Published in final edited form as:

J Head Trauma Rehabil. 2017 ; 32(6): E29–E37. doi:10.1097/HTR.0000000000000294.

Group-Based Trajectory Analysis of Emotional Symptoms among Survivors after Severe Traumatic Brain Injury

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Abstract

Objectives—Depressive symptoms and anxiety are fairly common emotional outcomes after severe TBI. Life satisfaction is a main factor in the general construct of subjective well-being. However, there is limited literature available on the interrelationship between emotional outcomes and life satisfaction post-severe TBI over time. The purpose of this study was to characterize distinct patterns of change in depressive symptoms, anxiety and life satisfaction over 24 months after severe TBI and evaluate the interrelationship of different trajectory groups among them as well as associated subject characteristics.

Methods—This prospective study used longitudinal data collected from the University of Pittsburgh Brain Trauma Research Center (BTRC) from survivors of severe TBI (N=129). In addition to demographic and injury related data, depressive symptoms, anxiety and life satisfaction were collected at 3, 6, 12, and 24 months post-injury. A group-based trajectory model was performed to identify distinct longitudinal patterns of depressive symptoms, anxiety and life satisfaction. The interrelationships of distinct trajectory groups were examined using chi-square tests. A multivariate logistic regression model was used to examine the predictors of different emotional symptom trajectories.

Results—The group-based trajectory model identified 2 distinct patterns of each of 3 outcomes: constantly low and constantly high depressive symptoms group (70.4% vs 29.6%), constantly low and constantly high anxiety group (69.1% vs 30.9%) and low-decreasing and high-stable life satisfaction groups (56.3% vs 43.7%) A strong pair-wise association was observed between trajectory group membership for depressive symptoms and anxiety ($p<0.0001$), depressive symptoms and life satisfaction ($p<0.0001$), anxiety and life satisfaction ($p<0.001$). Subjects with increased severe injury were more likely to belong to the high-stable depressive symptoms group, while there were no significant associations between age, gender, race, education, marriage status and distinct depressive symptoms, anxiety, and life satisfaction trajectory groups.

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Conflict of Interest: My co-author and I do not have any interests that might be interpreted as influencing the research.

Conclusions—A group-based trajectory model revealed patterns of emotional symptoms that have not been fully explored among survivors of severe TBI. There appear to be distinct trajectory patterns for depressive symptoms, anxiety and life satisfaction respectively. There was strong interrelationship among emotional symptoms. The findings add to our understanding of psychosocial outcomes experienced over time after severe TBI.

Keywords

longitudinal data; trajectory analysis; severe TBI; depressive symptom; anxiety; life satisfaction

Introduction

Traumatic brain injury (TBI) is not only among the most common cause of brain damage in the United States, but also a major public health issue and health care challenge.¹ According to the CDC, approximately 1.7 million people sustain a TBI annually in the United States and 5.3 million Americans are living with a TBI-related disability, including cognitive and physical impairments.^{2,3} Moreover, TBI is also a contributing factor to a third (30.5%) of all injury-related deaths in the United States.⁴ While there is disability and cost associated with TBI, the severe TBI population makes a significant contribution to these numbers. In addition, severe TBI can lead to a wide range of short- or long-term outcomes, including physical, cognitive, behavioral, and emotional alternations.^{5,6,7}

Psychological or emotional alterations following severe TBI are well documented and often contribute to depression, anxiety, personality changes, aggression, acting out, and social inappropriateness.^{8,9} Of these emotional alterations, depression and anxiety are fairly common emotional outcomes after TBI, and they often co-exist with each other.¹⁰ This comorbidity of anxiety and depression renders the course of mental disorder more chronic, which not only leads to impairment and functional limitations at work and in social situations, but also substantially raises the risk of suicide.¹¹ Life satisfaction is a main factor in the general construct of subjective well-being. Extensive research on life satisfaction with disability were reported.^{12,13,14} However, there is limited literature available on the analysis of depressive symptoms, anxiety and life satisfaction among survivors of severe TBI over time as well as on the interrelationship among these factors. Research focusing on emotional symptoms after severe TBI has important clinical implications. Severe TBI patient's outcomes need to be measured beyond just survival and functional performance, and these outcomes should incorporate the psychological facets, which can vary greatly during the course of rehabilitation.

