

Table 1. Studies of Pre-Post Changes in Memory following Surgical Intervention for Epilepsy in the Pediatric Population

Study	N	Groups	Age at Sx	Age at onset	Time since sx/FU	Measures	Pre-Post Changes	Laterality differences	Significant Medical variables
Beardsworth & Zaidel 1994	29	L (13), R (16), Control (18)	L = 14 R = 12.9	L = 5.0 R = 5.3	6m	Beardsworth memory for children faces test, WISC-R	Right improved on immediate and delay FR	R improve, L unchanged	
Chieffo et al 2010	24	FLE (12) TLE (12)	FLE = 7.5, TLE = 8.2	FLE = 5.6 TLE = 5.8	FLE = 2.1y TLE = 3.4y	Griffith's dev scale/WPPSI/WISC, naming (PLT/TVL/BNT), word list, Rey-O, VMI, VS (bells test), verbal fluency, tower of london, Luria motor, CBCL	FLE - decline in EF, TLE - improve in naming and visual memory		
Dlugos et al 1999	8	L (5) & R (3)	1 y 11m	L = 8y6m; R = 2y8m	L = 9m, R = 27m	WISC/WAIS, CVLT, WJ-Cog (naming), WRAML Visual Memory, WIAT	Decline in overall verbal memory for L; R unchanged	L decline in memory (only 4), R unchanged (only 1 with >70 IQ)	
Gleissner et al 2002	55	L (26) & R	13.3; L = 13.1 R = 13.5	7.3; L = 7.8 R = 6.8	3 & 12 m	Verbal Learning & Mem Test, AVLT	L decreased VL (imm and delay) at 3 m, but improved by 1 yr; R decline at 3 verb recog, improve at 1yr. L had	L decline VL at 3 month	Duration of epilepsy predictive of post operative loss; L amyg-hippo worse perf at F/Us

Gonzalez et al 2012	24	L (11) & R (13); Sx(14) vs no sx	12.43	6.31	2.73 y	WMS paired associates, 9box maze CMS, facial recog CMS, WISC, CDI	Sx gr (L&R) improved on del facial recog; R improved on 9box; no sx unchanged	L < R for PA hard imm & delay	Age of sz onset for Paired Associates hard delay
Hepworth & Smith 2002	35	L (10) & R (9); control (16)	L = 10.3, R = 12.1	L = 3.4, R = 6.4	L = 4.1, R = 3.3	Experimental story memory and spatial memory	Not assessed, but verbal memory recall both groups < control	R worse on spatial mempry for 1st trial, but similar on 2nd and delayed recall	R more AEDs than L
Jambaque et al 2007	20	L (12) & R (8)	L = 11.1; R = 13.3	L = 4.4, R = 6.7	L = 1.2y; R = 0.8y	Signoret's memory battery, RCFT, Rivermead, WISC, naming, category fluency, Corsi blocks	Verbal memory and naming improved	Verbal/non-verbal diff score: L < R for verbal and R > L for non-verbal post-sx; everyday memory worse for L	Younger age at sx - greater increase in VIQ; RCFT: earlier onset, lower score; Previous hippo damage - more improvement on verbal memory
Korkman et al 2005	38	L (19) & R (19)	11.55	?	6 m; 24 m	Wechsler tests	No change		Hemispherectomy worse on IQ; younger children had poorer results
Kuehn et al 2002	26	L (13), R (7), Extratemp (6)	11.9		5-15 m	WISC, WRAML	No change	L Verbal < visual at post; R too small to do memory function	
Lah et al 2002	16	L (6), R (4), Extratemp (6)	T=10.8, ET=11.3	T=3, ET=3.8	T=8.5m, ET=5.7m	WISC, verbal list learning	ETLE 4 decline, TLE 2 decline, 10 unchanged		

Lendt et al 1999	88	L (10), R (10), control (30), no sx (38)	13.8	8.3	3 & 12 m	d2 (letter cancel); VLMT; figure memory (DCS); token test, verbal written word fluency; block design	No change in memory by group; RCI: 5 improved, 4 declined (both types of mem)		Those with no szs post, improved or unchanged
Lendt et al 2002	24	FLE (12) TLE (12)	FLE = 11.3 TLE = 11.8	FLE = 6.3 TLE = 5.0	1yr (no mean given)	WISC, letter cancel or comp choice RT, letter fluency, maze test, STM (digits forward/backward, corsi blocks), LTM (AVLT, figure memory), Luria fist-palm, token test	STM, LTM improved both groups		Sz free post-operation related to improved STM
Mabbott & Smith 2003	44	L (17), R (18), Extratemp (9)	L = 12.9; R = 12.2; ET = 12.4*	L = 6, R = 12.2, ET = 12.4	L = 1.24; R = 1.34; ET = 1.67	Story recall, CAVLT, RCFT, face recog - Denman NP	All improved on face recog	R worse than L on facial recog only post-op	Older age of sz onset, better verbal and facial recog; longer duration of sz d/o - worse perf, more meds & sx freq, worse on CAVLT delay - but not sig pre post change
Smith, Elliott & Lach 2004	51	Sx (30) & No sx (21)		Sx = 6.7, no sx = 5.4	1 y	WISC, WIAT, CMS, Denman NP (story), CAVLT, RCFT, Face recog, Gordan, CBCL, Pier-Harris self-concept	No change		
Szabo et al 1998	14	L (7) & R (7)	9.4	3.6y	7m	WISC, CAVLT	All decreased in delayed memory; L >		

