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Family Factors Associated with Academic Achievement Deficits in Pediatric Brain Tumor Survivors

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Abstract

PURPOSE—To examine whether parental education, socioeconomic status (SES), or family environment moderate the extent of academic achievement deficits in pediatric brain tumor survivors (PBTS) relative to classmate case-controls. PBTS are known to be at risk for cognitive and academic impairment; however, the degree of impairment varies. Prior, research has focused on treatment risk and efforts to examine the protective role of family resources and relationships have been lacking.

METHODS—PBTS (N = 164), ages 8–15 and 1–5 years post-treatment, were recruited at five treatment centers in the United States and Canada. A case-control classmate, matched for age, gender, and race, was recruited for each survivor. The Wide Range Achievement Test, a demographic form, and the Family Environment Scale were administered in families' homes. Treatment data were abstracted from medical charts.

RESULTS—PBTS demonstrated lower achievement than classmate-controls in reading, spelling, and arithmetic. Parental education and SES were associated with levels of achievement demonstrated by PBTS, but did not account for discrepancies between PBTS and classmate-controls. Deficits in achievement relative to classmate-controls, across all academic domains, were greater for survivors in families lower in support and higher in conflict. These associations remained after controlling for age at diagnosis, time since treatment, and whether treatment had involved chemotherapy, focal or whole brain radiation.

CONCLUSIONS—These results support the development of interventions to enhance family functioning as well as educational resources as part of intervention and rehabilitation services to optimize academic progress in children who have been treated for brain tumors.

Introduction

Brain tumors are the second most common form of pediatric cancer, affecting 2,500 children under the age of 19 each year in the United States and Canada [1,2]. Treatment advances over the past 30 years have led to a 20% decline in mortality [3,4], and overall survival rates

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now exceed 65% [2,5]. This heightens concern about the quality of life of pediatric brain tumor survivors (PBTS) and creates an imperative to develop interventions that can optimize functional outcomes. These approaches must rely on empirical evidence of risk factors and mechanisms that contribute to key outcomes.

Neurocognitive and academic impairment are well documented for PBTS [6], and these morbidities may lead to diminished educational attainment, psychosocial development, and quality of life into adulthood [7,8]. Relative to children never diagnosed with cancer, PBTS are more likely to: (a) receive services for learning disabilities (19% vs. 7%), (b) be enrolled in a special education program (20% vs. 8%), (c) experience academic problems requiring extra tutoring or academic support services (46% vs. 23%), or (d) repeat a grade (21% vs. 9%) [9]. PBTS are less likely to graduate from high school than other pediatric cancer survivors or healthy controls [10].

Academic outcomes vary between studies and among PBTS within study samples [6]. Treatment factors have been the focus of the efforts to understand these differences [11,12]. Academic deficits have been linked with cranial radiation and CNS-directed chemotherapy, with particular risk associated with irradiation during early childhood [13,14]. Furthermore, core neurocognitive deficits, (e.g. inattention and short-term memory deficits), emerge as late-effects and result in declining age-referenced intellectual and academic abilities over time. Attempts to preserve function while still maximizing survival by altering the timing or dosing of neurotoxic treatments has become a focus of cooperative group clinical trials [13,14].

Treatment factors may not, however, fully account for the variability in academic achievement amongst survivors [15]. Socio-demographic variables, such as family SES, are predictive of a child's recovery from traumatic brain injury (TBI) [16], and the quality of parenting and family environment also appear to moderate academic achievement after TBI [17,18]. Global indicators of family functioning, which take into account family problem-solving, roles, communication, affective responsiveness and involvement, and the extent to which set rules and procedures are used to govern family life, have been associated with intellectual functioning and memory in children recovering from TBI [19].

Despite calls to examine whether family processes moderate functional outcomes such as academic achievement for cancer survivors, very few studies have done this [12,20–22]. In a sample of 63 children with heterogeneous brain tumor diagnoses, Carlson-Green explored whether family variables predicted children's cognitive and behavioral outcomes, above and beyond illness factors [23]. A combination of illness and family variables (e.g., family stress level, number of parents in the home) was the strongest predictor of children's intellectual functioning [23]. Better medical and psychological outcomes for children with cancer and other chronic illnesses also been found among families characterized by high levels of cohesion and low levels of conflict [24], suggesting that the quality of the child's family environment may contribute to academic functioning for PBTS.

