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Evaluation of Psychological Recovery in Patients with Major Medical Illnesses

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EVALUATION OF PSYCHOLOGICAL RECOVERY IN PATIENTS
WITH MAJOR MEDICAL ILLNESSES

by

Kelly M. James

A dissertation submitted to the faculty of

Brigham Young University

in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

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ABSTRACT

EVALUATION OF PSYCHOLOGICAL RECOVERY IN PATIENTS WITH MAJOR MEDICAL ILLNESSES

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Doctor of Philosophy

The OQ-45.2 (Outcome Questionnaire-45.2) is a measure of psychological distress that examines patients' emotional states and level of functioning in society. This measure was administered at admission and discharge to inpatients at a level II trauma center with in- and outpatient populations in addition to the BBHI-2 (Brief Battery for Health Improvement-2) and FIM (Functional Independence Measure). Results suggested that patients demonstrated psychological improvements from admission to discharge. In addition, the OQ-45.2 was found to correlate with nearly all subtests of the BBHI-2. Finally, diagnosis, length of stay, and number of psychotherapy sessions were not predictive of improvements on the OQ-45.2 total score, suggesting that this measure can be appropriately used on a heterogeneous medical population.

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CHAPTER ONE

INTRODUCTION

Recovery and change are common to both mental and medical health (Duncan, et al., 1994; Lambert & Ogles, 2004). Lambert and Ogles (2004) report that change is an essential concept in psychotherapy and counseling. They state that not only should clients be different as a result of their interaction with their therapist, but that these differences should be beneficial. In addition, it is not enough that as therapists, we believe that our clients are changing in positive ways, but that this change should be a measurable phenomenon.

The idea of recovery and change is fundamental to the field of physical medicine and rehabilitation. Recovery and healing are underlying expectations of physical medicine, whether the patient is being seen by a physician, or is receiving surgical care, nursing care, physical therapy, occupational therapy, speech therapy, or any other aspect of medical treatment in acute care or rehabilitation. These physical changes are measurable in more overt ways than are the changes in mental health treatment. Imaging procedures such as structural and functional MRI, CT, and x-ray are used to examine healing of the brain, bones, and other internal organs (Nair, Fuchs, Burkart, Steinberg, & Kelso, 2005). Recovery from deep lacerations, burns and more superficial cuts and scrapes are more easily observable as the skin regenerates (Khodr, Howard, Watson, & Khalil, 2003).

Patients with major medical illnesses requiring physical rehabilitation prior to being discharged from the hospital often suffer from poor mental health in addition to their physical injuries. For example, depression and post-traumatic stress disorder (PTSD) are two of the most common mental illnesses that commonly co-occur with medical illness (Bryant, Marosszeky, Crooks, & Gurka, 2000; Feighner, Robins, Guze, et al., 1972). These psychological difficulties

can and should be addressed by rehabilitation professionals (Küchler & Wood-Dauphinée, 1991; O'Connor, Cano, Thompson, & Playford, 2005; Proctor, Wade, Woodward, Pendleton, et al., 2008). While the Functional Independence Measure (FIM) is commonly used in physical rehabilitation, it is a clinician-rated measure of physical recovery and lacks a psychological component. Given the connection between physical and mental health, a self-report measure of psychological functioning would likely be a useful component of a physical rehabilitation program, and indeed such measures are increasingly being used (Guyatt, Feeny, & Patrick, 1993).

This study primarily attempts to demonstrate psychological improvement over the course of physical rehabilitation as measured by the Outcome Questionnaire-45.2 (OQ-45.2) (Lambert, Morton, Hatfield, Harmon, Hamilton, Reid, et al., 2004) and the Brief Battery for Health Improvement-2 (BBHI-2) (Disorbio & Bruns, 2002), but also investigates intercorrelations between the measures and whether variables such as diagnosis, length of stay, and number of psychotherapy sessions predict psychological improvement. While the BBHI-2 has been used with a medical population, the OQ-45.2 is primarily used in psychotherapy for psychological problems. By administering both measures, this study provides evidence for use of the OQ-45.2 as an appropriate measure of psychological distress for an inpatient physical rehabilitation population.

