Published in final edited form as:

Monogr Soc Res Child Dev. 2017 September ; 82(3): 46–52. doi:10.1111/mono.12309.

Chapter III. Stability and Change in Children's Emotional and Behavioral Adjustment after the Birth of a Sibling

Brenda L. Volling, Wonjung Oh, and Richard Gonzalez

To begin our investigation of the developmental patterns of children's emotional and behavioral adjustment after the birth of an infant sibling, we have organized the presentation of the seven CBCL syndrome scales into three sections corresponding to *externalizing* (aggression, attention problems), *internalizing* (anxiety/depression, emotional reactivity, withdrawal), and *physical problems* (somatic complaints, sleep problems). Descriptive statistics for each of the scales across the five timepoints can be found in Table 2.

We then calculated cross-time correlations to determine whether there was stability in individual differences in children's behavioral, emotional and physical symptoms over the course of the study. Indeed, on all subscales, there were stable individual differences (all p 's significant) from the prenatal- to 12-month timepoint on aggression ($r = .65 - .76$, $M = .72$), attention problems ($r = .66 - .76$, $M = .71$), anxiety/depression ($r = .47 - .79$, $M = .64$), emotional reactivity ($r = .54 - .68$, $M = .61$), withdrawal ($r = .47 - .64$, $M = .57$), somatic complaints ($r = .47 - .70$, $M = .58$) and sleep problems ($r = .63 - .76$, $M = .70$).

To examine change in children's adjustment over time for the sample as a whole, we ran unconditional latent growth curve models to examine (a) which of the possible effects (linear, quadratic, Adjustment and Adaptation Response) best described the overall trajectory pattern for each of the subscales; and (b) whether there was significant variance in the different growth parameters providing evidence of individual differences in the level of initial problem behavior at the prenatal time point (intercept) and the patterns of trajectories tested (linear, quadratic, Adjustment and Adaptation Response). Recall that the quadratic term would capture several different curvilinear patterns (e.g., delayed impact, gradual increase and decline, and sudden, persistent change). We were particularly interested in whether there was any evidence of a maladaptive pattern of sudden, persistent change (i.e., developmental crisis) in problem behavior in which children's behavior increased suddenly from prenatal to 1 month and did not return to pre-birth levels by one year after the birth.

Across all models, time was centered at the prenatal time point. Following standard practice in the structural equations modeling (SEM) approach to latent growth curve modeling, the intercept paths were constrained to be 1 for each timepoint. The paths from the latent linear slope to the observed items were constrained to be 0, 1, 2.5, 4.5, and 6.5, which corresponded to the prenatal, 1-month, 4-month, 8-month, and 12-month timepoints, respectively. The rationale for the unequal spacing of the linear contrast values was because the timepoints themselves were not equally spaced. For the quadratic model, a new contrast was created involving the squared terms of the linear contrast and added to the model as a fixed effect term. The paths from the latent Adjustment and Adaptation Response factor to the observed items were constrained to be -1, 2.5, -1, 0, and 0. The Adjustment and

Adaptation Response(AAR) contrast is orthogonal to the linear contrast, but not to the grand mean contrast (i.e., the intercept). The reason we settled on orthogonality to the linear contrast was because we wanted to ensure that the Adjustment and Adaptation contrast modeled properties of the trajectory over and above the linear slope.

For the unconditional models, we used Chi-square difference tests for nested models (e.g., comparing the quadratic latent growth model to the linear growth model). For non-nested models, such as comparing the quadratic model to the Adjustment and Adaptation Response model, we used multiple criteria including the Bayesian Information Criterion (*BIC*; (Schwarz, 1978), the sample size adjusted *BIC* (*SSA BIC*; (Sclove, 1987), and the Akaike Information Criterion (*AIC*; (Akaike, 1987); lower scores represent better fitting models. To be noted, we removed 1 extreme outlier from the growth mixture modeling analysis in three cases, anxiety-depression, attention problems, and emotional reactivity, because they were more than 5 S.D. above the mean, resulting in an n of 229 for these analyses.

In the section that follows, we examine which of the models tested (e.g., linear, AAR, quadratic) best fit the data for each of the problem behaviors referred to as the best fitting unconditional model. We then interpret the overall general pattern (i.e., mean level) for each subscale. Because each unconditional model also indicated significant variance (i.e., individual differences) around the growth parameters, each subsequent chapter will focus specifically on modeling the individual variability in growth trajectories using growth mixture modeling.

