

The Association between Demographic and Injury-Related Factors and Return to Driving following Holistic Milieu-Oriented Neurorehabilitation

Anissa Maffett, Ph.D., Pamela Klonoff, Ph.D., ABPP-CN, Spring Flores Johnson, Ph.D., Sari Roth-Roemer, Ph.D., Edward Koberstein, MSC, CCMH.

Center for Transitional Neuro-Rehabilitation, Barrow Neurological Institute, St. Joseph’s Hospital and Medical Center, Phoenix, Arizona



BACKGROUND

❖Return to driving (RTD) is a common goal of neurorehabilitation and is associated with increased community participation, better functional outcomes, greater life satisfaction, and fewer symptoms of depression (Novack et al., 2021).

❖Driving is a complex task requiring the integration of motor, sensory, and cognitive processes (Perna et al., 2021; Stolwyk et al., 2021).

❖Literature suggests approximately 32% to 78% of TBI survivors return to driving (Novack et al., 2021; Rapport, Hanks, & Bryer, 2006).

METHOD

Aim:

- 1)To explore the RTD rate in an outpatient holistic, milieu-oriented, interdisciplinary neurorehabilitation program
- 2)To investigate the demographic and injury-related factors associated with a successful RTD for survivors of brain injury

Design: Retrospective study

Participants: 178 participants in holistic, milieu-oriented, neurorehabilitation at the Center for Transitional Neuro-Rehabilitation from 2012 to 2022

Factors Investigated:

- ❖ Education
- ❖ Sex
- ❖ Race/Ethnicity
- ❖ Age at injury
- ❖ Age at admission
- ❖ Chronicity (i.e., injury-to-admission intervals)
- ❖ Injury etiology
- ❖ Length of treatment

Exclusion criteria:

- Self-discharged against medical advice
- Returned to driving prior to admission
- Premature discharge

Data Analysis:

- Chi-squared tests of association
- Independent samples t-tests

Table 1. Demographic information for overall sample

Characteristic	<i>M</i>	<i>SD</i>	Range
Age at injury	35.4	16.3	0.0–78.0
Age at admission	37.7	15.7	16.3–78.9
Education	14.5	2.6	8.0–20.0
Days in treatment	380.2	176.5	43.0–926.0
Chronicity (in days)	834.9	1469.7	16.0–8058.0

Note. *M* = mean; *SD* = standard deviation

Table 2. Demographic information for overall sample

Etiology	<i>n</i>	%
TBI	84	47.2
CVA, Aneurysm, AVM	63	35.4
Other (Tumor, Infection, Encephalopathy, Anoxia, Seizures)	31	17.4
Sex		
Female	60	33.7
Male	118	66.3
Race		
American Indian or Alaskan Native	2	1.1
Asian	9	5.1
Black of African American	4	2.2
Hispanic/Latino	32	18.0
White	117	65.7
2 or more races/ethnicities	3	1.7
Not listed	11	6.2

Note. CVA = cerebral vascular accident; AVM = arteriovenous malformation

RESULTS

Table 3. Comparison of demographic and injury-related variables based on identification of a RTD goal.

Characteristic	RTD Goal						<i>t</i>	<i>df</i>
	RTD Goal			No RTD Goal				
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>		
Age at injury	36.3	15.9	136	32.7	17.6	42	-1.26	176
Age at admission	37.9	15.8	136	37.3	15.8	42	-0.20	176
Education (in years)	14.3	2.7	135	15.1	2.5	42	1.39	175
Days in treatment	382.5	168.3	136	327.6	203.1	42	-0.32	176
Chronicity (in days)	569.8	907.9	136	1693.2	2371.3	42	3.00*	44.8

Note. **p* < .05. ***p* < .01. RTD = return to driving; *M* = mean; *SD* = standard deviation; *df* = degrees of freedom.

Table 4. Comparison of demographic and injury-related variables based on a RTD goal status at discharge

