In determining the number of participants to recruit for a study, an investigator considers many factors, such as the amount of time and money available for the study or the prevalence of disease or disorder of interest. Expensive research protocols or rare disorders may lead to small samples. More informally, the final sample size in some studies is determined when a grant ends, when a paper is due, or when the investigator loses interest in the study. In other cases, researchers may employ general “rules of thumb” to determine sample size. For example, Currier (1984) recommends a minimum of 15 participants per group in experimental studies involving group comparisons.

Although the practicalities of time, money, and study feasibility cannot be ignored, formal sample size calculations (also known as a “power analysis”) need to be conducted prior to the initiation of every study to preclude waste of resources. Statistical power is the capacity to detect a treatment difference or association when one is actually present. Sample size acts as a statistical “microscope” with regard to power. That is, when a sample size is small, the study may lack sufficient power to detect a treatment difference even when one is present – much like using a toy microscope to try to see tiny micro-organisms. It is better to know upfront if a proposed study will require an unachievably large sample to detect a treatment difference than to go ahead with the study that will yield murky results at best. In their discussion of under-powered studies, Halper, Karlawish, and Berlin (2002) have argued, “Because such studies may not adequately test the underlying hypotheses, they have been considered scientifically useless and therefore unethical in their exposure of participants to the risks and burdens of human research” (p. 358). On the other hand, a large sample is like an electron microscope in the sense that almost any treatment difference can appear to be large and important. Therein lies the challenge in power analysis: we want our sample to be large enough to determine if a new treatment is working but not so large as to inflate the importance of a trivial intervention. In addition, all research carries some risk to participants.

A COMBI Primer

The Center for Outcome Measurement in Brain Injury (COMBI) is an online resource center cataloguing information on brain injury outcome and assessment scales. The COMBI is funded by the National Institute on Disability and Rehabilitation Research (NIDRR) and is a collaborative project of eleven TBI Model System Projects. Information on the COMBI is available free of charge.

Currently, the COMBI contains information on 22 outcome or assessment scales. Materials available include scale syllabi, administration and scoring guidelines, training and testing materials, information on scale properties, references, scale forums, and frequently asked questions (FAQs). Rating forms for most of the measures are also available for downloading. COMBI users have the advantage of instant access to the materials they want.
We enter these parameter estimates into the follow-

ance effects and score variation (Halper et al., 2002; Hulley et al., 2001): (a) consult the research 

In order to do the power analysis, the investigator 

What Do I Do? 

In most cases, the power analysis needs to be done 

Where I Do Get the Parameter Estimates? 

There are several sources of information on which to base your estimates of treatment 

What if the Power Analysis Tells Me That I Need More 

Participants Than I Can Recruit? 

In most cases, the power analysis needs to be done 

What if the Power Analysis Tells Me That I Need More 

Participants Than I Can Recruit? 

In most cases, the power analysis needs to be done 

Other Considerations 

We typically think of performing a power analysis for studies that assess the effectiveness 

References 

Currier DP. Elements of research in physical therapy. 2nd ed. Baltimore: Williams and Wilkins, 

Halper SD, Kaelawish JHT, Berlin JA. The continuing unethical conduct of underpowered 


Hulley SB, Cummings SR, Browner WS, Grady D, Hearst N, Newman TB. Designing clinical 


We thought, because we had power we had wisdom. 

Stephen Vincent Benet (1898-1943) 

Let not thy will roar, when they power can but whisper. 

Thomas Fuller (1654-1734) 

I have found power in the mysteries of thought. 

Euripides (484-406 BC)
NEW on the COMBI

Technical Report on Substance Use

Problematic Substance Use Identified in the TBI Model Systems Dataset

John D. Corrigan, PhD; Jennifer Bogner, PhD; Gary Lamb-Hart, MDiv; and Niccole Sivak Spears, MS
Ohio Valley Center for Brain Injury Prevention and Rehabilitation, Department of Physical Medicine and Rehabilitation, Ohio State University

This technical report is intended as a resource to researchers in traumatic brain injury (TBI) who are studying substance use disorders or would like to include a measure of this construct in the data they are collecting. While the measurement portions of this review are based on the TBI Model Systems methodology, that method is in turn based on the most widely used surveys of substance use in the general population—the National Household Survey on Drug Abuse (Substance Abuse and Mental Health Services Administration, 1998) and the Behavioral Risk Factors Surveillance System (Centers for Disease Control and Prevention, 1998). Thus, this information should be useful to researchers regardless of whether they are involved in the TBI Model Systems.