Externalizing Problems

Aggressive behavior

Chi-square tests between the unconditional latent linear model, the unconditional quadratic model, and the unconditional Adjustment and Adaptation Response model for aggression indicated that the unconditional quadratic model, $\chi^2(1) = 3.927, p < .05$, and the unconditional Adjustment and Adaptation Response model, $\chi^2(1) = 30.085, p < .001$, were better fitting models than the unconditional latent linear model. Model comparisons between the unconditional quadratic and unconditional Adjustment and Adaptation Response model indicated the unconditional Adjustment and Adaptation Response model was a better fitting model (i.e., non-nested model comparisons: the unconditional Adjustment and Adaptation Response model $AIC=5507.988$ vs. the quadratic model $AIC = 5534.146$, smaller AIC indicates a better fitting model).

The growth parameters for the unconditional Adjustment and Adaptation Response model are presented in Table 3. The fixed effects (mean) for the intercept and Adjustment and Adaptation Response contrast for aggression are significant, suggesting that for the sample overall there was an increase in aggression from prenatal to 1 month, with a decline by 4 months. This effect contrasts with the fixed effect for the linear slope which is nonsignificant, showing no overall linear change in aggressive behavior after the birth of a sibling. The random effects (variance) do indicate, however, that there is substantial variability around the intercepts and the linear contrast. The unconditional Adjustment and

Adaptation Response model was chosen as our final model to be used in the Growth Mixture Modeling (GMM) of aggression trajectories presented in Chapter IV.

Attention problems

Chi-square tests indicated that the unconditional latent linear model was a better fitting model than the unconditional Adjustment and Adaptation Response model, $\chi^2(1) = 0.797$, $p = 0.372$, and the unconditional quadratic model, $\chi^2(1) = 0.419$, $p = 0.517$, so the unconditional latent linear model was chosen as the final model to be used in the GMM.

The growth parameters for the unconditional latent linear model are presented in Table 3. The fixed effects for the intercept and linear slope are significant, highlighting that, on average, there is a linear decrease in attention problems from prenatal to 12 months for the sample. In addition, the random effects indicate substantial variability around the intercept and linear slope that can be modeled in our analyses looking at individual differences in trajectories for attention problems.

Internalizing Problems

Emotional reactivity

Chi-square tests indicated that the latent linear model was the better fitting model, in comparison to the unconditional Adjustment and Adaptation Response model, $\chi^2(1) = 1.912$, $p = 0.167$, and the unconditional quadratic model, $\chi^2(1) = 1.384$, $p = 0.239$.

Growth parameters presented in Table 3 for the unconditional model show the fixed effect for the intercept was significantly different from zero, yet there was no average change in emotional reactivity, i.e., the fixed effect for the slope was zero. The random effects for both the intercept and the linear slope were significant. The unconditional latent linear model was chosen as the final model for the GMM.

Withdrawal

Chi-square tests indicated the unconditional latent linear model for withdrawal was a better fitting model, $\chi^2(1) = 0.716$, $p = 0.397$, than the unconditional Adjustment and Adaptation Response model, but the unconditional quadratic model was a better fitting model than the unconditional latent linear model, $\chi^2(1) = 6.471$, $p < 0.05$. Thus, the unconditional quadratic model was chosen as our final model in the GMM.

The growth parameters for the unconditional quadratic model presented in Table 3 show the fixed effects for the intercept, linear slope and quadratic slope are significant. Overall, there was a moderate increase in withdrawal with a decelerating rate of curvature in the growth trajectory over time. The random effects indicate that there is significant variability around the intercepts and linear slope.

Anxiety-depression

The Chi-square tests between the unconditional latent linear model and the unconditional Adjustment and Adaptation Response model and the unconditional quadratic model

indicated the unconditional Adjustment and Adaptation Response model, $\chi^2(1) = 0.050$, $p = .823$, and the unconditional quadratic model, $\chi^2(1) = 2.062$, $p = .151$, were not better fitting models than the unconditional latent linear model, which we chose for the final model for the GMM.

Table 3 shows the growth parameters (fixed and random effects for intercept and slope) for the unconditional latent linear model. There was no significant change in anxiety-depression, on average (i.e., the linear slope was nonsignificant), but there were significant random effects for both the intercept and linear slope.

Physical Problems

Somatic complaints

Chi-square tests between the unconditional latent linear model and the unconditional AAR model for somatic complaints, and the unconditional quadratic model, indicated that neither the unconditional AAR model, $\chi^2(1) = 0.005$, $p = 0.944$, nor the unconditional quadratic model, $\chi^2(1) = 1.668$, $p = 0.197$, were better fitting than the unconditional latent linear model. The unconditional latent linear model was chosen as our final model for the GMM analyses.

The growth parameters for the unconditional latent linear model presented in Table 3 reveal the fixed effects for the intercept and linear slope are significant. For the sample overall, there is a linear decrease in somatic complaints from prenatal to 12 months. In addition, the significant random effects indicate there is substantial variability around the intercept and linear slope.