Furthermore, few studies to date have characterized the individual pattern of depressive symptoms, anxiety and life satisfaction among severe TBI survivors over time. Typically, longitudinal data are summarized as population average at each of different time points. Nevertheless, this assume that (1) individuals come from a single population, (2) a single growth trajectory adequately approximates an entire population, and (3) covariates that affect the growth factors influence each individual in the same way. These assumptions not only limit the typical longitudinal data analysis, but also result in analysis reflecting inherent

bias.¹⁵ This bias stems from relying on a single group trajectory to describe a heterogeneous population, which results in inaccurate estimates of change over time for the individuals.

Group-based trajectory modeling is an application of finite mixture modeling of unobserved subpopulations¹⁵ and is designed to identify clusters of individuals following similar progression patterns over time. Although group-based trajectory models increasingly have been applied in recent years, this technique rarely has been used to characterize emotional symptoms after severe TBI throughout the course of recovery. Clinically it is very important to identify specific patterns of severe TBI patients' symptom changes over time and the characteristics associated with distinct trajectories. These findings have the potential to make contributions on the lives of individuals with severe TBI by generating new knowledge that can be used to design and implement interventions that target severe TBI patients who display a poor recovery trajectory.

The purpose of this study was to 1) characterize distinct patterns of change in depressive symptoms, anxiety and life satisfaction over 24 months among survivors of severe TBI, 2) evaluate the interrelationship of different trajectory groups of depressive symptoms, anxiety and life satisfaction, and 3) identify characteristics of TBI survivors that are associated with various trajectories of emotional symptoms over time.

Methods

Study Participants

This study was approved by the University of Pittsburgh's Institutional Review Board (Pittsburgh, PA). The data analyzed in this study were obtained through the University of Pittsburgh, Brain Trauma Research Center (BTRC). The subjects who met inclusion criteria were recruited upon diagnosis of severe traumatic brain injury. In our analysis, we utilized the subset of subjects who (1) survived their severe TBI out to at least 24 months and (2) were able to complete subject-reported measures of depression, anxiety, and satisfaction with life. Longitudinal emotional symptom data were collected at 3, 6, 12 and 24 months post-injury. Our sample for this study comprised 129 adults with severe TBI (i. e., Glasgow Coma Scale [GCS] ≤ 8) who had received at least 2 time measurements within the 4 time-point data collection period (i.e., the subjects who missed more than two times measurement were excluded from the analysis) to preserve the longitudinal nature of the study. Under the group-based trajectory model, the information from the dataset can, in addition, be used to impute missing data prior to input into the trajectory model when the data is missing at random (MAR). The full-information maximum likelihood (FIML) estimation is used to integrate all available information based on MAR assumptions and provide parameter estimates that are asymptotically unbiased.²²

Measures

Depression and Anxiety—The Brief Symptom Inventory 18 (BSI 18)¹⁶ is a short form of the Symptom Checklist-90-revised.¹⁷ It is a brief subjective symptom scale that measures 3 dimensions (somatization, depression, anxiety) independently as well as provides a composite score with excellent reliability and validity in TBI populations.^{18,19} In addition,

respondents' raw scores also were converted to standardized T-scores based on a linear transformation that standardizes scores for the BSI-18 while adjusting for sex differences observed in the normative population.²⁰ Higher BSI 18 subscale scores indicate more severe depressive and anxiety symptoms. T score of 63 or greater are considered to be a positive clinical diagnosis.

Satisfaction with Life—The Diener Satisfaction with Life Scale was used as a global measure of life satisfaction. It is a subjective self-report measure with 5 items that reflect overall well-being. Overall scores on the Satisfaction with Life range from 5 to 35, with higher scores reflecting greater satisfaction. The scale has been well established among individuals with TBI and is considered a valid and reliable measure of life satisfaction.²¹

Data Analysis

Descriptive statistics were presented for patient demographic characteristics including mean and standard deviation for continuous variables (age) and frequency and percentage for categorical variables (gender, race, GCS, education and marital status).

Group-based Trajectory Modeling

Group-based trajectory model is a contemporary statistical approach designed to identify clusters of individuals following similar progressions of a targeted behavior (i.e., emotional symptoms) over time.²² This method assumes that the population is not homogeneous and is composed of a finite number of distinct groups. Three types of distributions are provided by group-based trajectory modeling: (1) censored normal (CNORM) for censored continuous data, (2) zero-inflated Poisson (ZIP) to analyze count data, and (3) Bernoulli distributions (binary logistic model) to analyze binary data. Given the continuous measurement of depressive symptoms, anxiety and life satisfaction featured in this study, we used CNORM for our analysis. The CNORM distribution, which allows for censoring, tends to cluster at the minimum of the scale or at the scale maximum or both, especially is useful for psychometric scale.²³ The software used in the group-base trajectory modeling is SAS PROC TRAJ that was developed by Jones et al.²⁴ Finally, subjects who missed more than two time point measurements were excluded from the model.