Previous work with PBTS has relied primarily on comparison to siblings or scores from norm-referenced samples. Comparisons to instrument norms fail to account for geographic differences or the unique educational opportunities and environments each PBTS has experienced. Although a sibling control group may address this shortcoming, it fails to match on the basis of age and possibly gender. Therefore, a matched-pair design, utilizing case-control classmates, was adopted in our research to control for child demographic variables and systematic differences in school environment and general educational opportunities.

Based on prior research [11–13], we expected to find deficits in academic functioning for PBTS relative to classmate controls, and that larger deficits relative to classmate-controls would be found for children who were diagnosed at a younger age, treated with radiation and chemotherapy, and further from treatment completion. It was hypothesized though that higher family SES and higher levels of parental education would be associated with smaller deficits in academic achievement among PBTS [16]. Finally, it was hypothesized that lower levels of family conflict and higher levels of family support and control would be associated with smaller deficits in academic achievement for PBTS relative to classmate classmate-controls. [17–19,22,23]

Method

Procedures

PBTS were identified using tumor registries at five pediatric oncology centers in the United States and Canada. Children were eligible if they: a) were 8–15 years old, b) had been treated for an intracranial tumor, and c) had been off treatment for 1–5 years without disease progression. Children were excluded if they: a) had a preexisting neurobehavioral disorder; e.g., neurofibromatosis or tuberous sclerosis, b) were not fluent in English, c) were home-schooled or d) received full-time special education services. These criteria were implemented to assure children were old enough to complete self-report measures and belonged to a classroom in which sociometric data assessing peer relations (not the focus of this paper) would be valid.

Parents of eligible children received a letter from their child's oncologist or neurosurgeon and were contacted by a study coordinator to explain the study, confirm eligibility, and seek permission to work with their child's school on a study of children's behavior and relationships with peers at school. Collaborations were established with schools, consents distributed, and data collected with classmates of PBTS in primary elementary school classes or a required academic class of students in middle or high school. A second phase involved 1:1 assessments with PBTS and their parents in their homes. The classmate of the same gender, race, and closest in birthdate to each PBTS who participated in each class was identified as a case-control. Parents of this child were contacted and invited to participate in the second phase of the study. If control families declined, the next most closely matched classmate was contacted. Potential controls were excluded if they, or another child in the home, had been treated for a serious illness that had lasted at least 6 months and required treatment by a medical specialist.

During home-based assessment batteries, children in both groups completed a standardized measure of academic achievement as well as checklists assessing social and emotional adjustment. Each caregiver in the home was also asked to complete multiple questionnaires regarding child and family functioning. If a parent in a two-caregiver home declined to participate, information regarding their education and employment was obtained from the participating parent. Parents provided consent and children assent for participation following approval by local Institutional Review Boards. Families were compensated for their time.

Participants

Across the five data collection sites, parents of 306 eligible children were contacted for the first phase of the research. Data were collected in the classrooms of 216 PBTS (71%). Subsequently, the families of 188 PBTS (87%) participated in the second phase of the study. Home visits were completed with a classmate-control for 173 (92%) of these children. In 4 cases, the PBTS was unable to complete the primary measure of achievement due to sensory-motor impairment and in 5 additional instances data for either the PBTS or the

classmate-control was missing, e.g., unable to be scored, or the child refused to complete the measure. This resulted in a final sample of 164 PBTS and control pairs with data on the primary outcome measure. The mean age of PBTS and controls was 11.3 years ($SD = 2.3$), $t(326) = .246$, $p > .05$. Both groups included 76 girls (46%). Eighty-five percent of PBTS and 88% of controls were White, 7% of PBTS and 8% of controls were Black, and 8% of PBTS and 4% of controls belonged to another racial group, $\chi^2 (2, 325) = .247$; $p > .05$.

PBTS ($N = 164$) were, on average, 7.8 years old at diagnosis ($SD = 3.0$), and home data collection occurred an average of 3.1 years ($SD = 1.7$) after completion of treatment. The sample included children treated for low grade astrocytoma (49%), medulloblastoma (22%), ependymoma (9%), craniopharyngioma (7%), germ cell (5%) and other tumors (7%). Most children (89%) had undergone surgical resection, 43% had received chemotherapy, and 43% cranial radiation. Thirty-three percent of the PBTS received both chemotherapy and radiation as part of their treatment. Focal radiation was documented for 34% of PBTS with a dosage range of 1800–5580 cGy, $M_{Dose} = 4105$ cGy, $SD = 1421$. Whole brain or craniospinal radiation was documented for 22% of PBTS with a dosage range of 2300–4680 cGy, $M_{Dose} = 3084$ cGy, $SD = 949$.