							R decreased in Imm mem (with higher scores)		
Williams et al 1998	9	L (5) & R (4)	13*	3 y	11m	WISC, WRAML, PPVT, WRAT, WCST, TMT, GP, CBCL, RCMAS	Decreased delay verbal learning	No difference	

*Note.* \* = age at baseline assessment; Sx = surgery; FU = follow-up assessment; L = left temporal lobe group, R = right temporal lobe group; Extratemp = extratemporal lobe group; m = months; y = years; sz = seizure; VIQ= Verbal IQ; PIQ = Performance IQ; RCI = Reliable Change Index; **Tests:** AVLT = Auditory Verbal Learning Test; BNT = Boston Naming Test; CAVLT = California Auditory Verbal Learning Test; CBCL = Child Behavior Checklist; CDI = Child Depression Inventory; CMS = Children’s Memory Scale; Face recog = facial recognition tasks; Gordan = Gordan Continuous Performance Tests; GP = Grooved Pegboard; LTM = Long Term Memory; PLT = Primary Language Test; PPVT = Peabody Picture Vocabulary Test; RCFT = Rey Complex Figure Test; RCMAS = Revised-Child Manifest Anxiety Scale; RT = Reaction Time; STM = Short Term Memory; TMT = Trails Making Test; TVL = Test di Valutazione del Linguaggio; VL = Verbal Learning; VMI = Visuomotor Integration; VS = Visual Scanning; WCST; Wisconsin Card Sorting Test; WIAT = Wechsler Individual Achievement Test; WISC = Wechsler Intelligence Scale for children; WJ-Cognitive = Woodcock-Johnson Cognitive Assessment; WMS = Wechsler Memory Test; WPPSI = Wechsler Primary and Preschool Scale of Intelligence; WRAML = Wide Range Assessment of Memory and Learning; WRAT = Wide Range of Achievement Tes

Table 2 Demographic Characteristics Comparing those with Follow-up, No Follow-up, and All Participants

Variable	Had Follow-up (N=55)		No Follow-up (N=48)		All participants (N=103)	
	M (SD)	N	M (SD)	N	M (SD)	N
Age at baseline	13.38 (2.84)	55	12.72 (3.16)	48	13.07 (2.96)	103
Age at onset	6.91 (4.14)	55	6.34 (4.15)	48	6.65 (4.14)	103
Age at surgery	14.21 (3.00)	47	13.62 (3.39)	25	14.00 (3.13)	72
Seizure Frequency Baseline	56.80 (127.32)	55	74.47 (156.35)	47	64.94 (140.99)	102
# of Medications Baseline	1.85 (0.83)	54	1.62 (0.68)	45	1.75 (0.77)	99
Mother Education	14.04 (2.28)	51	15.04 (2.48)	44	14.51 (2.41)	95
Gender (female)	25	55	25	48	50	103
Ethnicity (%)		55		48		103
Caucasian	52.73		68.75		60.19	
African American	16.36		6.25		11.65	
Hispanic	29.09		18.75		24.27	
Asian	1.82		4.17		2.91	
Other	0		2.08		0.97	
Verbal IQ	91.22 (11.83)	55	93.83 (15.06)	48	92.44 (13.43)	103
PPVT	92.94 (13.68)	53	95.62 (15.72)	47	94.20 (14.66)	100
Story Mem Imm	8.89 (2.55)	53	9.26 (3.09)	47	9.06 (2.81)	100
Story Mem Delay	8.60 (2.73)	53	9.04 (2.87)	46	8.81 (2.80)	99
Story Mem Recog	9.20 (3.00)	51	9.35 (2.81)	43	9.27 (2.90)	94
Verbal Learning Imm	9.22 (2.78)	54	8.85 (2.59)	46	9.05 (2.67)	100
Verbal Learning Delay	8.96 (3.24)	54	8.85 (2.76)	46	8.91 (3.01)	100
Verbal Learning Recog	9.58 (2.76)	50	8.60 (3.34)	42	9.13 (3.06)	92
Paired Recall	7.98 (3.14)	44	8.00 (3.20)	42	7.99 (3.15)	86
Vis Selective Reminding Imm	8.60 (3.13)	53	8.57 (3.37)	47	8.59 (3.23)	100
Vis Selective Reminding Del	9.06 (1.97)	53	8.83 (2.16)	46	8.95 (2.06)	99
Facial Memory	9.71 (2.74)	41	9.29 (2.38)	34	9.52 (2.58)	75
Facial Memory Delay	9.73 (2.36)	41	9.56 (1.81)	34	9.65 (2.11)	75
Reading Composite	92.24 (12.30)	54	93.30 (15.97)	48	92.71 (14.09)	102
Math Composite	93.49 (15.29)	55	94.19 (16.64)	48	93.82 (15.86)	103
Prospective Memory (Parent)	3.50 (0.79)	47	3.66 (0.72)	29	3.56 (0.76)	76
Learning & Retrieval (Parent)	3.61 (0.99)	47	3.64 (0.95)	29	3.62 (0.97)	76
Prospective Memory (Child)	3.62 (0.69)	48	3.55 (0.71)	27	3.60 (0.69)	75
Learning & Retrieval (Child)	3.35 (0.74)	48	3.56 (0.81)	27	3.42 (0.77)	75

Note. M=mean; SD=standard deviation; Mem=Memory; Imm=Immediate; Recog=Recognition. There were no significant differences between groups on any of the above measures.

