We tested a theoretical model (Palmer, 2008), that proposed cognitive predictors of academic achievement, in 51 pediatric brain tumor survivors and 51 matched healthy controls; 47% male, $M_{\text{age}}=23\text{years}(SD=4)$. Survivors were on average of 7 years ($SD=4$) from diagnosis, and had heterogeneous tumor presentations (29% medulloblastoma, 37% cerebellar astrocytoma). Measures of processing speed (Oral-SDMT), attention (WMS Digit Span-Forward), working memory (ACT-36 seconds), and Passage Comprehension (Woodcock Johnson-NU) were administered.

A multistep regression was computed for each group. Survivor model: 1) NPS, the measure of treatment factors, predicted reading ($R^2=0.15$, $F(1,49)= 10.00$, $p<0.01$; $\beta=-0.41$, $B=-2.13$, $SE=0.67$, $t=-3.16$); 2) O-SDMT predicted reading ($\Delta R^2 = 0.23$, $\Delta F (1,48) =18.33$, $p<0.01$; $\beta=0.53$, $B=0.27$, $SE=0.06$, $t=4.28$); 3) Digits Forward predicted reading ($\Delta R^2 = 0.07$, $\Delta F (1,47) =6.11$, $p<0.05$; $\beta=0.28$, $B=2.49$, $SE=1.01$, $t=2.47$); and 4) ACT predicted reading ($\Delta R^2 = 0.06$, $\Delta F (1,46) =6.30$, $p<0.05$; $\beta=0.33$, $B=0.21$, $SE=0.09$, $t=2.51$). Control model: 1) O-SDMT predicted reading ($R^2=0.06$, $F(1,49)= 4.22$, $p<0.05$; $\beta=0.28$, $B=0.11$, $SE=0.06$, $t=2.06$), but steps 2 and 3 were not significant.

For controls, none of the predictors were significant in the overall model. For survivors, the model accounted for 49% of the variance in reading (19% of unique variance from O-SDMT, 12% of unique variance from ACT, and remaining variance from overlap of the variables).

Processing speed and working memory were significant predictors of reading in survivors. NPS appears to be a proxy variable for processing speed. The relationship between processing speed and reading is consistent with previous literature in healthy children (Fry & Hale, 2000). These models help differentiate the relationships between core cognitive processes and achievement in clinical and healthy populations. Our findings with reading comprehension in survivors provide empirical support for the model.