Supplemental Materials:

Altered Longitudinal Trajectory of Default Mode Network Connectivity in Healthy Youth with Subclinical Depressive and Posttraumatic Stress Symptoms

LGCM Results for the Medial Temporal Subsystem of the DMN

The baseline medial temporal (MT) subsystem model without predictors or control variables had excellent fit ($\chi^2(1) = 0.126$, $p = .72$; RMSEA = 0.000, 90% CI[0.00, 0.137]; CFI = 1.00). Using the motion-corrected residuals of DMN connectivity as the inputs for our model, the mean of the latent intercept indicated that across the whole sample, average DMN connectivity was 0.000 ($p = .947$) and the latent slope indicated that there was no systematic change in DMN connectivity over time (mean = -0.001, $p = .874$). In contrast, there was significant variability in the slope (mean = 0.005, $p = .007$) and trending significance for the intercept (mean = 0.005, $p = .053$). We then imposed age, sex, and site as control variables on the estimated latent intercept and slope variables. The model had good fit ($\chi^2(4) = 6.43$, p = .17; RMSEA = 0.057, 90% CI[0.00, 0.134]; CFI = .84). No effects of age (β = .026, b = 0.001, $p = .813$), sex (β = .152, b = 0.020, $p = .157$), or site (β = -.120, b = -0.016, $p = .268$) were found on the latent intercept. The slope of change in mean DMN connectivity was not associated with age (β = -.217, b = -0.009, $p = .072$), sex (β = -.074, b = -0.011, $p = .526$), or site (β = -.017, b = -0.002, $p = .886$). In this model, we found no systematic changes in DMN connectivity over time. We then included the TSCC symptom scores to generate a final model with good fit ($\chi^2(6) = 6.88$, p = .33; RMSEA = 0.028, 90% CI[0.00, 0.101]; CFI = .99). Age at time 1 was significantly associated with depressive (β = -.177, b = -0.279, $p = .012$) and posttraumatic symptoms (β = -.222, b = -0.594, $p = .002$), though it was not significantly associated with the latent intercept (β = -.122, b = 0.002, $p = .724$) or latent slope (β = -.003, b = -0.008, $p = .107$) variables. Site was significantly associated with depressive (β = .147, b = 0.804, $p = .038$) and posttraumatic (β = .144, b = 1.341, $p = .042$) symptoms, though it was not significantly associated with the latent intercept (β = -.122, b = -0.017, $p = .260$) or latent slope (β = -.177, b = 0.000, $p = .982$) variables. Sex did not show any associations with the other variables. The association between depressive symptoms and the latent slope was trending (β = -.269, b = -0.007, $p = .074$), while no significant association between depressive symptoms and latent intercept were detected (β = -.039, b = -0.001, $p = .770$). No significant effect of posttraumatic stress symptoms on the latent intercept (β =.083, b = 0.001, $p = .534$) and latent slope (β =.215, b = 0.003, $p = .155$) was detected.

LGCM Results for the Core Subsystem of the DMN

The baseline core subsystem model without predictors or control variables had excellent fit ($\chi^2(1) = .013$, $p = .91$; RMSEA = 0.000, 90% CI[0.00, 0.079]; CFI = 1.00). Using the motion-corrected residuals of DMN connectivity as the inputs for our model, the mean of the latent intercept indicated that across the whole sample, average DMN connectivity was 0.003 ($p = .979$) and the latent slope indicated that there was no systematic change in DMN connectivity over time (mean = 0.014, $p = .903$). In contrast, there was significant variability for both the slope (mean = 0.006, $p = .001$) and intercept (mean = 0.007, $p = .008$). We then imposed age, sex, and site as control variables on the estimated latent intercept and slope variables. The model had excellent fit ($\chi^2(4) = 4.291$, $p = .39$; RMSEA = 0.020, 90% CI[0.00, 0.113]; CFI = .98). No effects of age (β = .114, b = 0.006, $p = .222$), sex (β = .120, b = 0.020, $p = .194$), or site (β = .044, b = 0.007, $p = .634$) were found on the latent intercept. The slope of change in mean DMN connectivity was not associated with age (β = -.164, b = -0.007, $p = .145$), sex (β = -.095, b = 0.001, $p = .390$), or site (β = -.019,

b = -0.003, p = .862). In this model, we found no systematic changes in DMN connectivity over time. We then included the TSCC symptom scores to generate a final model with excellent fit ($\chi^2(6)$ = 4.035, p = .67; RMSEA = 0.000, 90% CI[0.00, 0.074]; CFI = 1.00). Age at time 1 was significantly associated with depressive (β = -.177, b = -0.278, p = .012) and posttraumatic symptoms (β = -0.223, b = -0.595, p = .002), though it was not significantly associated with the latent intercept (β =.116, b = 0.005, p = .236) or latent slope (β = -.145, b = -0.006, p = .208) variables. Site was significantly associated with depressive (β = .148, b = 0.810, p = .037) and posttraumatic (β = .143, b = 1.332, p = .042) symptoms, though it was not significantly associated with the latent intercept (β =.047, b =0.008, p = .629) or latent slope (β = -.005, b = -0.001, p = .996) variables. Sex did not show any associations with the other variables. The association between depressive symptoms and the latent slope was trending (β = -.254, b = -0.007, p = .077), while no significant association between depressive symptoms and latent intercept were detected (β = -.029, b = -0.001, p = .805). No significant effect of posttraumatic stress symptoms on the latent intercept (β =.019, b = 0.000, p = .873) and latent slope (β =.223, b = 0.004, p = .118) was detected.