The Group-based trajectory model allows a variety of straight and curved trajectories to capture different symptom patterns over time. Each group reveals the distinct pattern for each of three outcomes. For model selection, the choice of the number of groups and the shape of each group are most important considerations. Different models with a varying number of groups and shapes have to be compared to find the best-fit model. Several statistical criteria and model-fit indices were considered to help determine the best model.¹⁵ These include: (1) estimated probability of group membership for each trajectory group. The average of the posterior probability of group membership for each group should be greater than 0.7. (2) the proportion assigned to that group based on posterior probability of group membership. (3) Akaike's Information Criterion(AIC)²⁵, Bayesian Information Criterion (BIC)²⁶ were compared between different models. Smaller values of AIC and BIC denote better fit models. (4) Bayes factor¹⁵, another statistical index that quantifies the evidence in favor of a null hypothesis, was also calculated by the exponential function of difference of

two BIC values between two different models (i.e., $\exp(\text{BIC1}-\text{BIC2})$). A 10-fold difference in Bayes factor is considered a meaningful difference between two models.¹⁵ In our analysis we first fit 2 to 6 group model with all groups set to a quadratic equation and then determined the optimal number of trajectories and the shape of each trajectory group according to the criteria described in above. In addition, besides these statistical criteria when selecting best model, we have to consider the “usability in analysis” in practice. A combination of substantive knowledge and statistical inference was both accounted to determine the optimal models.

For all three outcomes, pairwise associations between trajectory groups were assessed using chi-square tests. Predictors of trajectory group membership were initially identified using either two-sample independent t-test or chi-square tests to compare the differences between two trajectory groups regarding to all demographics and clinical variables at baseline, which comprised age, gender, GCS, race, education and marital status. Next, multivariate logistic regression models were also estimated including all the demographics and clinical variables. Statistics were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). *P* values of 0.05 or less were considered to be statistically significant throughout.

Results

Our analysis included a total of 129 survivors doing well enough to conduct assessment after severe TBI followed-up at 3-, 6-, 12- and 24-months post-injury. 27 subjects were excluded from the analysis because these subjects missed more than two time point measurements for depression, anxiety and life satisfaction. We compared demographics (age, gender, race, education and marital status) between those excluded 27 subjects and included 129 subjects and found no statistical significant differences between the two cohorts ($P<0.05$). Table 1 shows demographics and injury severity at baseline. Of the 129 subjects, 99 were male (76.7%) and 30 were female (23.3%). The gender distribution is consistent with gender differences in the incidence of TBI among the general population reported in the literature, which indicates that male display a higher incidence of TBI than female.² The majority of the population was white (93%). The average age at injury was 33.3 years ($SD=14.6$). At the first assessment time point (3 months), only 68% of subjects reported their education level and 83% reported their marital status. Most study subjects were single (78.5%). Education level for 65.9% of the subjects was less than a high school diploma. The average completed years of education was 12.6 years. The mean initial GCS score was 6.27. Our severe TBI survivors were grouped by first available GCS score: moderate severe (GCS=5-8) and highly severe (GCS=3-4). As such, 86.0% ($n=111$) of the subjects were moderate severe injury TBI patients, and 14.0% ($n=18$) were highly severe injury TBI patients.

Trajectory Analysis

A two-group linear trajectory model best fit severe TBI survivor's depressive symptoms (Figure 1 and Table 2). About 70% ($n=91$) of the survivors were assigned to the low-increasing depressive symptoms group. The “average” survivor in the low-increasing group had a depressive symptom score of 49.2 at 3 months that significantly increased by approximately 0.18 points per month. The other 30% of the survivors followed a trajectory

that started high at 3 month and remained high, with no significant change over time. The “average” survivor in this high-stable group had a depressive symptoms score of 67.5 at 3 month.

Similarly a two-group linear trajectory model best fit severe TBI survivor's anxiety over time (Figure 2 and Table 2). The low-stable group represented 69% ($n=89$) of survivors who expressed low levels of anxiety at 3 months, and this level remained constantly low over time. The “average” survivor in the low-stable group had an anxiety symptoms score of 45.4 at 3 month. The remaining 31% ($n=40$) of survivors were assigned to the high-stable group, who reported high anxiety at 3 months, and their anxiety level remained high over time. The “average” survivor in this high-stable group had an anxiety symptoms score of 66.0 at 3 months.