Table 3 Demographic Characteristics by Group

Variable	L-TLE (n=15)	R-TLE (n=11)	FLE (n=10)	Other (n=8)	No Surgery (n=10)
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Age at baseline	14.60 (2.62)	12.89 (3.16)	13.43 (2.89)	13.26 (2.68)	12.69 (2.36)
Age at onset	7.97 (4.06)	7.75 (4.33)	6.59 (4.41)	5.75 (3.06)	6.34 (4.48)
Age at surgery	15.35 (2.69)	13.64 (3.36)	14.16 (2.84)	13.91 (2.76)	N/A
Age at Follow-up	16.11 (2.81)	15.15 (3.35)	15.77 (2.37)	15.00 (2.68)	14.95 (3.25)
Length of Follow-up	18.38 (7.76)	27.48 (13.09)	28.49 (18.98)	21.17 (8.46)	32.76 (12.50)
Seizure Frequency Pre	16.13 (23.65)	28.18 (44.36)	203.00 (243.92)	30.13 (72.85)	29.80 (36.21)
Seizure Frequency Post	1.6 (3.44)	1.09 (2.77)	12.40 (28.42)	0.50 (1.07)	19.60 (27.34)
# of Medications Pre	1.80 (0.77)	1.64 (0.81)	2.00 (0.87)	2.25 (1.04)	1.80 (0.79)
# of Medications Post	1.13 (0.99)	0.64 (1.03)	1.30 (1.25)	0.63 (0.92)	2.00 (0.82)
Mother Education	13.14 (2.51) <sup>a</sup>	14.78 (1.72) <sup>b</sup>	13.00 (2.00) <sup>c</sup>	15.00 (2.08) <sup>d</sup>	14.80 (2.35)
Gender (Female)	7	6	5	3	4
Ethnicity (%)					
Caucasian	40.00	81.82	40.00	25.00	70.00
African American	20.00	0	10.00	25.00	30.00
Hispanic	33.33	18.18	50.00	50.00	0
Asian	6.67	0	0	0	0
Verbal IQ	88.73 (11.20)	96.81 (8.66)	91.10 (13.44)	92.75 (8.81)	88.50 (15.93)

*Note.* L-TLE=Left Temporal Lobe Epilepsy; R-TLE=Right Temporal Epilepsy; FLE=Frontal Lobe Epilepsy; Follow-up in months; M=Male; F=Female; IQ=Intelligence Quotient; <sup>a</sup>n=14; <sup>b</sup>n=9; <sup>c</sup>n=9; <sup>d</sup>n=7

Table 4 Means and Standard Deviations Pre- and Post-Assessment for Surgery and No Surgery Groups

	Surgery (N = 44)				No Surgery (N=10)			
	Pre		Post		Pre		Post	
	SS (SD)	N	SS (SD)	N	SS (SD)	N	SS (SD)	N
Verbal Memory Tasks								
Immediate Story Recall	9.00 (2.40)	43	9.16 (2.55)	43	8.40 (3.20)	10	8.10 (3.98)	10
Delayed Story Recall	8.51 (2.62)	43	8.63 (2.72)	43	9.00 (3.30)	10	8.50 (4.03)	10
Story Recognition	9.44 (2.85)	41	9.52 (2.60)	42	8.20 (3.55)	10	8.30 (3.13)	10
Immediate Verbal Learning	9.16 (2.68)	44	8.61 (2.79)	44	9.50 (3.34)	10	10.00 (3.77)	10
Delayed Verbal Learning	8.91 (3.06)	44	8.32 (3.72)	44	9.20 (4.10)	10	10.30 (3.59)	10
Verbal Learning Recog	9.34 (2.77)	41	9.19 (3.47)	43	10.67 (2.60)	9	10.70 (2.87)	10
Paired Recall	8.14 (3.17)	35	8.97 (3.41)	38	7.33 (3.12)	9	7.10 (4.28)	10
Non-verbal Memory Tasks								
Immediate VSR	8.86 (3.19)	43	8.82 (2.94)	44	7.50 (2.72)	10	8.50 (3.54)	10
Delayed VSR	9.16 (2.07)	43	9.43 (1.77)	44	8.60 (1.51)	10	8.70 (2.00)	10
Immediate Facial Memory	9.47 (2.51)	32	8.79 (3.41)	34	10.56 (3.47)	9	10.00 (2.91)	10
Delayed Facial Memory	9.53 (2.53)	32	9.76 (1.91)	34	10.44 (1.51)	9	8.90 (2.42)	10
Everyday Memory Tasks								
Child Prospective Memory	3.61 (0.73)	39	3.56 (0.67)	39	3.66 (0.48)	9	3.41 (0.61)	10
Child Learning/Retrieval	3.34 (0.76)	39	3.26 (0.66)	39	3.39 (0.70)	9	3.36 (0.58)	10
Parent Prospective Memory	3.59 (0.77)	37	3.53 (0.75)	38	3.17 (0.79)	10	3.11 (0.64)	9
Parent Learning/Retrieval	3.67 (0.91)	37	3.46 (0.85)	38	3.39 (1.24)	10	3.56 (0.86)	9
Academic Skills								
Reading Composite	92.30 (12.52)	44	91.70 (12.55)	44	92.00 (11.91)	10	87.00 (12.23)	10
Math Composite	94.89 (15.37)	44	95.66 (16.04)	44	89.70 (13.67)	10	86.30 (10.39)	10

