

Studying Employment Following Traumatic Brain Injury

Therese M. O'Neil-Pirozzi, Sc.D., CCC-SLP, Spaulding/Partners Traumatic Brain Injury Model System at Harvard Medical School & Northeastern University; John D. Corrigan, Ph.D., Ohio Regional Traumatic Brain Injury Model System, Department of Physical Medicine and Rehabilitation, Ohio State University, Columbus, Ohio; and Flora Hammond, M.D., Carolinas Traumatic Brain Injury Rehabilitation and Research System Traumatic Brain Injury Model System, Charlotte Institute of Rehabilitation, Charlotte, North Carolina

This technical report is intended as a resource for researchers in the area of traumatic brain injury (TBI) who are interested in studying employment. While the measurement portion of this report is based on TBI Model System methodology, that methodology is the result of reviews of methods for collecting such data in healthy, TBI, and other populations. As a result, this information should be useful to researchers regardless of their involvement in the TBI Model Systems.

This report is organized into three sections:

- Research on Traumatic Brain Injury and Employment;
- Challenges Related to Studying Employment in Traumatic Brain Injury;
and
- Measurement of Employment in the TBI Model System.

The first two sections provide background information that is useful for considering the information presented in the third section.

You can download a Portable Document Format (PDF) version of the Studying Employment Issues Report.

This technical report was contributed by the Spaulding/Partners at Harvard Medical School, Ohio Regional, and Carolinas Traumatic Brain Injury Rehabilitation and Research System at Charlotte Institute of Rehabilitation TBI Model Systems. Please contact Therese M. O'Neil-Pirozzi, Sc.D., at <toneilpi@lynx.dac.neu.edu> for more information.

Research on Traumatic Brain Injury and Employment

Logically, a research report on TBI and employment should include information on employment in the general population. However, identifying resources to examine employment in the general population is challenging. Resources' systems for data collection, analysis, and reporting vary to such an extent that it can be difficult to make generalizations across multiple databases. For example, the timeframe within which resources' data is collected frequently varies. Also, there is significant variability in how

individual resources report their findings such that drawing conclusions from a single resource's database can also be difficult. For example, for some variables in a database, age-related employment data is presented for individuals 16 years and older; for other variables in the same database, the same data is presented for individuals between the ages of 21 and 64 years of age. In spite of such challenges, the U.S. Census Bureau and the U.S. Department of Labor's Bureau of Labor Statistics are two good resources for information regarding employment and nationwide employment norms in the general population. A summary of relevant employment norms for the general U.S. population, abstracted primarily from these two resources, follows (Table 1).

Table 1. Employment Norms for the General Population

Variable	Individuals (16 years and older)	Reference
<i>Total Population 18 years and over</i>	<i>209,128,094</i>	1
Population Employed	217,168,077	1
<i>Population age 21-64 years</i>	<i>159,131,544</i>	2
<i>" ", no disability</i>	<i>128,577,748</i>	2
<i>" ", employed</i>	<i>99,262,049</i>	2
Employment Continuity Per Year:		
Mean Hourly Wage Across Occupations	\$16.	3
Mean Annual Wages	\$34,020.	3
Annual Income and Benefits:		4
...Less than \$10,000.	9,790,454	
...\$10,000. to \$14,999.	6,971,175	
...\$15,000. to \$24,999.	14,036,218	
...\$25,000. to \$34,999.	13,499,899	
...\$35,000. to \$49,999.	17,193,083	
...\$50,000. to \$74,999.	20,100,827	
...\$75,000. to \$99,999.	10,489,213	
...\$100,000. to \$149,999.	8,120,571	
...\$150,000. to \$199,999.	2,343,556	
...\$200,000. or more	2,273,999	
Average Household Income	\$55,409.	4
Average Earnings	\$56,025.	4
Monthly Earnings		5
...Male Full-Time	\$2,190.	
...Female Full-Time	\$1,470.	

The consequences of a TBI on an individual's work productivity and, as a result, society at large can be devastating. In its Spring 2001 publication "Traumatic Brain Injury Facts

and Figures," the Traumatic Brain Injury Model System (TBI MS) National Data Center reported that approximately 59% of 2,553 persons who sustained a TBI were competitively employed at the time of their injury (6). Based on the same analysis of the TBI MS Database, one year post-injury, only 24% of persons who sustained a TBI were competitively employed. What happened to the others? A number of different scenarios exist. For example, following a TBI, some individuals decide not to return to work; some are unable to return to work as a result of their injury; and some attempt to return to work but are unsuccessful doing so, either in the short term or over the long term. One estimate of the annual indirect costs of TBI associated with lost productivity and wages, continued health maintenance, and long-term care was reported to be 22 billion dollars (7).

Multiple factors have been identified as prognostic indicators for successful/unsuccessful return to work following a TBI. Among these are: severity of injury (i.e., the more severe the injury, the less likely return to work is) (8-10); age at time of injury (i.e., the older the individual at time of injury, the less likely return to work is) (11, 12); and pre-injury education level and marital status (i.e., if not a high school graduate and if single, the less likely return to work is) (11-13).