A two-group quadratic trajectory model best fit severe TBI survivor's life satisfaction scores over time (Figure 3 and Table 2). The low-decreasing-increasing life satisfaction group ($n=73$), which represented 56% of survivors, displayed quadratic change patterns of life satisfaction score. The subjects in this group demonstrated low life satisfaction score at 3 months, and these scores continued to decrease significantly over 12 month (slope= -0.75 ; $p=.01$). The life satisfaction score improved slightly between 12 and 24 months, but they were still lower than at 3 months (quadratics slope= 0.02 ; $p=.01$). Approximately 44 % ($n=56$) of survivors reported moderate scores at 3 months, which did not change significantly over time ($p=0.61$).

Associations Between Trajectory Groups of Depression, Anxiety and Satisfaction with Life

A strong pair-wise association was observed between trajectory group membership for depressive symptoms and anxiety ($\chi^2(1, N=129)=57.87, p<.0001$), depressive symptoms and life satisfaction ($\chi^2(1, N=129)=20.07, p<.0001$), and anxiety and life satisfaction ($\chi^2(1, N=129)=10.32, p=0.02$) (Table 3). These results demonstrated that the majority of severe TBI survivor subgroup with high depressive symptoms was also in the high anxiety group (79%) and low life satisfaction group (87%), while the majority of severe TBI survivor subgroup with low depressive symptoms was in the low anxiety group (89%) and high life satisfaction group (56%). The majority of severe TBI survivor subgroup with high life satisfaction was also in the low anxiety group (84%), while the nearly half of severe TBI survivor subgroup with low life satisfaction was in the high anxiety group (42%).

Predictors of Trajectory Group Membership

The bivariate association between demographics and clinical variables with distinct trajectory groups of depressive symptoms, anxiety and life satisfaction was examined (Table 4). We found that GCS was associated with depressive symptom trajectory groups at a level that reached statistical significance (Fisher's exact test $p=.04$). The severe TBI survivors with greater injury severity were more likely to belong to the high-stable depression group (odds ratio [OR]=2.83, 95% CI (1.02, 7.81), $p=.04$), the high-stable anxiety group (odds ratio [OR]=1.50, 95% CI (0.54, 4.22), $p=.43$) and were less likely to belong to high-stable life satisfaction group (odds ratio [OR]=0.45, 95% CI (1.15, 1.36), $p=.20$). We did not find statistically significant association between injury severity and anxiety and life satisfaction.

However, the direction of association between injury severity and psychosocial outcomes were very much consistent except for the magnitude of association as well as statistical significance. We found no statistically significant associations between age, gender, race, education, marital status and any distinct depression trajectory groups. Neither those demographics nor the GCS were associated with distinct trajectory group of anxiety and life satisfaction ($p>0.05$). The multivariate logistic regression models revealed similar findings as bivariate association reported in table 4.

Discussion

Group-based trajectory modeling revealed distinct patterns of emotional symptoms for severe TBI survivors over the 24 months following the injury. Some survivors display persistent high levels of depressive symptoms and anxiety throughout the 24 months of follow-up evaluation, while another group of survivors did not show the same high levels of those symptoms.

Two trajectories were identified in depressive symptoms after severe TBI in this study. One trajectory that started with low level depression scores (i.e., near the population norm mean score) at 3 months showed significant increase over time. The other trajectory was characterized by stable, high-level depression scores across time. Two trajectories were identified in anxiety after severe TBI. Most of severe TBI survivors *showed no* sign of anxiety symptoms and kept a stable level over 24 months. However, some severe TBI survivors reported high scores of anxiety that improved slightly over time. Two trajectory groups were also identified for satisfaction with life. About 50% of severe TBI survivors reported a relatively high score of satisfaction with life that did not change over time. However, the remaining half of severe TBI survivors reported lower life satisfaction scores at 3 months that first continued to decrease significantly for 12 months and then slowly improved between 12 to 24 months--- but it never achieved the level recorded at 3 months.

In this study, depressive symptoms and anxiety were assessed by the Brief Symptom Inventory-18 (BSI-18). The higher scores indicate increased depressive symptoms and anxiety. A T-score of 63 or greater on any scale corresponds to the 90th percentile in the normative population. A Depression score at or above the recommended T-score of 63 or greater was considered to reflect clinically significant depression. The Anxiety subscale was also evaluated against this clinical cut-off score.^{20,27} As such, the severe TBI survivors in the high depression trajectory group (i.e., 30% of the sample) were considered to manifest clinically significant depressive symptoms and the severe TBI survivors in the high-stable anxiety trajectory group (i.e., 31% of the sample) were also considered to show clinically significant anxiety symptoms.