Note. SS=Standard Score; SD=Standard Deviation; Recog=Recognition; VSR=Visual Selective Reminding

Table 5 Means and Standard Deviations Pre- and Post-Assessment for all Surgery Groups

	L-TLE (n = 15)		R-TLE (n = 11)		FLE (n = 10)		Other (n = 8)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	M(SD)/n*		M(SD)/n*		M(SD)/n*		M(SD)/n*	
<b>Verbal Memory</b>								
Imm Story Recall	8.67 (2.32)	7.79 (2.49)/14	10.10 (1.97)/10	9.55 (2.91)	8.10 (2.51)	10.20 (1.69)	9.38 (2.72)	9.75 (2.43)
Del Story Recall	7.47 (2.59)	7.14 (2.38)/14	10.10 (2.28)/10	9.36 (3.20)	8.10 (2.73)	9.20 (2.39)	9.00 (2.27)	9.50 (2.27)
Story Rec	8.20 (2.48)	8.00 (2.42)/14	10.60 (2.67)/10	10.18 (2.48)	10.13 (3.31)/8	10.50 (2.80)	9.63 (2.83)	10.14 (1.77)/7
Imm Verbal Learning	8.60 (3.33)	7.20 (2.86)	10.45 (2.34)	8.82 (1.60)	8.80 (2.20)	9.30 (3.02)	8.88 (2.03)	10.13 (2.90)
Del Verbal Learning	8.27 (3.56)	5.87 (3.94)	10.09 (2.51)	8.82 (2.29)	8.70 (3.74)	10.00 (3.43)	8.75 (1.49)	10.38 (3.02)
Verbal Learning Rec	8.73 (3.31)	7.53 (4.29)	9.91 (2.21)	8.64 (2.56)	11.00 (2.08)/7	10.10 (2.88)	8.25 (2.43)	10.43 (2.70)/7
Paired Recall	7.62 (3.64)/13	6.92 (4.29)/12	9.60 (2.41)/10	9.27 (2.65)	7.80 (3.35)/5	10.13 (2.42)/8	7.29 (3.04)/7	10.71 (2.36)/7
<b>Non-verbal Memory</b>								
Immediate VSR	9.60 (4.08)	8.67 (3.24)	9.0 (2.83)	8.09 (2.59)	7.56 (3.24)/9	9.90 (2.77)	8.75 (0.87)	8.75 (3.20)
Delayed VSR	9.00 (2.04)	8.87 (1.88)	9.82 (1.94)	9.55 (1.75)	8.33 (2.83)/9	9.60 (2.01)	9.50 (1.07)	10.13 (1.13)
Imm Facial Memory	8.92 (2.81)/13	8.67 (3.17)/12	10.86 (2.34)/7	9.56 (2.07)	10.60 (2.07)/5	8.57 (9.17)/6	8.29 (1.70) /7	7.71 (0.95)/7
Del Facial Memory	9.46 (3.15)/13	10.33(2.02)/12	10.29 (3.15)/7	9.11 (1.76)	9.00 (1.58)/5	9.83 (2.32)/6	9.29 (0.76)/7	9.57 (1.62)/7
<b>Everyday Memory</b>								
Child Prospective	3.75 (0.54)/12	3.52 (0.59)/13	3.31 (0.68)	3.31 (0.32)/9	3.54 (0.97)/8	3.60 (0.90)/9	3.89 (0.75)	3.86 (0.80)/8
Child L/R	3.30 (0.94)/12	3.11 (0.74)/13	3.36 (0.73)	3.32 (0.53)/9	3.48 (0.71)/8	3.29 (0.79)/9	3.21 (0.63)	3.41 (0.54)/8
Parent Prospective	3.55 (0.58)/12	3.42 (0.74)/13	4.00 (0.78)	3.76 (0.80)/9	3.36 (0.72)/8	3.38 (0.61)/9	3.41 (1.01)	3.60 (0.93)/7
Parent L/R	3.60 (0.88)/12	3.07 (0.80)/13	4.30 (0.73)	4.15 (0.62)/9	3.29 (0.95)/8	3.51 (0.79)/9	3.45 (0.91)	3.23 (0.85)/7
<b>Academic Skills</b>								
Reading Composite	86.47 (8.07)	86.60 (10.89)	102.55 (13.79)	100.09 (13.54)	91.30 (11.64)	93.20 (10.54)	90.38 (11.95)	87.88 (11.81)
Math Composite	93.20 (14.73)	94.20 (15.54)	103.64 (17.80)	103.18 (18.37)	90.50 (15.30)	91.60 (16.69)	91.50 (9.87)	93.13 (11.56)

*Note.* \* = n for each group is as indicated at the top of the column unless otherwise noted; L-TLE=Left Temporal Lobe Epilepsy; R-TLE=Right Temporal Epilepsy; FLE=Frontal Lobe Epilepsy; Imm=Immediate; Del=Delayed; Rec=Recognition; VSR=Visual Selective Reminding; L/R=Learning/Retrieval



Table 6 Means and Standard Deviations of Composite Variables Pre- and Post-Assessment for Surgery and No Surgery Groups