For the purposes of this study, the terms “mother” and “father” are used to refer to the child’s primary female and male caregiver living in the home. Data were provided by 153 mothers and 101 fathers of PBTS and 158 mothers and 92 fathers of controls. The majority of the participating mothers (90%) and fathers (81%) were biological parents. PBTS (76%; $n = 123$) and classmate-controls (83%; $n = 135$) were equally likely to live in two-parent versus single-parent families, $\chi^2 (1, 164) = 2.42$; $p = .120$.

Child Measures

Wide Range Achievement Test-3(WRAT-3)—The WRAT-3 [25] is a standardized, performance-based measure that produces age-standard scores ($M = 100$, $SD = 15$) on three subscales reflecting reading recognition, spelling, and arithmetic computation skills. Excellent split-half reliability (.94 to .97) are reported and scores correlate ($r = .40$ to .70) with other widely used tests of academic achievement [25,26].

Parent Measures

Demographic Questionnaire—This form records information about background characteristics of the participating child and each caregiver in the home, including occupation and highest level of education completed. Socioeconomic status (SES) was computed using the Revised Duncan Scale [27], based on occupational prestige. When both parents were employed, the SES used to characterize the family reflects the higher of their two scores.

Family Environment Scale (FES)—The FES assesses the social environment within the family using 90 “true” or “false” questions [28]. Factor analysis has found three higher order factors: Supportive, Conflicted, and Controlling [29]. The Supportive factor taps mutual concern, shared interests, cohesion, and expressiveness. The Conflicted factor represents a lack of cohesion and organization as well as conflict in the home. The Controlling factor reflects emphasis on control, achievement, morality and religion, and less independence among family members.

Analysis Plan

Non-directional, matched-pairs t-tests ($\alpha = .05$) compared PBTS and classmate-controls in terms of socio-demographic and family environment variables as well as child performance

in reading, arithmetic, and spelling. Correlations between PBTS and their classmate-controls on family variables and achievement scores examined whether study procedures had resulted in dependent samples. Discrepancy scores were computed between each PBTS and their classmate-control for each academic domain by subtracting WRAT age-standard scores for classmate-controls from that of PBTS, e.g., Reading Discrepancy =Reading $_{BT}$ − Reading $_{CC.}$ Negative discrepancy scores indicated an achievement deficit for a PBTS, whereas a positive discrepancy indicated better achievement by the survivor relative to their classmate-control. Independent group *t*-tests and Pearson correlations examined whether achievement discrepancy scores varied as function of discrete and continuous variables reflecting treatment, socio-demographic (i.e., family SES, maternal education and paternal education), and family environment (i.e., supportive, conflicted, and controlling) risk factors for PBTS. This approach was taken to allow moderator variables to remain continuous while accounting for the dependence of data created by the matched-pairs design. Finally, partial correlations assessed the association of family factors and achievement deficits after controlling treatment effects. The sample of 164 PBTS and classmate-control pairs had sufficient power to detect small effect sizes for group differences (1- β = .72) and correlations (1- β = .74).

Results

Analyses of similarities and differences in the socio-demographic and family environment characteristics variables for families of matched-pairs of PBTS and classmate-controls are summarized in Tables 1. Groups differed on family SES with significantly lower SES scores for PBTS families but the groups did not differ on parental education. Means for both groups reflect occupations in technical, sales, and administrative support sector. According to mothers, the families of PBTS were also characterized by lower levels of support. The two groups did not differ significantly on the amount of conflict or control reported by either parent. Significant correlations between PBTS and classmate-controls for achievement, parental education, and family SES demonstrated dependency of data for these groups created by the matched-pairs design.

Significant correlations were also found between PBTS and their classmate-controls in all three domains of achievement (Table 2). Matched-pair *t*-tests demonstrated that achievement was lower in reading, spelling, and arithmetic for PBTS, and the magnitude of these deficits did not vary by domain, $F(2,326) = 1.59$; $p = .21$. Conservative effect size computations, assuming independent samples, yielded values of Cohen's $d = -0.32$ to -0.45 (Table 2) [30]. Effect size estimates were larger when assuming group-dependence, ($d = -0.57$ for reading, $d = -0.53$ for spelling, and $d = -0.76$ for arithmetic) [31].

Comparisons of achievement discrepancy scores as a function of treatment variables are summarized in Table 3. Significantly larger discrepancies, reflecting deficits for PBTS relative to classmate-controls, were found in Reading and Arithmetic for children treated for chemotherapy as well as those receiving whole brain radiation. Larger deficits for reading and spelling, but not arithmetic, were associated with younger age at diagnosis. There was no evidence that deficits in any academic domain were larger for children who were further from treatment completion.