We also examined relationship between different trajectories of emotional symptoms after severe TBI and found a strong pair-wise association between trajectory group membership of depressive symptoms and anxiety, depressive symptoms and life satisfaction, and anxiety and life satisfaction. These findings are consistent with previously reported studies in the literature.^{28,29} The co-occurrence of depression and anxiety is highly prevalent and it is well documented that both disorders are related to reduce functional status and quality of life.³⁰

Moreover, our findings indicate that TBI survivors with highly severe injury are more likely to report increased depressive symptoms over time compared to those with moderate injury severity. Our analysis failed to identify significant associations between other demographics with depressive symptoms, anxiety and life satisfaction in severe TBI survivors (e.g., age, gender, race, education and marital status). In the current literature,^{31,32} age, race and marital status have not been significantly related to depression following TBI. However, mixed findings have been reported in TBI population with regard to gender and education. Some studies found no relationship between gender and depression and no effects of education on depression.^{31,33,34} Others reported that women were more likely to be depressed³⁵ and the a lower education level was implicated in higher depression rate after TBI.^{36,37}

To our knowledge, few TBI survivor studies have been conducted that feature group-based trajectory modeling to estimate distinct trajectories of depressive symptoms, anxiety and life satisfaction over time. Traditional longitudinal techniques such as mixed model and GEE (Generalized Estimating Equation) models^{38,39} assume only a single common growth trajectory that can approximate an entire population. However, this assumption may not be appropriate in situations where there are multiple subgroups of distinct developmental trajectories.¹⁵

In our population of severe TBI survivors, early intervention could be targeted to those survivors who are at high risk of depression and anxiety. For example, our group-based trajectory analyses revealed a subgroup of severe TBI survivors who report clinical significant high levels of depressive symptoms and anxiety at 3 months, yet these levels exhibit no any improvement over 24 months. Therefore, this subgroup of severe TBI survivors could be targeted for early intervention. To accomplish this, clinicians can assess severe TBI survivors for depressive symptoms and anxiety upon injury and then identify those in need of early intervention especially for those more severe injured survivors who are more likely to be depressed based on our findings. These distinct trajectory groups and associated risk factor of injury severity can be used as a screening tool to identify subjects who may be at high risk of depression and anxiety over time.

It is important to consider the limitations of the current study when interpreting the results. Firstly, the small sample size in the study and small number of measurement time points may have affect estimated trajectory group shape and classes. Future studies with large sample size would contribute added information for trajectories identified as well as associated characteristics of TBI survivors. Secondly, the current sample is quite young, overwhelmingly white, and with somewhat low education. The findings from our study may not be applicable to other population. Thirdly, the data of depression, anxiety and life satisfaction were collected at 3, 6, 12 and 24 months after severe TBI. The findings from our study may be confined by the time pointes collected only and may not be representative of long-term outcomes of TBI more broadly. Fourthly, given the limitation of incomplete information of education and marital status (there were 32% and 17% missing for those two variables respectively), the association between demographics and distinct trajectory groups could not be fully investigated. Lastly, we did not collect data of income level and employment status which may be potential risk factor for depression and anxiety.

Conclusion

The group-based trajectory model featured in this study revealed patterns of emotional symptoms that have not been fully explored among severe TBI survivors. Our analysis suggested distinct trajectory patterns for depressive symptoms, anxiety and life satisfaction among severe TBI survivors. In addition, there was strong interrelationship among those emotional symptoms. Our findings may provide new knowledge that can be used to design and implement targeted interventions for emotional disorders among survivors of severe TBI.

Acknowledgments

Source of funding: Dr. Yvette Conley received NIH R01 grant “Genomic Variability and Symptomatology after Traumatic Brain Injury” (R01 NR013342-01)

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Figure 1. Trajectory of depressive symptoms from 3 months to 24 months after severe TBI (Group 1: Low-stable depressive symptoms; Group2: High-stable depressive symptoms)

Figure 2. Trajectory of anxiety from 3 months to 24 months after severe TBI (Group 1: Low-stable anxiety; Group2: High-stable anxiety)

Figure 3. Trajectory of life satisfaction from 3 months to 24 months after severe TBI (Group 1: Low-decrease-increase life satisfaction; Group2: High-stable life satisfaction)