LGCM Results for the Dorsal Medial Prefrontal Cortex Subsystem of the DMN

The baseline dmPFC subsystem model without predictors had excellent fit ($\chi^2(1)$ = .002, p = .96; RMSEA = 0.000, 90% CI[0.00, 0.000]; CFI = 1.00). Using the motion-corrected residuals of DMN connectivity as the inputs for our model, the mean of the latent intercept indicated that across the whole sample, average DMN connectivity was 0.000 (p = .973) and the latent slope indicated that there was no systematic change in DMN connectivity over time (mean = .000, p = .998). In contrast, there was trending significance for variability in both the slope (mean = 0.003, p = .054) and intercept (mean = 0.004, p = .082). We then imposed the control variables on the estimated latent intercept and slope variables. This model had excellent fit ($\chi^2(4)$ = 3.145, p = .53; RMSEA = 0.000, 90% CI[0.00, 0.098]; CFI = 1.00). No effects of age (β = .114, b = 0.000, p = .996), sex (β = .114, b = 0.007, p = .619), or site (β = .114, b = 0.009, p = .509) were found on the latent intercept. The slope of change in mean DMN connectivity was not associated with age (β = .114, b = -0.004, p = .338), sex (β = .114, b = -0.012, p = .424), or site (β = .114, b = -0.008, p = .617). We found no systematic changes in DMN connectivity over time. We then included the TSCC symptom scores to generate a final model with excellent fit ($\chi^2(6)$ = 3.930, p = .68; RMSEA = 0.000, 90% CI[0.00, 0.073]; CFI = 1.00). Age at time 1 was significantly associated with depressive (β = -.177, b = -0.278, p = .013) and posttraumatic symptoms (β = -.223, b = -0.595, p = .001), though it was not significantly associated with the latent intercept (β = -.013, b = -0.003, p = .510) or latent slope (β = -.091, b = 0.000, p = .910) variables. Site was significantly associated with depressive (β = .147, b = 0.806, p = .038) and posttraumatic (β = .144, b = 1.333, p = .042) symptoms, though it was not significantly associated with the latent intercept (β =.078, b = 0.010, p = .494) or latent slope (β = -.050, b = -0.006, p = .714) variables. Sex did not show any associations with the other variables. Youth who self-reported more depressive symptoms tended to have decreased DMN connectivity over time (β = -.524, b = -0.011, p = .003). Posttraumatic stress symptoms showed the opposite pattern, where youth who self-reported more posttraumatic stress symptoms tended to have increased DMN connectivity over time (β = .519, b = 0.006, p = .003). No significant effects of depressive symptoms (β = .123, b = 0.003, p = .382) or posttraumatic stress symptoms (β = -.184, b = -0.002, p = .191) were detected on the latent intercept variable.

Supplementary Table 1: Complete Correlation Matrix for Variables of Interest Included in the Final Model

	Site	Sex	Age	DEP	PTS	THP	1DMN	2DMN	3DMN	1MT	1Core	1dmPFC	2MT	2Core	2dmPFC	3MT	3Core
Site	---																
Sex	-0.02	---															
Age	-0.05	-0.06	---														
DEP	0.16*	0.08	-0.19**	---													
PTS	0.16*	0.05	-0.23**	0.59**	---												
THP	-0.05	0.00	-0.12	0.28	0.50	---											
1DMN	0.07	0.07	0.06	0.01	-0.01	-0.06	---										
2DMN	0.01	0.01	-0.15	-0.13	0.10	0.09	0.18	---									
3DMN	0.04	-0.01	-0.03	-0.13	0.08	-0.06	0.00	0.34	---								
1MT	-0.08	0.10	0.05	-0.02	0.02	-0.11	0.43**	0.19	0.02	---							
1Core	0.04	0.09	0.10	-0.02	-0.01	-0.09	0.90**	0.22	0.05	0.47**	---						
1dmPFC	0.04	0.03	0.02	0.02	-0.07	-0.05	0.90**	0.15	-0.02	0.36**	0.71**	---					
2MT	-0.15	0.09	-0.26**	-0.03	0.10	0.04	0.04	0.63**	0.27*	0.14	0.04	0.06	---				
2Core	-0.04	0.04	-0.14	-0.08	0.07	0.10	0.13	0.93**	0.35**	0.18*	0.22*	0.11	0.64**	---			
2dmPFC	0.02	-0.01	-0.19*	-0.10	0.10	0.08	0.18*	0.92**	0.31**	0.17	0.19*	0.19*	0.61**	0.79**	---		
3MT	-0.02	-0.03	-0.08	-0.16*	0.09	-0.03	-0.06	0.28**	0.81**	-0.02	-0.01	-0.07	0.32**	0.31**	0.26**	---	
3Core	0.05	-0.02	-0.04	-0.13	0.07	-0.07	-0.05	0.35**	0.95**	-0.03	0.01	-0.08	0.30**	0.40**	0.30**	0.83**	---
3dmPFC	-0.04	-0.04	0.00	-0.15	0.06	-0.11	0.04	0.27**	0.94**	0.02	0.06	0.07	0.26*	0.27*	0.30**	0.79**	0.87**