Contrary to hypotheses, neither maternal nor paternal education level was associated with the magnitude of discrepancies found between the academic achievement scores of PBTS and classmate-controls (Table 4). A significant positive correlation was found between SES for families of survivors and reading discrepancy scores. Negative discrepancy scores, reflecting deficits in reading for PBTS, became smaller and approached zero at higher levels of SES. Post-hoc analyses found significant correlations ($p<.05$) between reading, spelling,

and math achievement scores with family SES, $r(163) = .28, .23$, and .22, maternal education, $r(157) = .26, .20$, and .21, and paternal education, $r(122) = .21, .28$, and .23, within the PBTS sample. All nine correlations remained significant ($p < .05$) even after controlling for treatment risk factors, i.e., administration of chemotherapy, focal or whole brain radiation; age at diagnosis, and time since treatment completion. Although three of these correlations did not reach statistical significance within the classmate-control sample, no significant differences were found between groups in the magnitude of these correlations.

Finally, significant correlations were found between achievement discrepancy scores in all three academic domains and both mother and father ratings on the support and conflict on the FES, as well as for arithmetic and father-report of control (Table 4). The more support and less conflict parents reported in the family, the less academic impairment PBTS demonstrated relative to classmate-controls. In most instances, these correlations remained significant after controlling for treatment effects.

Discussion

Increasing numbers of children treated for brain tumors now become long-term survivors [5]. Many, but not all, of these survivors will evidence deficits in academic achievement and progression that may have far-reaching consequences for employment, independent living, and quality of life [11,15]. The purpose of the current study was to investigate whether deficits in academic achievement are moderated by family resources and processes that could be used to identify children at heightened risk and be possible targets in new, expanded intervention paradigms. This effort was strengthened by inclusion of a large, demographically and medically diverse sample of PBTS drawn from multiple institutions. Academic achievement was assessed using a well-established, standardized, performance-based measure of reading, spelling, and math skills rather than grades or caregiver ratings of academic performance. Classmate-controls provided a comparison point for achievement levels for PBTS that controlled, at least in part, for variations in educational opportunities and resources.

Consistent with previous research [6], PBTS in this study demonstrated lower levels of achievement in multiple domains relative to classmate-controls, although obtained scores on the WRAT for the full sample of PBTS were not strikingly different than age-based norms. Previously reported findings that achievement in PBTS varies as function of age at diagnosis and treatment with chemotherapy or whole brain radiation [13,14] were replicated. Consequently, we evaluated whether achievement deficits relative to classmate-controls varied as a function of socio-demographic factors and family environment both with and without controlling for treatment variables. Interestingly, family resources that accounted for variance in achievement or achievement deficits did so whether treatment-associated risk for accounted for or not.

Consistent with previous work [12,33–36], we found that parental education and family SES were correlated with achievement scores obtained by PBTS; however, these differences did not account for discrepancies between survivors and their classmate-controls. Similarity in the family demographics of children attending the same school explain these results. By using a design that attempted to control for shared school environment, we also limited the variance in achievement discrepancy scores that could be attributed to individual family demographic characteristics. One significant relationship was found; higher family SES was correlated with smaller reading deficits for PBTS relative to their classmate-controls. Reading deficits in PBTS may reflect poor auditory attention, phonological processing and sequencing, leading to suggestions that remedial training and repetition of phonologic skills

may reduce reading deficits [37]. Higher SES families may read and allocate time to promoting skills that underlie reading with their children.

In contrast, family environment did moderate the magnitude of achievement deficits among PBTS relative to their classmate-controls, and families of children attending the same school did not tend to be similar in family environment. Reading, arithmetic, and spelling deficits all varied as a function of the degree of family support and conflict reported by mothers and fathers. With increasing amounts of supportiveness; reflecting cohesion, expressiveness, shared interests, and mutual concern in the home, survivors demonstrated smaller achievement deficit. Conversely, larger deficits were demonstrated by children in homes characterized by greater conflict, less organization and cohesion. These results are consistent with literature highlighting the importance of family environment for children recovering from TBI and expands upon limited related research with PBTS [18,19,23].