	Surgery (n = 44)						No Surgery (n = 10)					
	n	Pre		n	Post		n	Pre		n	Post	
		SS	Z		SS	Z		SS	Z		SS	Z
		M (SD)			M (SD)			M (SD)			M (SD)	
Objective Memory	44	8.93 (1.94)	0.05 (0.97)	44	9.00 (2.04)	0.08 (1.02)	10	8.66 (2.15)	-0.09 (1.07)	10	8.91 (2.41)	0.03 (1.20)
Everyday Memory	37	3.63 (0.78)	0.05 (0.99)	38	3.49 (0.72)	-0.13 (0.92)	10	3.28 (0.97)	-0.40 (1.26)	9	3.33 (0.70)	-0.33 (0.90)
Academic Skill	44	93.59 (12.76)	0.06 (0.91)	44	93.68 (12.72)	0.02 (0.91)	10	90.85 (12.04)	-0.18 (0.86)	10	86.65 (10.87)	-0.48 (0.78)

*Note.* SS=Standard Score; M = Mean; SD=Standard Deviation; Z = Z-score

Table 7 Means and Standard Deviations of Composite Variables Pre- and Post-Assessment for Combined TLE/FLE and Other

	Combined TLE/FLE (n = 36)						Other (n = 8)					
	n	Pre		n	Post		n	Pre		n	Post	
		SS	Z		SS	Z		SS	Z		SS	Z
		M (SD)			M (SD)			M (SD)			M (SD)	
Objective Memory	36	8.95 (2.04)	0.05 (1.02)	36	8.76 (2.09)	-0.04 (1.04)	8	8.85 (1.50)	-0.00 (0.75)	8	10.08 (1.43)	0.61 (0.72)
Everyday Memory	29	3.68 (0.74)	0.12 (0.95)	31	3.51 (0.71)	-0.10 (0.91)	8	3.43 (0.92)	-0.21 (1.18)	7	3.42 (0.82)	-0.22 (1.04)
Academic Skill	36	94.18 (13.53)	0.06 (0.97)	36	94.39 (13.38)	0.07 (0.96)	8	90.94 (8.74)	-0.17 (0.63)	8	90.50 (9.25)	-0.21 (0.66)

*Note.* TLE = Temporal Lobe Epilepsy; FLE = Frontal Lobe Epilepsy; SS=Standard Score; M = Mean; SD=Standard Deviation; Z = Z-score

Table 8 Means and Standard Deviations of Composite Variables Pre- and Post-Assessment for Combined TLE and FLE Groups

	FLE (n = 10)							TLE (n = 26)					
	Pre			Post				Pre			Post		
	SS	Z	M (SD)	n	SS	Z	n	SS	Z	n	SS	Z	n
Immediate Memory	10	8.04 (1.56)	-0.30 (0.73)	10	9.88 (1.31)	0.55 (0.61)	26	9.14 (2.30)	0.21 (1.07)	26	8.25 (2.12)	-0.20 (0.98)	
Verbal Immediate	10	8.23 (1.51)	-0.22 (0.66)	10	9.88 (2.09)	0.49 (0.91)	26	9.12 (2.51)	0.15 (1.09)	26	8.17 (2.42)	-0.25 (1.05)	
Non-verbal	9	7.56 (3.24)	-0.32 (1.01)	10	9.90 (2.77)	0.41 (0.86)	26	9.35 (3.55)	0.23 (1.10)	26	8.42 (2.94)	-0.05 (0.91)	
Immediate Facial Memory	5	10.60 (2.07)	0.42 (0.81)	6	9.17 (2.32)	-0.14 (0.90)	20	9.60 (2.76)	0.03 (1.07)	21	9.05 (2.73)	-0.18 (1.06)	
Delayed Memory	10	8.30 (2.37)	-0.30 (1.19)	10	9.60 (1.18)	0.35 (0.60)	26	8.97 (2.06)	0.04 (1.02)	26	8.15 (2.09)	-0.38 (1.05)	
Verbal Delayed	10	8.40 (2.93)	-0.18 (1.18)	10	9.60 (2.01)	0.30 (0.81)	26	8.77 (2.59)	-0.03 (1.05)	26	7.67 (2.82)	-0.48 (1.14)	
Non-verbal Delayed	9	8.33 (2.83)	-0.30 (1.37)	10	9.60 (2.01)	0.32 (0.98)	26	9.35 (2.00)	0.19 (0.97)	26	9.15 (1.82)	0.10 (0.89)	
Facial Memory Delay	5	9.00 (1.58)	-0.31 (0.75)	6	9.83 (2.32)	0.09 (1.10)	20	9.75 (3.09)	0.05 (1.46)	21	9.81 (1.97)	0.07 (0.93)	
Recognition Memory	8	10.38 (2.56)	0.47 (1.03)	10	10.30 (2.53)	0.44 (1.01)	26	9.23 (2.41)	0.01 (0.97)	26	8.81 (2.85)	-0.16 (1.14)	
Everyday Memory	8	3.32 (0.69)	-0.34 (0.88)	9	3.45 (0.68)	-0.18 (0.87)	21	3.82 (0.73)	0.30 (0.93)	22	3.53 (0.73)	-0.07 (0.94)	
Learning/Retrieval	8	3.29 (0.95)	-0.35 (0.98)	9	3.51 (0.79)	-0.12 (0.82)	21	3.90 (0.88)	0.29 (0.91)	22	3.51 (0.90)	-0.12 (0.93)	
Prospective	8	3.36 (0.72)	-0.26 (0.95)	9	3.39 (0.61)	-0.22 (0.80)	21	3.74 (0.69)	0.24 (0.91)	22	3.56 (0.77)	-0.00 (1.01)	
Academic Skill	10	90.90 (13.07)	-0.17 (0.94)	10	92.40 (12.80)	-0.07 (0.92)	26	95.44 (13.74)	0.15 (0.98)	26	95.15 (13.76)	0.18 (0.98)	