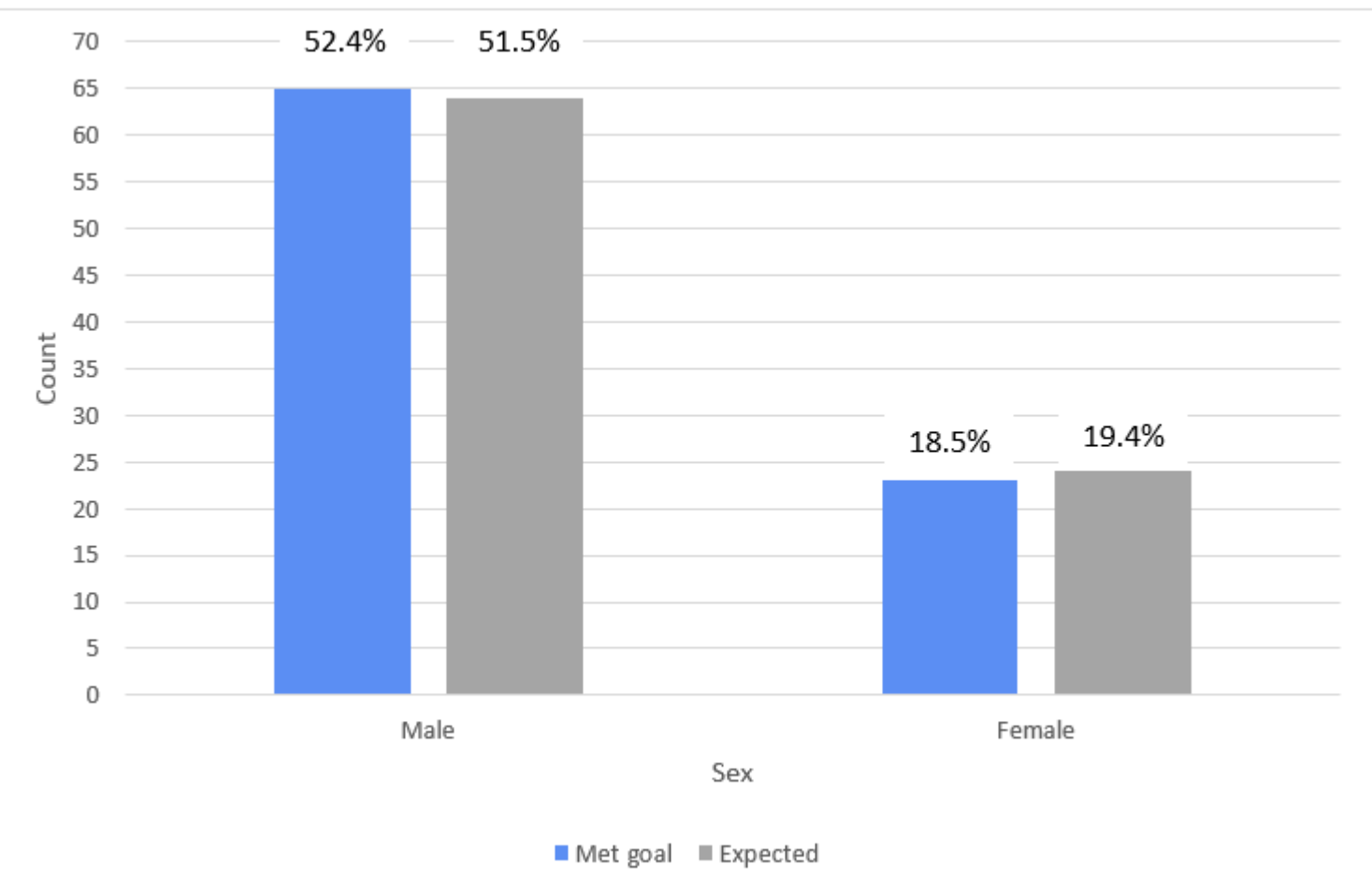
Characteristic	RTD Goal						<i>t</i>	<i>df</i>
	Goal Met			Goal Unmet				
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>		
Age at injury	36.0	15.3	88	34.2	17.6	36	-0.59	122
Age at admission	37.1	15.3	88	36.1	16.9	36	-0.34	122
Education (in years)	14.4	2.6	88	13.7	2.7	35	-1.36	121
Days in treatment	383.8	167.6	88	389.9	183.4	36	0.18	122
Chronicity (in days)	397.2	606.1	88	694.3	862.4	36	1.89	49.8

Note. **p* < .05. ***p* < .01. RTD = return to driving; *M* = mean; *SD* = standard deviation; *df* = degrees of freedom.

❖71% of individuals with a goal to RTD met their goal by discharge.