Sleep problems

Chi-square tests between the unconditional latent linear model and the unconditional Adjustment and Adaptation Response and unconditional quadratic models for sleep problems indicated that neither the unconditional Adjustment and Adaptation Response model, $\chi^2(1) = 1.419$, $p = 0.234$, nor the unconditional quadratic model, $\chi^2(1) = 1.092$, $p = 0.296$, were better fitting models than the unconditional latent linear model, which we chose as our final GMM model. The growth parameters show that the fixed effect for the intercept is significant, but the fixed effect for the linear slope is nonsignificant (see Table 3); there is no overall linear change in sleep problems after the birth of a sibling. The random effects are significant for both the intercept and linear slope.

Having now established the general trajectory pattern for each of the subscales for the entire sample and finding variability in the growth parameters for each subscale, we now proceed to discuss the search for individual differences in growth trajectories using growth mixture modeling for each of the CBCL subscales.

Acknowledgments

This research was supported by grants from the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD: R01HD042607, K02HD047423) to Volling. Matthew M. Stevenson was supported by the Developmental Psychology Training Grant (T32HD007109) from NICHD during the writing of this project.

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Table 2
Means and Standard Deviations for the Seven Syndrome Scales of the Child Behavior Checklist, 1.5 – 5 years

Scales	Prenatal (<i>n</i> = 229)		1 Month (<i>n</i> = 218)		4 Month (<i>n</i> = 208)		8 Month (<i>n</i> = 206)		12 Month (<i>n</i> = 199)	
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Aggressive Behavior	8.55 (4.53)		9.91 (4.91)		8.93 (4.75)		8.86 (4.56)		8.63 (4.99)	
Attention Problems	2.25 (1.46)		2.26 (1.48)		2.15 (1.51)		2.09 (1.56)		1.89 (1.46)	
Anxious/Depressed	1.66 (1.32)		1.60 (1.27)		1.55 (1.36)		1.56 (1.43)		1.57 (1.43)	
Emotional Reactivity	2.07 (1.34)		2.27 (1.55)		2.23 (1.55)		2.07 (1.50)		2.19 (1.57)	
Withdrawal	1.12 (1.03)		1.28 (1.14)		1.38 (1.19)		1.52 (1.16)		1.51 (1.11)	
Somatic Complaints	1.68 (1.39)		1.61 (1.44)		1.56 (1.42)		1.37 (1.34)		1.42 (1.30)	
Sleep Problems	3.11 (2.61)		2.86 (2.25)		2.94 (2.41)		2.89 (2.43)		2.85 (2.20)	

Table 3

Growth Parameters for the Unconditional Latent Growth Models for the Seven Syndrome Scales of the Child Behavior Checklist, 1.5 – 5 years (Achenbach & Rescorla, 2000)

Growth Parameters	Intercept	Linear Slope	Quadratic Slope	AAR Contrast
Aggressive Behavior				
<i>M (SE)</i>	9.026 *** (.29)	-.026 (.04)	-	.349 *** (.06)
Variance (<i>SE</i>)	16.047 *** (1.79)	.113 *** (.04)	-	-
Attention Problems				
<i>M (SE)</i>	2.276 *** (.09)	-.059 *** (.01)	-	-
Variance (<i>SE</i>)	1.652 *** (.18)	.010 * (<.01)	-	-
Anxious/Depressed				
<i>M (SE)</i>	1.615 *** (.08)	-.006 (.01)	-	-
Variance (<i>SE</i>)	1.143 *** (.14)	.017 *** (.01)	-	-
Emotionally Reactive				
<i>M (SE)</i>	2.124 *** (.09)	.006 (.01)	-	-
Variance (<i>SE</i>)	1.442 *** (.17)	.014 ** (.01)	-	-
Withdrawal				
<i>M (SE)</i>	1.112 *** (.07)	.143 *** (.04)	-.013 * (.01)	-
Variance (<i>SE</i>)	.733 *** (.09)	.008 ** (.00)	-	-
Somatic Complaints				
<i>M (SE)</i>	1.659 *** (.09)	-.044 ** (.01)	-	-
Variance (<i>SE</i>)	1.279 *** (.16)	.010 * (.00)	-	-
Sleep Problems				
<i>M (SE)</i>	3.012 *** (.16)	-.020 (.02)	-	-
Variance (<i>SE</i>)	4.758 *** (.53)	.044 *** (.01)	-	-

Note. AAR = adjustment and adaptation response. The random effects (variance) of the quadratic slope and the AAR contrast were constrained to be 0.

$p > .001$

 $p < .01$
**
 $p < .05$
*

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