CHAPTER TWO

LITERATURE REVIEW

Outcome Questionnaire-45.2 (OQ-45.2)

The OQ-45.2 is a revised version of the original OQ-45 which was designed to measure psychological distress relating to outcome in a way that is short, quick, cost effective, and sensitive to change over short periods of time (e.g., weekly). This self-report measure is comprised of 45 items which are scored on a 5 point Likert scale with a range of 0 to 180 (higher score indicates higher level of distress). In order to minimize response bias and capture psychological health, nine of the items are reverse scored. The questionnaire has three levels of usage: 1) Measurement of current level of distress; 2) Measurement of outcome or ongoing treatment response, to be administered before and after treatment intervention; and 3) Improvement of quality of patient care by accompanying computer decision support tools. The OQ-45.2 is designed to be used with patients ranging in age from 17 through 80 (Lambert et al., 2004). It has become one of the most commonly used outcome measures in this field (Hatfield & Ogles, 2004).

The 45 items in the OQ-45.2 yield three subscales or domains: 1) subjective discomfort, 2) interpersonal relationships, and 3) social role performance. These scales were developed in order to examine changes in patients' emotional states as well as their level of functioning in society (Lambert et al., 2004). The three scales combine into a total score, which appears to be a valid unitary construct based on confirmatory factor analysis (Mueller, Lambert, & Burlingame, 1998). However, according to the authors, the three domains can be used by the practicing clinician to examine additional useful information above and beyond the total score.

Reliability and validity of the questionnaire has been extensively tested (Lambert, Burlingame, Umphress, Hansen, Vermeersch, Clouse, et al., 1996; Lambert et al., 2004; Mueller et al., 1998; Umphress, Lambert, Smart, Barlow, & Clouse, 1997; Vermeersch, Lambert, & Burlingame, 2000; Vermeersch, Whipple, Lambert, Hawkins, Burchfield, & Okiishi, 2004). The original OQ developed in 1996 demonstrated test-retest reliabilities ranging from .78 to .84, internal consistency ranging from .70 to .93, and high concurrent validity with other measures of symptomatic distress. The measure has also been shown to distinguish between patients being treated for psychological disorders and non-patients, with patient samples scoring significantly higher (Lambert et al., 2004).

In addition to reliability and validity, the OQ-45.2 also incorporated the concept of clinically significant change (Jacobson & Truax, 1991). This refers to the idea that statistically significant change in large treatment samples may not be representative of change for the individual case. The OQ-45.2 uses the Jacobson and Truax formulas to create a cut-off score (between 63 and 64) that differentiates normal and abnormal functioning as well as cut off score for reliable change (14 points). Clinically significant change (recovery) occurs when both criterion are met.

Rehabilitation Outcome Measures

Physical rehabilitation is quite diverse, ranging from general hospital rehabilitation to specialized rehabilitation for stroke, traumatic brain injury (TBI), anoxic brain injury (ABI), spinal cord injury (SCI), amputation, cardiac problems, complex regional pain syndrome, and blind/low vision (Babcock-Parziale & Williams, 2006; Burke, Shah, Dorvlo, & Al-Adawi, 2005; Ditunno, Burns, & Marino, 2005; English, Hillier, Stiller, & Warden-Flood, 2006; Hagberg, Brånemark, & Hägg, 2004; Hevey, McGee, & Horgan, 2004; Schasfoort, Bussmann, & Stam,

2000; Sopena, Dewar, Nannery, Teasdale, & Wilson, 2007). In each of these areas professionals utilize a variety of outcome measures to assess recovery or level of debility. Several reviews have been conducted to ascertain which measures are being used in rehabilitation facilities around the world.

In 2005, Scheuringer, Grill, Boldt, Mittrach, Müllner, and Stucky identified 277 formal assessment instruments and 351 single clinical measures used internationally. They listed the most frequently used formal instruments as the Functional Independence Measure (FIM), the Barthel Activities of Daily Living Index (BI), the Glasgow Coma Scale (GCS), and the Mini Mental State (MMS). Similar results were found in 2006 when Skinner and Turner-Stokes reported that in the United Kingdom, the BI and the FIM with or without the Functional Assessment Measure (FAM) were the most popular outcome measures.

In 2007, Schepers, Ketelaar, Van De Port, Visser-Meily, and Lindeman conducted a review of outcome measures in the context of the World Health Organization (WHO) International Classification of Functioning, Disability and Health (ICF) which was published in 2001 and uses a biopsychosocial approach. It was designed to deal with functioning and disabilities as well as contextual and environmental factors. They examined 15 instruments, including the BI and the FIM and found that most of the instruments contained constructs that could be linked to the ICF, particularly to mobility.