Table 1
Patients Baseline Characteristics (N=129)

Variables	Summary Statistics
Age, Mean (SD)	33.3 (14.6)
Gender, N (%)	
Female	30 (23.3)
Male	99 (76.7)
GCS, N (%)	
Highly severe (3-4)	18 (14.0)
Moderate severe (5-8)	111 (86.0)
Race, N (%)	
Non-White	9 (7.0)
White	120 (93.0)
Education, N (%)	
<=High School	58 (65.9)
>High School	30 (34.1)
Missing	41 (31.8)
Marital Status, N (%)	
Not Married	84 (78.5)
Married	23 (21.5)
Missing	22 (17.1)

Summary of Group-Based Trajectory Analysis for Depression, Anxiety and Satisfaction with Life

Table 2

Trajectory Group	Intercept β_0 (SE)	Linear Slope β_1 (SE)	P-value	Quadratic Slope β_2 (SE)	P-value
Depressive Symptoms (Range: 1-81)					
Low-increasing	49.3 (1.00)	0.18 (0.08)	0.02	--	--
High-stable	68.2 (1.90)	0.03 (0.15)	0.87	--	--
Anxiety (Range: 1-81)					
Low-stable	45.8 (1.03)	0.05 (0.08)	0.51	--	--
High-stable	68.7 (1.91)	-0.24 (0.14)	0.10	--	--
Life Satisfaction (Range: 5-35)					
Low-decreasing-increasing	20.2 (1.57)	-0.75 (0.30)	0.01	0.02(0.01)	0.04
High-stable	25.6(1.12)	0.04 (0.07)	0.61	--	--

Table 3
Pair-wise associations between trajectory group memberships for depressive symptoms, anxiety and life satisfaction

Trajectory Group	Anxiety			Life Satisfaction		
	Low-stable		High-stable	Low-decreasing		High-stable
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Depressive Symptoms						
Low-stable	81	89.0	10	11.0	40	44.0
High-stable	8	21.0	30	79.0	33	87.0
	$\chi^2(1, N = 129) = 57.87, p < .0001$			$\chi^2(1, N = 129) = 20.07, p < .0001$		
Life Satisfaction						
Low-decreasing-increasing	42	58.0	31	42.0	--	--
High-stable	47	84.0	9	16.0	--	--
	$\chi^2(1, N = 129) = 10.32, p = .002$					

Note: The percentages reported in the table are row percentages.

Demographic and Clinical Variables by Trajectory Groups of Each Emotional Symptom

Table 4

Subjects' characteristics	Depressive Symptoms			Anxiety			Life Satisfaction		
	Low (N=91)	High (N=38)	P	Low (N=89)	High (N=38)	P	Low (N=73)	High (N=56)	P
Age, Mean±SD	32.4±15.1	35.3±13.5	0.30	33.2±15.8	33.3±11.8	0.98	34.6±13.8	31.5±15.6	0.24
Gender, N (%)			0.94			0.89			0.39
Female	21 (23.1)	9 (24.7)		21 (23.6)	9 (22.5)		19 (26.0)	11 (19.6)	
Male	70 (76.9)	29 (76.3)		68 (76.4)	31 (77.5)		54 (74.0)	45 (80.4)	
Race, N (%)			0.72			>0.99			>0.99
Non-White	6 (6.60)	3 (7.90)		6 (6.7)	3 (7.5)		5 (6.9)	4 (7.1)	
White	85 (93.4)	35 (92.1)		83 (93.3)	37 (92.5)		68 (93.1)	52 (92.9)	
Education, N (%)			0.80			0.83			0.66
≤High School	43 (65.2)	15 (68.2)		40 (66.7)	18 (64.3)		32 (64.0)	26 (68.4)	
>High School	23 (34.8)	7 (31.8)		20 (33.3)	10 (35.7)		18 (36.0)	12 (31.6)	
Marital Status, N(%)			0.29			0.68			0.27
Not Married	64 (81.0)	20 (71.4)		62 (79.5)	22 (75.9)		44 (74.6)	40 (83.3)	
Married	15 (19.0)	8 (28.6)		16 (20.5)	7 (24.1)		15 (25.4)	8 (16.7)	
GCS, N (%)			0.04			0.43			0.20
Highly severe (3-4)	9 (9.90)	9 (23.7)		11 (12.4)	7 (17.5)		13 (17.8)	5 (8.9)	
Moderate severe (5-8)	82 (90.1)	29 (76.3)		78 (87.6)	33 (82.5)		60 (82.2)	51 (91.1)	