These data do not provide detail about the mechanisms by which family environment may preserve or enhance academic achievement for PBTS. It is possible that supportive families provide extra time, attention, and assistance in developing academic skills and completing schoolwork, thereby compensating for neurocognitive deficits that result from treatment. Conflict in the home may represent competing demands for caregiver time or disagreements about how to respond to child impairment and needs. Less conflicted and more supportive families may spend more time engaged in activities that foster a child's intellectual development, self-esteem, and self-efficacy, factors that may generally promote academic engagement and performance [32].

There are limitations to this research, including the cross-sectional design and possible bias introduced by the eligibility criteria. In addition to examining mechanisms of influence, a longitudinal design would be better able identify bidirectional relationships between achievement deficits and family processes. Our approach emphasized the associations of individual family characteristics with academic deficits and did not examine unique contributions that took into account correlated indicators of family environment or resources. Rather we focused on analyses that examined whether each family indicator accounted for achievement while controlling for treatment risk and shared school environment. Our assessment of family variables was limited to questionnaires completed by caregivers. Future studies might consider assessments of family interactions from other perspectives (e.g., child-report) or methods (e.g., in-home or laboratory based observations of family interactions) [38]. The current study excluded PBTS if they did not spend part of their school day in a mainstream classroom, perhaps excluding children with the greatest academic difficulties. Current education policies favor mainstreaming whenever possible; therefore our participants represented a broad range of abilities and included children who received less-restrictive special education services. Of the PBTS initially identified as eligible, approximately 10% were excluded because they were home-schooled or in self-contained, special education settings. Had the sample included these more impaired children, effects might have been larger.

Increased understanding of which PBTS are at greatest risk for achievement deficits and which processes account for these different outcomes could help healthcare providers, schools, and families to titrate appropriate services toward those at greatest need. The current results reinforce concerns about academic risk associated with socioeconomic disadvantage for PBTS, even if this risk is shared by classmates experiencing the same classroom environment. Identification of mechanisms that account for differences in academic outcomes will inform the development of family-based interventions aimed at shaping the home environment and altering family dynamics to best facilitate a child's rehabilitation. Previous intervention research has focused on pharmacotherapy [39] and

cognitive rehabilitation programs aimed at remediating core neurocognitive (e.g. attention and working memory deficits) [40,41] or phonological skills [12] thought to underlie poor academic performance for PBTS. Intervention programs targeting characteristics of the family environment could not be identified in the current literature and should be considered in future work. Attention to family environment in future interventions may be particularly warranted given evidence in this research that mothers, if not fathers, of PBTS report that their families demonstrate less support and more conflict than families of control children. Ideally, intervention programs might integrate remediation of child skills and enhancement of family resources that can facilitate learning and academic engagement. Most of all, continued research is needed to develop and establish the efficacy of integrative, creative treatment approaches that will maximize functioning and enhance the opportunity for PBTS to lead fulfilling, independent, and productive lives.

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Table 1

Comparison of Family Demographic Characteristics for Pediatric Brain Tumor Survivors (PBTS) and Classmate-Controls

	PBTS		Controls					
	M	***SD***	***M***	***SD***	t^a	***p***	d^b	r^c
Mother								
Education	14.3	2.1	14.7	2.2	−1.58	.117	−0.19	.25**
Family Environment Scale								
Supportive	30.0	7.0	32.4	6.5	−3.95	.000	−0.36	.02
Conflicted	−9.5	4.7	−10.4	4.5	2.09	.038	−0.20	.11
Controlling	10.2	4.4	9.6	4.5	1.52	.130	−0.13	.20*
Father								
Education	14.4	2.5	14.7	2.5	−0.43	.671	−0.12	.25*
Family Environment Scale								
Supportive	29.5	6.2	29.8	7.1	−0.62	.541	−0.04	.12
Conflicted	−9.9	4.8	−9.9	5.3	−0.29	.777	0.00	.01
Controlling	10.8	4.2	10.8	3.7	0.25	.804	0.00	.21
Family Demographics								
SES[d]	53.4	21.2	58.3	21.9	−2.19	.030	−0.23	.22**

[a] Two-tailed, dependent groups *t*-tests, *df* =152 to 160 for mothers and *df* =91 to 127 for fathers, *p* denotes significance of *t*

[b] Cohen's *d* estimating effect size assuming independent groups [30]

[c] Correlation between scores for matched-pairs of PBTS and classmate-control families to evaluate group dependency

[d] Revised Duncan Scores of occupational prestige; when two parents reported occupations, the higher was used

* p≤.05,

** p≤.01,

*** p≤.001

Table 2

Comparison of Academic Achievement for Pediatric Brain Tumor Survivors (PBTS, n =164) and Classmate-Controls (n =164)