Functional Independence Measure (FIM). The FIM was developed by the American Academy of Physical Medicine and Rehabilitation and the American Congress for Rehabilitation Medicine as a universal assessment tool in the Uniform Data System for Medical Rehabilitation (Kidd, Stewart, Baldry, & Johnson, 1995). It is an observer-rated instrument designed to assess functional independence. The measure is comprised of 18 items in both motor and cognitive

domains. The motor domain consists of six items relating to self-care, two items relating to sphincter control, three items relating to mobility, and two items relating to locomotion. The cognitive domain consists of two items relating to communication and three items relating to social cognition. Each item is rated on 7 levels of dependence/independence ranging from total assistance to complete independence (see Appendix A). The FIM is one of the most widely used formal assessment instruments in rehabilitation (Scheuringer et al., 2005) and is currently being implemented at UVRMC.

The BI is 10-item questionnaire that measures disability in basic personal activities of daily living such as toileting and ambulation (Collin, Wade, Davies, & Horne, 1988). The GCS is a neurological scale originally developed in Glasgow, Scotland in 1974 to assist in predicting survival and recovery post head injury. It measures the degree of unconsciousness in eye opening, verbal response, and motor response. Scores range from 3 (deep coma) to 15 (fully alert and oriented) (Fischer & Mathieson, 2001). The MMS is a short (11 questions) and quick (5-10 minute) form developed and standardized for repeated testing of patients' cognitive mental state (Folstein, Folstein, & McHugh, 1975).

It should be noted that the majority of the frequently used measures focus on physical ability or debility (e.g., continence, mobility, grooming, etc.). Although less frequently utilized, there are a number of measures that are specifically focused on mental and psychological well-being. In the area of cardiac rehabilitation there are several questionnaires including the Cardiac Depression Scale (CDS), the Heart Patients Psychological Questionnaire (HPPQ) (Hevey et al., 2004), and the Global Mood Scale (Denollet, 1993). For medical patients in general, the Hospital Anxiety and Depression Scale (HADS) is widely used. This measure consists of 14 items designed to detect anxiety and depression in medical outpatients (Zigmond & Snaith,

1983). It has been used with cardiac patients (Hevey et al.), spinal cord injuries (Berry & Kennedy, 2002), stroke or hip fracture (Ryan, Enderby, & Rigby, 2006), and TBI (Stilwell, Stilwell, Hawley, & Davies, 1998).

Relationship between Physical and Mental Health

While physical medicine and mental health share the common goal of recovery, change, and healing, they have a more complicated relationship and often co-occur (Sherbourne, Jackson, Meredith, Camp, & Wells, 1996; Strain, 1979; Wise & Rouchell, 1990). Depression may actually be the first manifestation of certain physical illnesses, including multiple sclerosis, Huntington's disease, Parkinson's disease, Cushing's disease, human immunodeficiency virus (HIV) encephalopathy, and systemic lupus (Cassem, 1990). Having a medical illness appears to increase the likelihood of suffering from a mental illness in general. Wells, Golding, and Burnam (1988) conducted a large scale study using participants from the National Institute of Mental Health (NIMH) Epidemiologic Catchment Area Program in the Los Angeles area and found that "there was a 41% increase in the relative risk of having any recent psychiatric disorder as a function of having a chronic medical disease" (p. 979). Depression specifically has been known to occur secondary to medical illness (Feighner, et al., 1972). Development of post-traumatic stress disorder (PTSD) has been linked to severe traumatic brain injury (TBI) (Bryant, et al., 2000) as well as a number of other physical illnesses and treatments including cardiac surgery, myocardial infarction (MI), childbirth, stroke, intensive care treatment, awareness under anesthesia, and HIV infection (Tedstone & TARRIER, 2003). Medical illnesses such as myocardial infarction can also contribute to a poor clinical prognosis of depression (Wells, Rogers, Burnam, & Camp, 1993).

Preexisting mental illnesses have also been shown to contribute to the development of medical illnesses. For example, Harter, Conway, and Merikangas (2003) found that patients who reported a lifetime anxiety disorder also reported higher rates of medical illness than those without anxiety disorders. They noted a specific pattern of hypertension, cardiac disorders, genitourinary difficulties, gastrointestinal problems, and migraine associated with anxiety disorders. Rogers and colleagues (1994) also found an increase in medical illness in patients with anxiety disorders. They specifically found that patients who suffered from panic disorder were most at risk for developing ulcer disease, thyroid disease, and angina.