Comparing norms for individuals following a TBI with those for the general population is one way to objectively measure the impact of such an injury on employment. However, the ability to make these comparisons is severely compromised because equivalent TBI norms have not been published (Table 2). Such comparisons might be one way to objectively measure the impact of such injuries on individual and societal work productivity and help justify the need for more resources and supports to counter this problem that is otherwise not likely to improve. However, significant obstacles challenge the feasibility of making these comparisons, as will be discussed in the next section of this report.

Table 2. Employment Norms for the General and TBI Populations

Variable	General Population (16 years and older)	Reference	TBI Population	Reference
<i>Total Population 18 years and over</i>	209,128,094	1	5,300,000	6
Population Employed	217,168,077	1	1,272,000	6
<i>Population age 21-64 years</i>	159,131,544	2	not reported	
<i>" ", employed</i>	99,262,049	2	" "	
Employment Continuity Per Year:			not reported	
Mean Hourly	\$16.	3		

Wage Across Occupations				
Mean Hourly Wages	\$34,020.	3		
Annual Income and Benefits:		4	not reported	
...Less than \$10,000.	9,790,454			
...\$10,000. to \$14,999.	6,971,175			
...\$15,000. to \$24,999.	14,036,218			
...\$25,000. to \$34,999.	13,499,899			
...\$35,000. to \$49,999.	17,193,083			
...\$50,000. to \$74,999.	20,100,827			
...\$75,000. to \$99,999.	10,489,213			
...\$100,000. to \$149,999.	8,120,571			
...\$150,000. to \$199,999.	2,343,556			
...\$200,000. or more	2,273,999			
Average Household Income	\$55,409.	4	not reported	
Average Earnings	\$56,025.	4	" "	
Monthly Earnings		5	" "	
...Male Full-Time	\$2,190.			
...Female Full-Time	\$1,470.			

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Challenges Related to Studying Employment in Traumatic Brain Injury

As discussed in the previous section, challenges related to studying employment are not unique to the field of TBI. Identifying resources to examine employment in the general population is also challenging. Resources' systems for data collection, analysis, and reporting vary to such an extent that it can be difficult to make generalizations across multiple databases. Also, there is significant variability in how individual resources report their findings such that drawing conclusions from a single resource's database can also be difficult.

Some of the same challenges exist in the field of TBI. That is, multiple resources have examined, and continue to examine, employment in TBI- e.g., return to work outcomes, efficacy of vocational training programs, and relationships among cognitive, physical, psycho-social, and vocational levels of function. However, data collection, analysis, and reporting methods vary across resources to such an extent that it is difficult to make generalizations across them (1, 2). Some of these methodologic differences relate to

definition of TBI and/or its' severity. Others relate to choice of/definition of predictor measures and/or outcomes. Still others relate to duration of follow-up and/or how post-injury subjects are. As a result, numerous publications regarding TBI employment exist, but comparisons with the general population as well as with other populations, in addition to within-TBI population comparisons are difficult and infrequent. TBI MS efforts to address some of these challenges will be discussed in the next section of this report.

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Measurement of Employment in the TBI Model System

The TBI MS National Dataset assesses employment to determine pre-injury status as well as status at each follow-up. In Form I, pre-injury employment information is elicited from the best available source of information during the subject's rehabilitation hospitalization. In Form II, follow-up questions of both the subject and a family member/significant other inquire about current employment status. Except for minor changes in wording reflecting the timing of some of the questions, the items used in Forms I and II are identical.

Prior to July 2001, in addition to the employment items on the Extended Glasgow Outcome Scale* (GOSE-E), the TBI MS employment questions were limited to queries regarding employment status and hours of paid competitive employment (similar to the current variables 111a and 111b, respectively, as shown below.

Based on discussions initiated by the TBI MS Functional Assessment and Community Evaluation (FACES) Committee in December 1999, a FACES sub-committee, consisting of Ruth Brannon, John Corrigan, and Therese O'Neil-Pirozzi, began researching ways to improve how the TBI MS measured employment. To be at least somewhat consistent with how employment was measured/reported by general and other population groups, as well as to allow for future comparisons between TBI MS employment data and data collected by these other groups, this FACES sub-committee consulted with Susanne Bruyere and Andrew Houtenville of the Rehabilitation Research and Training Center for Economic Research on Employment Policy for People with Disabilities at Cornell University and conducted other independent research investigating ways to measure employment. As a result of these efforts, beginning in July 2001, in addition to the employment items on the GOS-E, the TBI MS employment questions in Form I consisted of the following:

VARIABLE 111a. EMPLOYMENT STATUS

"Before the injury what was your employment status?"

Primary:

Secondary:

Data Entry Options:

- | | |
|---|------------------------------------|
| -Full time student | -Volunteer |
| -Part time student | -Retired (disability) |
| -Special education | -Unemployed (not looking for work) |
| -Competitively Employed | -Hospitalized (no pay) |
| -Taking care of house/family | -Retired (other) |
| -Special Employed/Sheltered
Workshop/Job Coach | -Other |
| -Retired (age) | -No secondary employment |
| -Unemployed (looking) | -Unknown |

VARIABLE 111b. HOURS/WEEKS PAID COMPETITIVE EMPLOYMENT

"What was the average number of hours you worked in the month before the injury?"