*Note.* \* = n for each group is as indicated at the top of the column unless otherwise noted; FLE = Frontal Lobe Epilepsy; TLE = Temporal Lobe Epilepsy

Table 9 Means and Standard Deviations of Composite Variables Pre- and Post-Assessment for Left and Right TLE Groups

	Left TLE (n = 15)						Right TLE (n = 11)					
	n	Pre	Z	Post	SS	Z	n	SS	Pre	Z	Post	Z
		SS		n					SS		SS	
		M (SD)		M (SD)				M (SD)		M (SD)		
Verbal Memory												
Verbal Immediate	15	8.38 (2.69)	-0.16 (1.17)	15	7.40 (2.65)	-0.59 (1.15)	11	10.11 (1.92)	0.59 (0.83)	11	9.21 (1.66)	0.20 (0.72)
Verbal Delayed	15	7.87 (2.60)	-0.40 (1.05)	15	6.70 (3.06)	-0.87 (1.24)	11	10.00 (2.10)	0.46 (0.85)	11	9.00 (1.84)	0.06 (0.75)
Non-verbal Memory												
Non-verbal Immediate	15	9.60 (4.08)	0.31 (1.27)	15	8.67 (3.24)	0.02 (1.01)	11	9.00 (2.83)	0.13 (0.88)	11	8.09 (2.59)	-0.15 (0.80)
Non-verbal Delayed	15	9.00 (2.04)	0.02 (0.99)	15	8.87 (1.88)	-0.04 (0.92)	11	9.82 (1.94)	0.42 (0.94)	11	9.55 (1.75)	0.29 (0.85)
Facial Memory Imm	13	8.92 (2.81)	-0.23 (1.09)	12	9.67 (3.17)	-0.33 (1.23)	7	10.86 (2.34)	0.52 (0.91)	9	9.56 (2.07)	0.01 (0.80)
Facial Memory Del	13	9.46 (3.15)	-0.09 (1.49)	12	10.33 (2.06)	0.32 (0.95)	7	10.29 (3.15)	0.30 (1.49)	9	9.11 (1.76)	-0.26 (0.83)

*Note.* TLE = Temporal Lobe Epilepsy; Imm = Immediate; Del = Delay

Table 10 Demographic Variables for Children with TLE, by Change Status

	Seizure Freq # free	Location # Mesial	Meds Change M (SD)	Age of Onset M (SD)	Age at Surgery M (SD)	Mother Ed M (SD)	Follow-up M (SD)
Verbal Mem Imm							
No-Decline (n=20)	14	13	-0.85 (1.23)	8.17 (4.04)	14.58 (3.16)	13.44 (2.45)	22.74 (12.04)
Decline (n=6)	5	4	-0.67 (1.37)	6.90 (4.50)	14.78 (2.92)	15.00 (1.41)	20.53 (7.84)
Chi-square	$\chi^2=.42$	$\chi^2=.01$					
Verbal Mem Delay							
No-Decline (n=18)	14	12	-0.67 (1.24)	7.46 (4.19)	14.28 (3.28)	13.65 (2.57)	20.78 (7.71)
Decline (n=8)	5	5	-1.13 (1.24)	8.81 (3.96)	15.42 (2.48)	14.17 (1.60)	25.50 (16.70)
Chi-square	$\chi^2=.66$	$\chi^2=.04$					
Non-verbal Mem Imm							
No-Decline (n=18)	12	11	-0.67 (1.14)	8.13 (4.11)	14.92 (3.30)	14.06 (1.77)	23.44 (12.74)
Decline (n=8)	7	6	-1.13 (1.46)	7.30 (4.25)	13.98 (2.47)	13.14 (3.39)	19.51 (5.83)
Chi-square	$\chi^2=1.22$	$\chi^2=.47$					
Non-verbal Mem Del							
No-Decline (n=22)	16	13	-0.64 (1.26)	7.91 (4.30)	14.92 (3.09)	13.85 (2.50)	23.49 (11.58)
Decline (n=4)	3	4	-1.75 (-.50)	7.71 (3.20)	13.02 (2.55)	13.33 (0.58)	15.30 (3.64)
Chi-square	$\chi^2=.01$	$\chi^2=2.50$					
Learning/Retrieval							
No-Decline (n=18)	15	11	-0.78 (1.35)	7.13 (4.24)	14.64 (2.90)	13.83 (2.55)	21.15 (7.88)
Decline (n=2)	2	2	-2.00 (0)	8.50 (4.95)	16.87 (1.63)	13.50 (0.71)	16.22 (1.30)
Academic Skill							
No-Decline (n=25)	18	17	-0.88 (1.20)	8.06 (4.06)	14.72 (3.08)	13.68 (2.34)	21.93 (11.22)
Decline (n=1)	1	0	1.00	3.25	12.26	16.00	29.87