Patients suffering from medical illnesses such as TBI, stroke, tumor, and other orthopedic injuries often undergo physical rehabilitation before returning home from the hospital (Brosseau, Philippe, Potvin, & Boulanger, 1996; Pietrapiana, Bronzino, Perino, & Rago, 1997). Throughout the course of rehabilitation, the patients are attended to by professionals that include nurses, physical therapists, occupational therapists, and speech therapists, among others (Wolfson, 2000). These professionals work together to maximize the patients' physical recovery, which is commonly measured using the Functional Independence Measure (FIM) (Kidd et al., 1995).

Even in physical rehabilitation mental and physical health are closely related. One important component to physical recovery is patient motivation or expectations, which plays a very important role in deciding the outcome of physical therapy (Lau-Walker, 2004; Maclean & Pound, 2000). In order to maximize patient recovery, it is necessary that rehabilitation professionals address their patients' psychological state, including their motivation and their expectations.

Other aspects of psychological and psychosocial status including depression, anxiety, and denial can also be addressed by these professionals (Küchler & Wood-Dauphinée, 1991). It is

possible that this attention to mental health during physical rehabilitation results in psychological improvement concurrent with physical improvement. In fact, O'Connor and colleagues (2005) reported that “. . . inpatient rehabilitation has been shown to improve psychological functioning. . .” (p. 814). In addition to a number of measures previously discussed, the Brief Battery for Health Improvement-2 (BBHI-2) has been designed to screen patients for a number of psychosocial factors that could complicate a medical condition or delay recovery (Disorbio & Bruns, 2002).

Brief Battery for Health Improvement-2 (BBHI-2). The BBHI-2 is a short form of the Battery for Health Improvement-2 (BHI-2) which was designed to screen patients for various psychosocial factors that could complicate a medical condition or delay recovery. It also serves to track progress in treatment as well as outcome by repeatedly measuring variables such as pain and functioning. The first prototype of the BHI was developed in 1985 and subsequently led to the development of a research version (BHI-R), the original BHI, the BHI-2 and the BBHI-2. The family of BHI tests was developed and normed on two large groups of patient and community samples using eight reference groups in order to compare an individual's scores to a patient of the same diagnosis (Disorbio & Bruns, 2002).

The BBHI-2 is self-report and contains 63 items which comprise the following scales: Defensiveness, Somatic Complaints, Pain Complaints, Functional Complaints, Depression, and Anxiety. The Defensiveness scale assesses how much personal information a patient is willing to disclose and whether he or she is trying to portray him- or herself in a positive or negative light. The Somatic Complaints scale assesses somatic symptoms, medically as well as psychologically, and can be used to help detect symptom magnification. The Pain Complaints scale is used to standardize the assessment of patient pain across 10 areas of the body. The

Functional Complaints scale was designed to measure a patient's perceptions of handicaps and physical disabilities. The Depression scale helps to assess characteristics of depression such as feelings of helplessness. The Anxiety scale helps to assess characteristics of anxiety such as excessive worrying. In addition, the BBHI-2 assesses a variety of risk factors through 17 critical items which include items relating to sleep disorder, vegetative depression, and anxiety/panic (Disorbio & Bruns, 2002).

Factors Potentially Impacting Mental Health in Physical Rehabilitation

Patients admitted to UVRMC Physical Medicine and Rehabilitation are quite heterogeneous. They differ on qualities such as gender, age, diagnosis, length of stay, and number of therapy sessions (PT, OT, speech, psychotherapy). For example, although gender of patients is almost equal, males are slightly more represented than females. In addition, the majority of patients are over the age of 75 (nearly 40%), with less than 25% between 65 and 74, less than 25% between 45 and 64, and approximately 15% under the age of 45. If physical rehabilitation is resulting in an improvement in mental as well as physical health, it is important to understand the impact of these heterogeneous variables on mental health.

Diagnosis. Patients with different diagnoses may be more or less likely to experience certain mental health difficulties such as depression or anxiety, as was previously discussed. For example, TBI has been associated with PTSD (Bryant et al., 2000) and depression is quite common among patients who have suffered a stroke (Caeiro, Ferro, Santos, & Figueira, 2006). According to UVRMC internal program evaluations for 2008, the most frequently occurring diagnosis of patients who go through inpatient rehabilitation is stroke, at just under 30% in 2008. This is followed by multiple trauma - brain and spinal cord injury (~10%), traumatic brain injury (~7%), and other neurological injury (~7%).