VARIABLE 111d. WEEKS EMPLOYED IN PAID COMPETITIVE EMPLOYMENT

"In the year before your injury, how many weeks were you competitively employed?"

VARIABLE 111f. NUMBER OF EMPLOYERS

"In the year before your injury, for how many different employers were you competitively employed?"

VARIABLE 111g. NUMBER OF TIMES LEFT A JOB

"In the year before your injury, how many times did you quit or resign, get laid off, or get fired?"

VARIABLE 111h. HOURLY WAGE

"What is your best estimate of your hourly wage for your main job in the month prior to the injury?"

VARIABLE 111i. ANNUAL EARNINGS OF PERSON

"What is your best estimate of your total annual salary from all jobs for the year prior to the injury?"

- | | |
|-------------------------------|-----------------------|
| 01=\$9,999 or less (employed) | 08=\$70,000-\$79,000 |
| 02=\$10,000-\$19,999 | 09=\$80,000-\$89,000 |
| 03=\$20,000-\$29,999 | 10=\$90,000-\$99,000 |
| 04=\$30,000-\$39,999 | 11=\$1000,000 or more |
| 05=\$40,000-\$49,999 | 77=Refused |
| 06=\$50,000-\$59,000 | 88=N/A, not employed |
| 07=\$60,000-\$69,999 | 99=Unknown |

VARIABLE 112. CENSUS OCCUPATIONAL CATEGORY

01=Exec/Admin/Manager	09=Farming/Forestry/Fishing
02=Professional Specialty	10=Precision Production/Craft/Repair
03=Technician/Support	11=Machine Operator/Assembler/Inspector
04=Sales	12=Transportation/Material Moving
05=Admin Support/Clerical	13=Handler/Equip Clean/Helper/Laborer
06=Private Household	14=Military
07=Protective Service	88=N/A
08=Service other	99=Unknown

The TBI MS employment questions in Form II consisted of the GOS-E employment items and parallel versions of the above Form I questions, with minor changes in wording reflecting the timing of the questions. Two additional employment questions were asked at follow-up visits as follows:

VARIABLE 211c: DATE OF FIRST COMPETITIVE EMPLOYMENT

- At one year follow-up: "When did you begin competitive employment following your injury?"
- At all other follow-ups: "When did you begin competitive employment following your injury?"- asked at all follow-up visits until the individual reported having resumed competitive employment

VARIABLE 211e: EMPLOYMENT CONTINUITY

- At one year follow-up: "Is your current primary employer also who was your primary employer before your injury?"
- At all other follow-ups: "Is your current primary employer also who your primary employer was at the time of your last follow-up?"

In December 2002, in an effort to streamline the entire TBI MS Dataset and make data collection more efficient, a TBI MS group decision was made to delete variables across categories, including Employment. Alternately, TBI MS researchers may pose specific research hypotheses and therefore investigate deleted variables as part of study-specific methodologies using the TBI MS National Dataset. In addition to the employment items on the GOS-E, the Employment variables that remain are as follows:

VARIABLE 111a. EMPLOYMENT STATUS

VARIABLE 111b. HOURS/WEEKS PAID COMPETITIVE EMPLOYMENT

VARIABLE 111d. WEEKS EMPLOYED IN PAID DCOMPETITIVE EMPLOYMENT

VARIABLE 111i. ANNUAL EARNINGS OF PERSON

VARIABLE 112. CENSUS OCCUPATIONAL CATEGORY

In addition to the GOS-E employment items, the TBI MS employment questions in Form II consist of parallel versions of the above Form I questions, with the target timeframe of the questions as follows:

VARIABLE 211a. 1 month prior to the follow-up interview

VARIABLE 211b. 1 month prior to the follow-up interview

VARIABLE 211c. no timeframe; discontinued after follow-up during which individual reports beginning competitive employment following injury

VARIABLE 211d. 1 year prior to the follow-up interview

VARIABLE 211i. calculated at the rate reported at the time of the follow-up interview

VARIABLE 212. 1 month prior to the follow-up interview

The TBI MS has long-standing commitments to study employment following TBI and improve employment-related outcomes of individuals following such injuries. As supported by this technical report and the TBI MS employment-related publications listed at the end of this document, the TBI MS continues its on-going journey of discovery-asking the right questions, getting relevant answers, and sharing that information with others.

*Information about the Extended Glasgow Outcome Scale (GOS-E) may be found at The TBI Model System Center for Outcome Measurement In Brain Injury (COMBI) website at <http://www.tbims.org/combi/gose/index.html>.

Acknowledgements: Thank you to Neeta Gupta and Lindsey Lambert, Northeastern University Speech-Language Pathology and Audiology undergraduate majors for their contributions regarding the information presented in Tables 1 and 2.

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*For more information about these publications and/or to locate others, please go to the Traumatic Brain Injury Model Systems National Data Center website at <www.TBINDC.org> and click on "The TBI Research and Publications Registry."