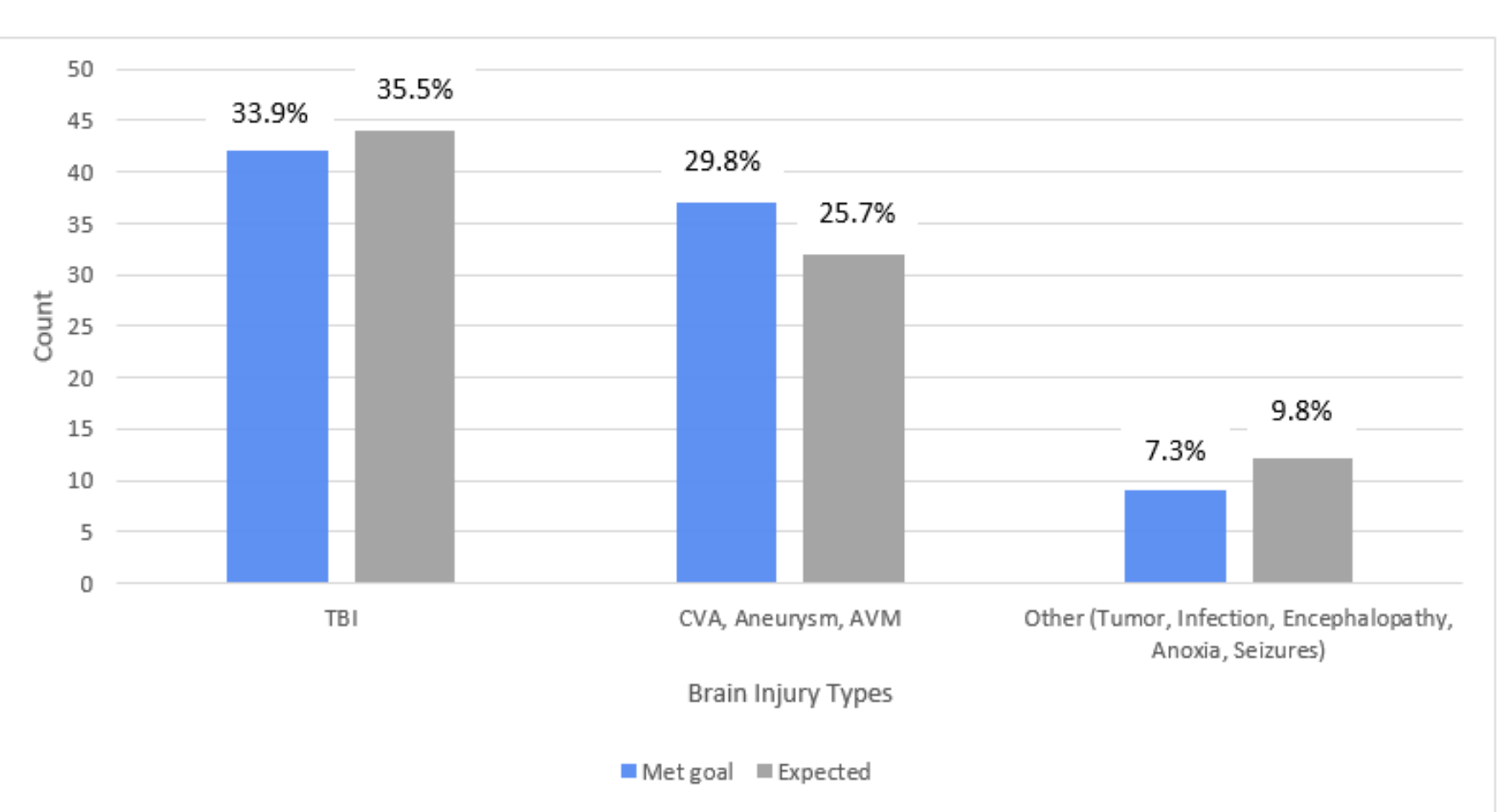
❖Individuals with longer injury chronicity injuries (i.e., injury-to-admission intervals) were statistically less likely to present with a RTD goal at admission (Table 3).