This report is organized into three sections:

• Research on Traumatic Brain Injury and Substance Abuse;
• Defining Problematic Use of Alcohol and Other Drugs; and
• Measurement of Substance Use in the TBI Model System.

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

MPAI Version 4 Now Available

The Mayo-Portland Adaptability Inventory (MPAI) was primarily designed to assist in the clinical evaluation of people during the postacute (post-hospital) period following acquired brain injury (ABI) and to assist in the evaluation of rehabilitation programs designed to serve these people.

MPAI-4 items represent the range of physical, cognitive, emotional, behavioral, and social problems that people may encounter after ABI. MPAI-4 items also provide an assessment of major obstacles to community integration which may result directly from ABI as well as features of the social and physical environment.

Now in its fourth revision, the MPAI-4 and its three subscales (Ability Index, Adjustment Index, Participation Index) offer measures with highly developed and well documented properties. These measures may be effectively employed in research applications as well as in clinical settings. The brief 8-item Participation Index may serve as a particularly useful measure of the final common aim, societal participation, of rehabilitation or other intervention efforts.

Throughout its development, the MPAI has been designed for possible completion by professional staff, people with ABI and their significant others. Recent research establishes the reliability of completion by these various rater groups and also documents characteristic biases of each. The MPAI-4 offers the possibility for combining results of the inventory completed by two or three rater groups to provide a potentially more reliable and representative measurement.

LOG FILES 101

Did you know that every time you access a web page, a record of what you did is created? These records, called log files, give webmasters a lot of information about you and what you looked at on the site. We use the log files to assess how the COMBI is being used.

The Stats

In the last twelve months (December 02 – November 03) the COMBI has logged in 131,500 visitors. That’s over 360 users a day! During this period 528,036 pages of information were reviewed (that’s 5,477 megabytes of data).

The COMBI logs show that 88% of our users are within the United States and 12% are from 62 other countries. The COMBI is especially popular in Canada, the United Kingdom, Australia, Italy, and Japan. Our biggest referrals come from Google, Yahoo, MSN, AOL, and stroke-site.org.

The COMBI newsletter, Outcome Oriented, is primarily disseminated in Portable Document Format (PDF) from the website. Over the last twelve months, 9,570 newsletters were downloaded by COMBI users.

The COMBI continues to be very successful as a dissemination effort. In the past twelve months over 33,000 rating forms were downloaded. Itemized scale activity is summarized in the table below.

But please, no wagering.

Scale Activity (Number of Visitors & Downloads)
December 2002 to November 2003

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Future Directions

This is the second Outcome Oriented newsletter for this funding cycle (2002-2007). We are updating materials for all of our current measures. We are also working with the University of Washington TBIMS to bring you the EuroQol.

We are looking to add more training and testing materials for COMBI measures, and to make the existing materials more interactive (automatic email of results from testing exercises).

Please email us at <combi@tbi-sci.org> with your thoughts and suggestions. Let us know how we measure up! Thank you for allowing us to be your brain injury outcome measure resource!

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Outcome Oriented is a project of the Center for Outcome Measurement in Brain Injury (COMBI) which is funded by the U.S. Department of Education, Office of Special Education and Rehabilitative Services, National Institute on Disability and Rehabilitation Research. The contents of this newsletter were developed under a grant from the Department of Education. However those contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the Federal government.

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This document is available online at:
<www.tbims.org/combi/combinews.html>

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The COMBI is a collaborative project of eleven brain injury centers located across the US. Without the expertise of these centers this project would not be possible. We would like to offer special recognition to the individuals at these facilities who have taken the time to prepare materials for the COMBI and act as contacts:

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UPDATE
Center for Outcome Measurement in Brain Injury (COMBI)
<www.tbims.org/combi>

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