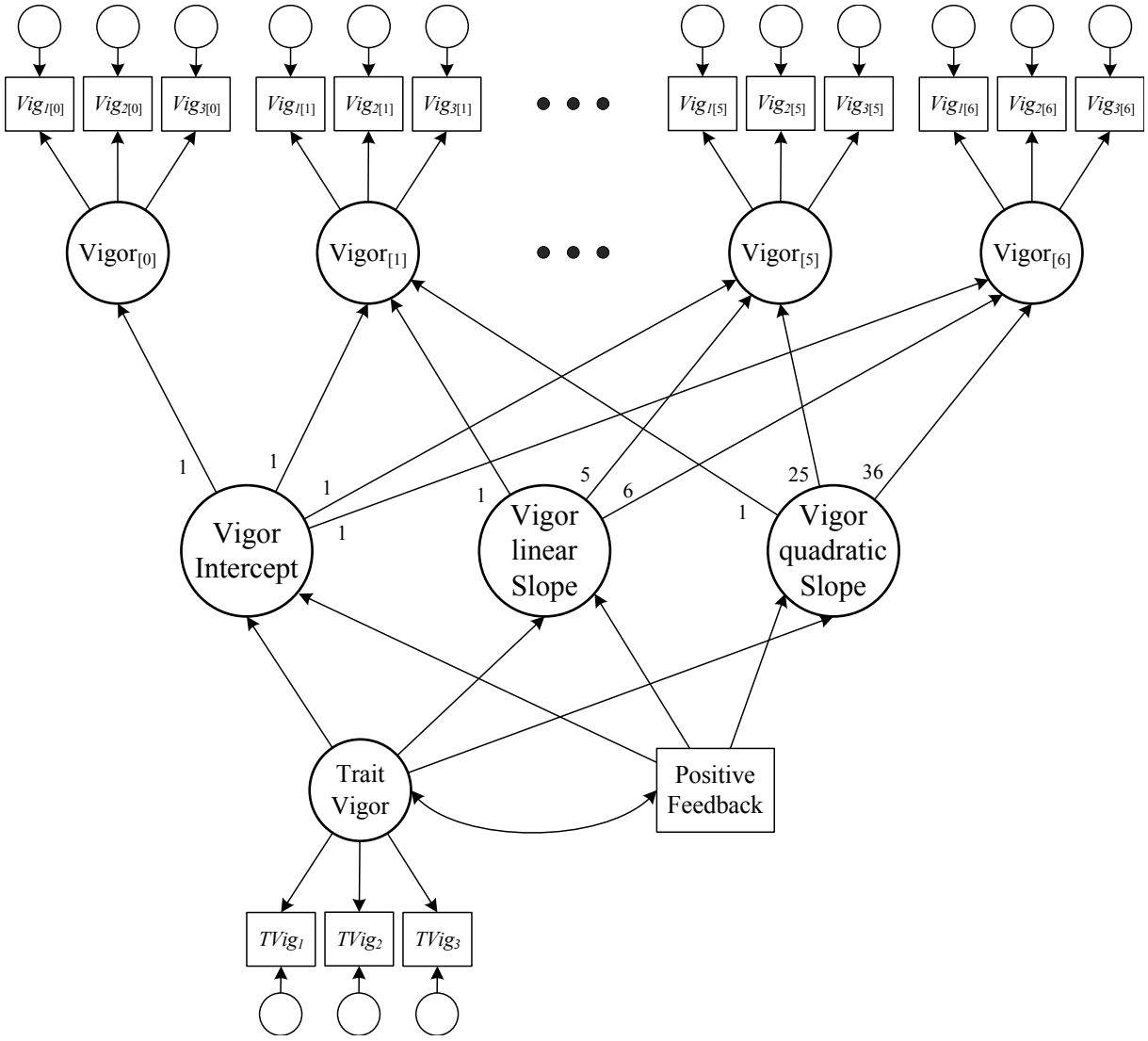
!Intercepts
!Estimating means of the growth parameter
[i s q];
! Setting intercepts of the latent vigor factors to zero
[lV0@0 lV1@0 lV2@0 lV3@0 lV4@0 lV5@0 lV6@0];
!Setting intercepts of the first indicator to zero
[vig1_M0@0 vig1_M1@0 vig1_M2@0 vig1_M3@0 vig1_M4@0 vig1_M5@0 vig1_M6@0];
!Setting intercepts of the second indicator to be equal across time
[vig2_M0 vig2_M1 vig2_M2 vig2_M3 vig2_M4 vig2_M5 vig2_M6] (ii2);
!Setting intercepts of the third indicator to be equal across time
[vig3_M0 vig3_M1 vig3_M2 vig3_M3 vig3_M4 vig3_M5 vig3_M6] (ii3);



!Structural Part
!quadratic LGM (i = intercept factor, s = linear slope factor, q =
quadratic slope factor)
i s q| lV0@0 lV1@1 lV2@2 lV3@3 lV4@4 lV5@5 lV6@6;
```

7. Quadratic LGM including TICs

7a Figure: Simplified quadratic LGM with covariates



7b Mplus Syntax

```
model:

!Measurement Model
!Code for the measurement model of vigor is the same as in the quadratic
LGM without TICs.
lV0 BY vig1_M0
        vig2_M0 (iv2)
        vig3_M0 (iv3);
…

!covariances of uniqueness
vig1_M0 with vig1_M1;
vig1_M0 with vig1_M2;
vig1_M0 with vig1_M3;
```

```
…

!Intercepts
!Estimating means of the growth parameter
[i s q];
! Setting intercepts of the latent vigor factors to zero
[lV0@0 lV1@0 lV2@0 lV3@0 lV4@0 lV5@0 lV6@0];
…

!Measurement Model for latent Trait vigor (LTV = latent trait vigor)
LTV by ltv1 ltv2 ltv3;


!Structural Part

!quadratic LGM
i s q| lV0@0 lV1@1 lV2@2 lV3@3 lV4@4 lV5@5 lV6@6;

!TICs as predictors of the quadratic LGM (PF = positive feedback (manifest
variable: was centered around the grand mean)
i on LTV;
s on LTV;
q on LTV;

i on PF;
s on PF;
q on PF;

!Allowing covariances among growth factors and among TICs
i with s q;
s with q;

LTV with PF;
```