*Note.* None of the chi-square statistics were significant; Learning/Retrieval and Academic skill could not be compared with chi-square due to small cell size; Freq = frequency; # free = children who were seizure free on follow-up; # mesial = number of children who had surgical intervention involving the mesial temporal lobe; Meds Change = Change in medication over time; age of onset and age at surgery are in years; Mother Ed = level of mother's education; follow-up = length of follow-up interval in months; M = Mean; SD=Standard Deviation; Mem=Memory; Imm=Immediate; Del=Delay

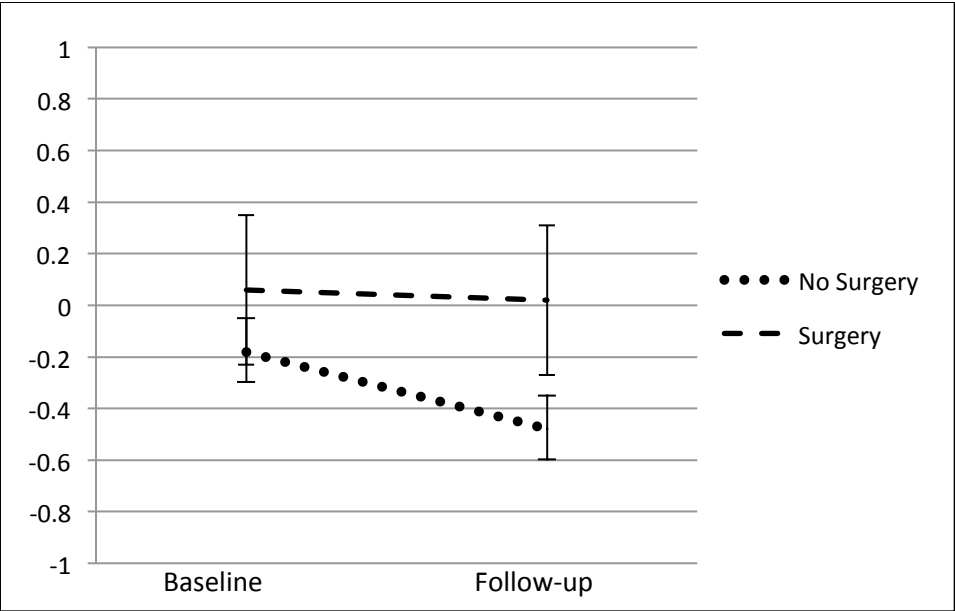


Figure 1. Academic Composite Variables Over Time in No Surgery and Surgery Groups. Error bars represent standard errors.

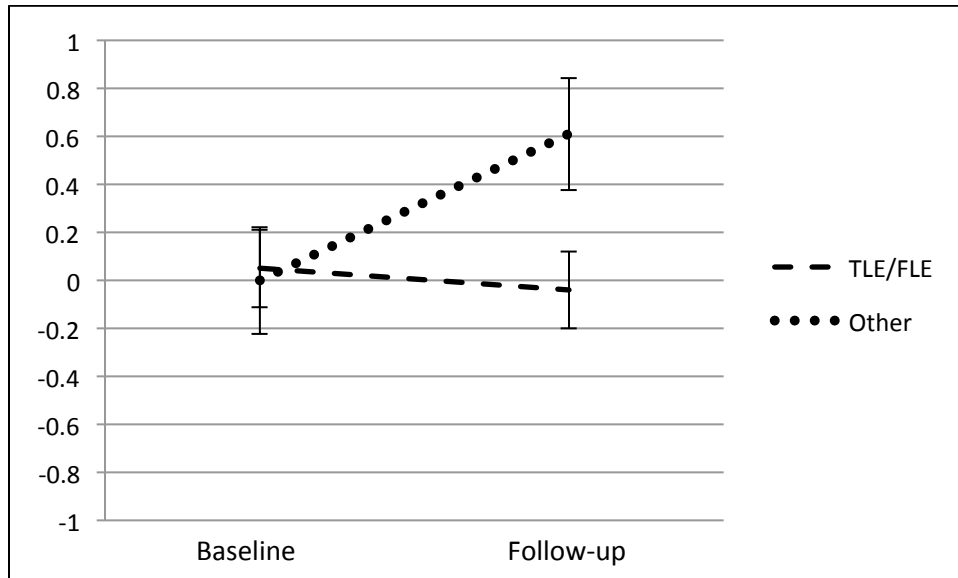


Figure 2. Objective Memory Composite Variable Over Time by TLE/FLE and Other Group. Error bars represent standard errors.