Figure 1
Return to driving status at discharge by sex



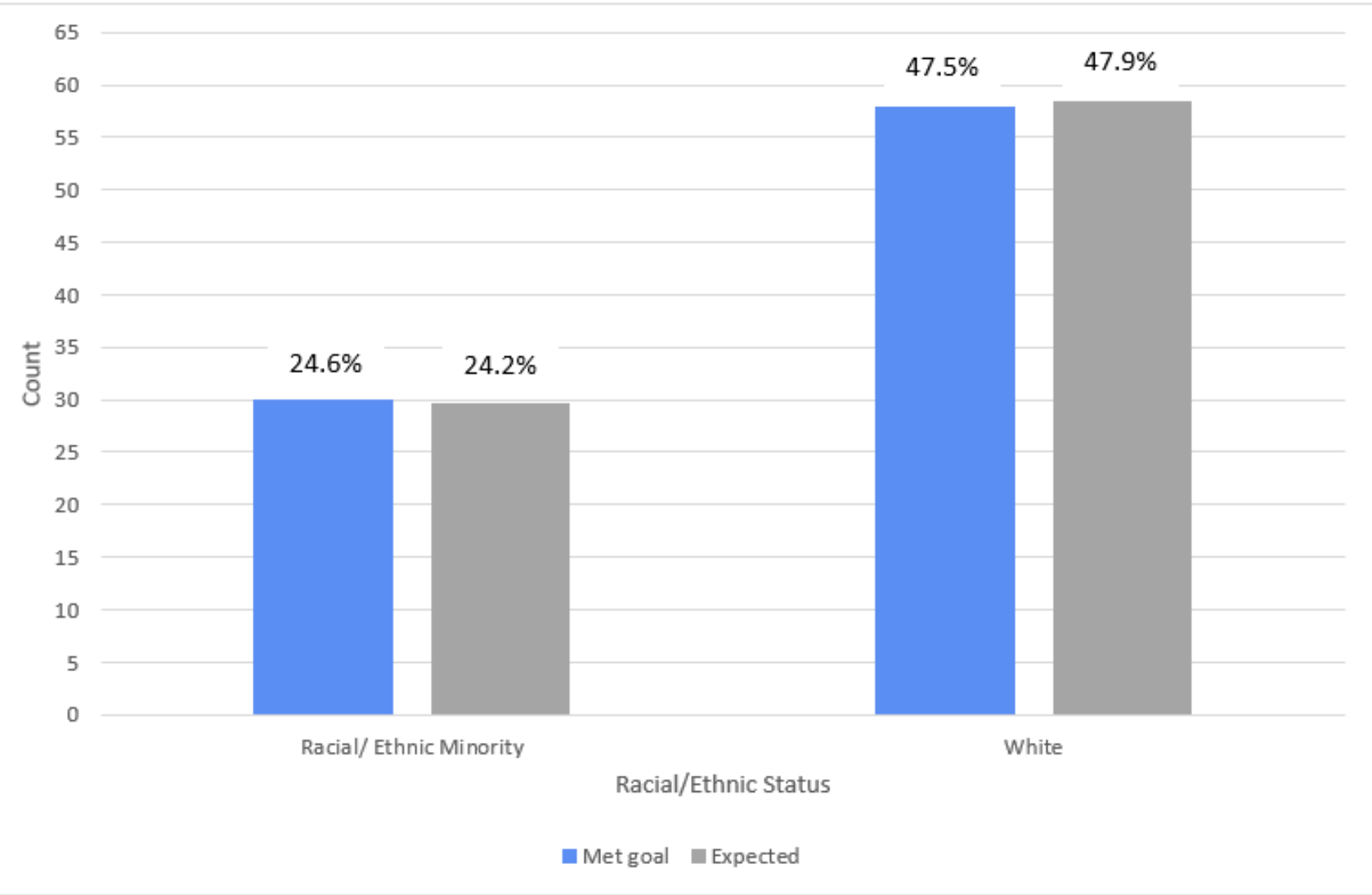
Note. *n* = 124. $\chi^2(1) = .251, p = .617$.

Figure 2
Return to driving status at discharge by injury type



Note. *n* = 124. CVA = cerebrovascular accident; AVM = arteriovenous malformation. (*p* = 0.059, Fisher's exact test)

Figure 3
Return to driving status at discharge by racial/ethnic minority status



Note. *n* = 122. $\chi^2(1) = .033, p = .855$.

❖There was no significant association between various demographic and injury-related factors and a successful RTD following intensive holistic milieu-oriented treatment.

CONCLUSIONS

❖Of the 178 participants successfully discharged, 54 (30.3%) participants did not have a RTD goal based on their driving status at admission or current medical or neurological status, leaving 124 (69.7%) participants who successfully completed the program with a reported RTD goal.

❖The majority of brain injury survivors in this sample (71%) met their goal to RTD at a rate consistent with previous literature (Novack et al., 2021; Stowyk et al., 2021).

❖The identification of a RTD goal was not associated with patients’ age at injury, education level, age at admission, and length of treatment.

❖Brain injury survivors with a longer chronicity were less likely to set a goal to RTD at admission.

❖There was no significant association between various demographic and injury-related factors and a successful RTD following intensive holistic milieu-oriented treatment.

❖Findings support that the holistic milieu-oriented treatment approach is beneficial across a wide spectrum of brain injury etiologies, demographics, and injury variables.

FUTURE RESEARCH

❖Future studies should investigate other biopsychosocial factors which may impact the decision to pursue a RTD goal or to complete a RTD goal by discharge.

❖For example, an individual’s access to a car, the ease of alternative transportation options, the feasibility of affording vehicle modifications required for a successful RTD, and considerations for the complexity of the driving environment (e.g., city/urban driving) may impact whether a RTD treatment goal is identified or pursued.

❖Future studies should investigate how premorbid driving behaviors (e.g., prior accidents, prior tickets) influence the RTD rate following neurorehabilitation.

❖Given recent evidence on average length of time to RTD (Novack et al., 2021; Perumparaichallai et al., 2020), future studies should look at outcomes at discharge and multiple follow-up intervals.

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For more information please contact, Anissa Maffett, Ph.D.,
(anissa.maffett@commonspirit.org)