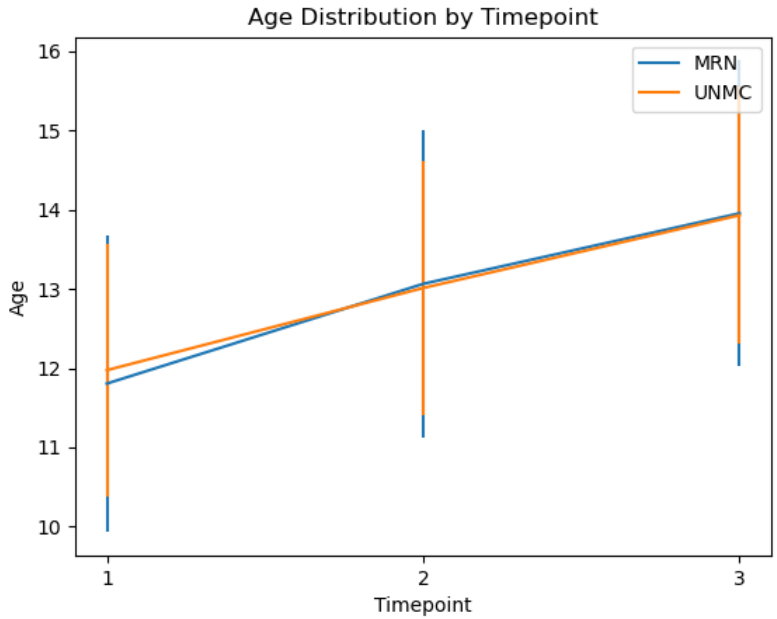
Site: 0 = UNMC, 1 = MRN; Sex: 0 = male, 1 = female; Age = age at year 1; DEP = depressive symptoms; PTS = posttraumatic stress symptoms; #DMN = Year # residual connectivity values following motion correction for the Default Mode Network from the Yeo-7 atlas. #MT = Year # residual connectivity values following motion correction for the Medial Temporal subnetwork. #Core = Year # residual connectivity values following motion correction for the Core subnetwork. #dmPFC = Year # residual connectivity values following motion correction for the dmPFC subnetwork. * indicates $p < 0.05$, ** indicates $p < 0.01$.

Supplemental Table 2: Latent Growth Curve Model Fit for the Medial Temporal, Core, and Dorsal Medial Prefrontal Cortex Subsystems of the Default Mode Network

Model	χ^2 (*p* value)	df	$\Delta\chi^2$	*p* value	RMSEA	90% CI	CFI
Medial Temporal	0.13 (.72)	1	-	-	0.000	0.00, 0.137	1.00
Medial Temporal + control	6.43 (.17)	4	6.30	.098	0.057	0.00, 0.134	0.84
Medial Temporal + control + TSCC	6.88 (.33)	6	0.45	.799	0.028	0.00, 0.101	0.99
Core	0.01 (.91)	1	-	-	0.000	0.00, 0.079	1.00
Core + control	4.29 (.39)	4	4.28	.233	0.020	0.00, 0.113	0.98
Core + control + TSCC	4.04 (.67)	6	-0.25	.000	0.000	0.00, 0.074	1.00
Dorsal Medial Prefrontal	0.00 (.96)	1	-	-	0.000	0.00, 0.000	1.00
Dorsal Medial Prefrontal + control	3.15 (.53)	4	3.15	.369	0.000	0.00, 0.098	1.00
Dorsal Medial Prefrontal + control + TSCC	3.93 (.68)	6	0.78	.677	0.000	0.00, 0.073	1.00

Control = control variables including age, sex, and site. TSCC = Trauma Symptom Checklist for Children; χ^2 = chi-square test of model fit; df = degrees of freedom; $\Delta\chi^2$ = change in chi-square; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval about the RMSEA; CFI = comparative fit index.

Supplementary Figure 1: Age of the sample (mean and standard deviation) over three years for the UNMC and MRN sites.



Supplementary Figure 2: Distribution of depressive symptoms, posttraumatic symptoms, and trauma history profile (THP) data