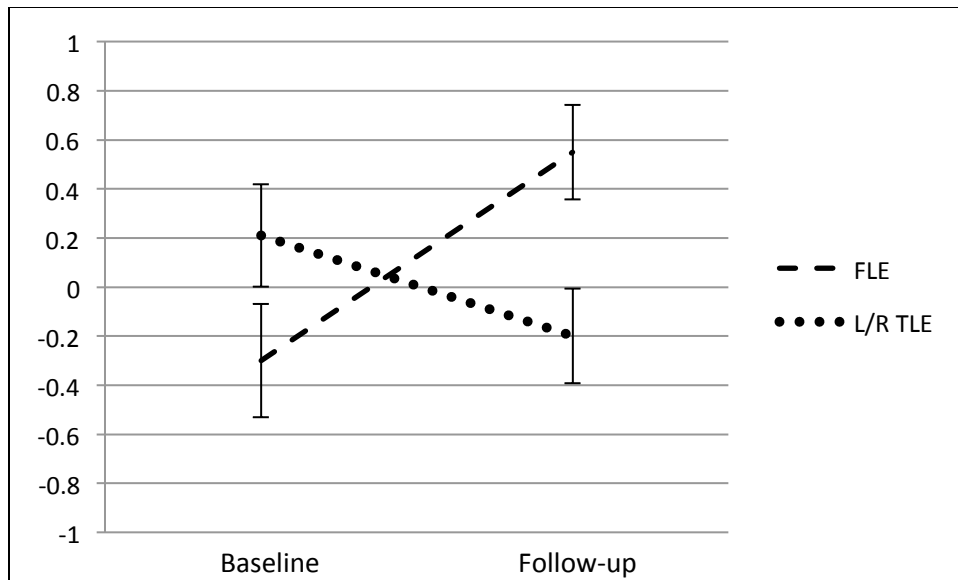


Figure 3. Immediate Memory Composite Variable Over Time by FLE and TLE Group. Error bars represent standard errors.



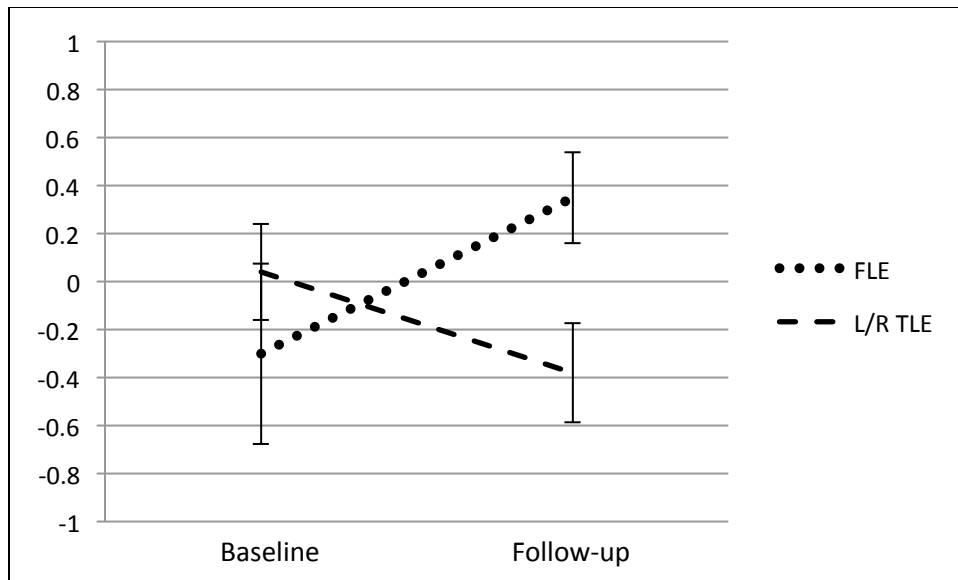


Figure 4. Delayed Memory Composite Variable Over Time by Frontal Lobe (FLE) and Temporal Lobe Epilepsy (TLE) Groups. Error bars represent standard errors. L = left, R= right.

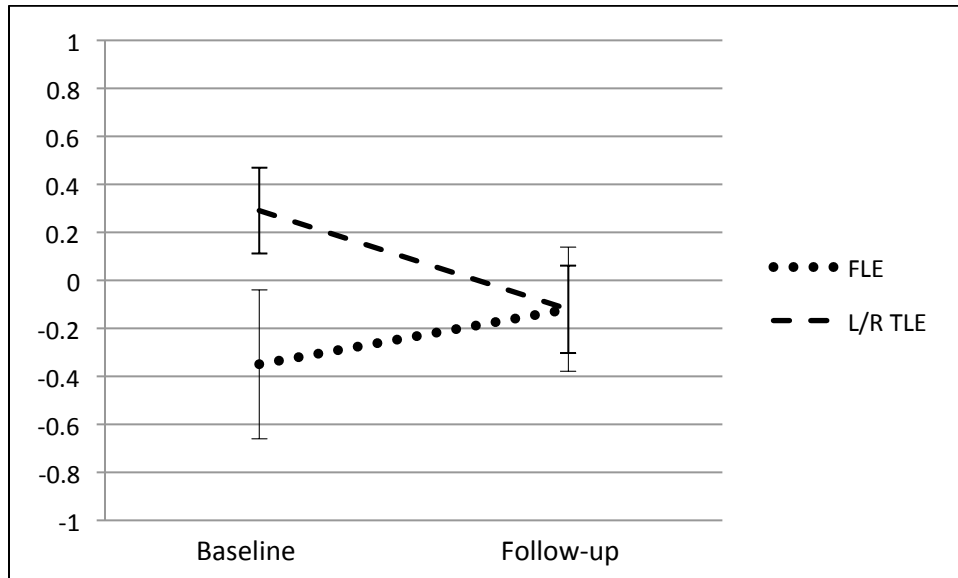


Figure 5. Learning/Retrieval Everyday Memory Variable Over Time by Frontal Lobe (FLE) and Temporal Lobe (TLE) Epilepsy Groups. Error bars represent standard errors. L = left, R = right.