	PBTS		Controls						
WRAT[a] Subscale	*M*	*SD*	*M*	*SD*	Mean Discrepancy[b]	*t*[c]	*p*	*d*[d]	*r*[e]
Reading	100.8	15.2	105.8	13.2	−4.98	−3.63	.000	−0.35	.24**
Spelling	99.3	15.5	104.1	14.2	−4.82	−3.38	.001	−0.32	.24**
Arithmetic	93.5	17.0	100.5	13.9	−6.93	−4.85	.000	−0.45	.32***

[a] WRAT = Wide Range Achievement Test

[b] Difference between age-referenced standard scores on the WRAT for survivor-control pairs (e.g, Reading_{BT}-Reading_{CC})

[c] Two-tailed, dependent groups *t*-tests, $df = 163$

[d] Cohen's *d* estimating effect size assuming independent groups [30].

[e] Correlation between scores for matched-pairs of PBTS and classmate-control families to evaluate group dependency

* p≤.05,

** p≤.01,

*** p≤.001

Table 3

Differences in Academic Achievement Deficits as a Function of Age at Brain Tumor Diagnosis, Treatment, and Time Since Treatment Completion

	WRAT Reading discrepancy[a]				WRAT Spelling discrepancy[a]				WRAT Arithmetic discrepancy[a]			
	M	*SD*	*t*[b]	*d*[c]	*M*	*SD*	*t*[b]	*d*[c]	*M*	*SD*	*t*[b]	*d*[c]
Chemotherapy												
No (*n* = 91)	−1.92	16.34	2.57**	.41	−3.15	16.81	1.35	.21	−4.19	17.85	2.18*	.35
Yes (*n* = 69)	−9.06	18.74			−7.09	20.01			−10.49	18.56		
Whole Brain Radiation												
No (*n* = 119)	−2.86	16.51	2.58**	.46	−3.98	17.30	1.24	.22	−4.37	18.50	3.51***	.71
Yes (*n* = 35)	−11.60	21.06			−8.40	22.03			−16.46	15.63		
Focal Radiation												
No (*n* = 99)	−4.30	16.85	0.52	0.09	−4.28	18.30	0.53	0.09	−5.88	17.96	1.09	.18
Yes (*n* = 56)	−5.88	19.73			−5.93	18.93			−9.23	19.38		
	r				*r*				*r*			
Age at Diagnosis	.23**				.18*				.00			
Time since treatment	−.04				−.07				.02			

*$p \leq .05$;

**$p \leq .01$;

***$p \leq .001$

[a] Difference between age-referenced standard scores on the Wide Range Achievement Test for each survivor-control (e.g., $Reading_{BT}$-$Reading_{CC}$)

[b] Two-tailed independent group *t*-tests

[c] Cohen's *d* estimating effect size assuming independent groups [30].

Table 4

Association of Achievement Deficits with Family Environment and Demographic Characteristics Reported by Parents of Brain Tumor Survivors

	WRAT Reading discrepancy[a]		WRAT Spelling discrepancy[a]		WRAT Arithmetic discrepancy[a]	
Family Environment Scale	***r***	**Partial Correlation[b]**	***r***	**Partial Correlation[b]**	***r***	**Partial Correlation[b]**
Mother-report						
Supportive	.19*	.18*	.16*	.14	.17*	.16
Conflicted	−.30***	−.29***	−.26***	−.26***	−.17*	−.18*
Controlling	−.04	−.01	.00	.01	−.03	−.08
Father-report						
Supportive	.22*	.30**	.21*	.28**	.23*	.29**
Conflicted	−.25*	−.27**	−.23*	−.27**	−.21*	−.25*
Controlling	.16	.08	.19	.17	.25*	.14
Demographic Factors						
Maternal Education	.04	.02	.07	.04	.08	.01
Paternal Education	.07	.08	.13	.14	.10	.13
Family SES[c]	.19**	.16*	.12	.11	.11	.11

*$p \leq .05$,

**$p \leq .01$,

***$p \leq .001$,two-tailed; $df = 157$ (mothers), $df = 124$ (fathers)

[a]Difference between age-referenced standard scores on the Wide Range Achievement Test for each survivor-control (e.g., $Reading_{BT}$- $Reading_{CC}$)

[b]Partial correlations controlling for treatment, (chemotherapy, focal and whole brain radiation), age at diagnosis, and time since treatment

[c]SES based on Revised Duncan Scores of occupational prestige; when both parents reported occupations, the higher of the two was used