Length of stay and number of inpatient therapy sessions. Length of stay in rehabilitation has been shown to have an impact on discharge outcome (Tooth, McKenna, & Geraghty, 2003). Spivack and colleagues (1992) found that brain injured patients with a longer length of stay made more progress across outcome variables. In addition, the authors reported that intensity of treatment also resulted in more progress and in fact interacted with length of stay in predicting outcome. Another study noted a dose-response relationship between therapy and outcome (Nugent, Schurr, & Adams, 1994). Length of stay and amount or intensity of therapy are intimately related, since the longer a patient is in rehabilitation, the more treatment they will receive. According to the 2007 report, the average length of stay in the UVRMC inpatient rehabilitation is approximately two weeks. In order to qualify for rehabilitation, the patient must be able to tolerate three hours of therapy (physical, occupational, and speech) per day.

Number of psychotherapy sessions. Previous research has estimated a psychotherapy dose-response relationship. One early study suggested that approximately 50% of patients improve after 8 weekly therapy sessions and 75% after 26 sessions (Howard, Kopta, Krause, & Orlinsky, 1986). More recent exploration into this relationship suggests that these numbers somewhat overestimate the speed of recovery and suggest that approximately 50% of patients needed 13 sessions instead of 8, and 75% of patients required more than 50 instead of the estimated 26 (Anderson & Lambert, 2001; Kadera, Lambert, & Andrews, 1996).

As part of the physical medicine and rehabilitation package, patients at UVRMC receive a visit from a psychologist on staff. Based on the information gleaned from that meeting, the psychologist may not visit the patient again, or may visit him or her as often as is deemed necessary. Consequently, the number of psychotherapy sessions received by the patients on the rehab unit is variable according to need.

Present Study

This study attempted to assess physical and psychological changes during the course of physical rehabilitation, the magnitude and relations of these changes, and whether common variables previously discussed would predict change. First, it was predicted that patients would demonstrate physical and psychological improvement over the course of physical rehabilitation as measured by changes on the FIM, BBHI-2, and OQ-45.2 scores from admission to discharge. Second, it was expected that there would be large changes (large effect sizes) in FIM scores since the physical aspect is what rehabilitation is directly addressing, with small to medium changes (small to medium effect sizes) in BBHI-2 and OQ-45.2 scores as the psychological aspect is not the direct target of rehabilitation. In addition, individual change on the OQ-45.2 was examined using the reliable change index (RCI) and criteria for clinically significant change (Hawley, 1995; Jacobson & Truax, 1991).

Third, it was predicted that patient scores on the admission and discharge OQ-45.2 would be positively correlated with admission and discharge scores on the BBHI-2 and negatively correlated with admission and discharge FIM ratings. Fourth, it was predicted that diagnosis, length of stay, and number of psychotherapy sessions would predict improvements on the OQ-45.2, BBHI-2, and FIM ratings from admission to discharge. As the OQ-45.2 had never previously been used in this population, there was no means of calculating statistical power. Sample size was therefore estimated from studies using the OQ-45.2 in a psychotherapy or psychiatric setting to be approximately 50 or greater to detect a moderate effect size with power of 75% (Pobuda, 2008; Shea, 2000; Thorslund, 2007).

CHAPTER THREE

METHOD

Participants

This study utilized 74 inpatient physical medicine and rehabilitation patients consecutively admitted to Utah Valley Regional Medical Center (UVRMC). Patients were excluded from the study if they were acutely or chronically delirious or confused, severely demented, aphasic, or otherwise unable to read and complete the measures. This heterogeneous sample of participants differed on a number of relevant variables including diagnosis, length of stay, and number of therapy sessions. This variability was addressed in the analyses.

Instruments

A demographic survey was completed based on a chart review and included the following variables: sex, age, ethnicity, diagnosis, and Glasgow Coma Scale (GCS) scores (an indication of level of consciousness that can be used to screen participants). The number of participants with GCS scores reported in their charts was too few to include as a variable in subsequent analyses. After the patient was discharged, a second chart review was conducted to assess length of stay and number of psychotherapy sessions.

Functional Independence Measure (FIM). This is an observer-rated instrument designed to assess functional independence (see Appendix A). It is comprised of 18 items (13 motor, 5 cognitive) that are rated on 7 levels of dependence/independence. It was developed by the American Academy of Physical Medicine and Rehabilitation and the American Congress for Rehabilitation Medicine and as a universal assessment tool in the Uniform Data System for Medical Rehabilitation (Kidd et al., 1995). Reliability and validity estimates for the FIM have been reported as high. Interrater reliabilities have been reported as kappas of .69 to .92 (Kidd et

al.; Hamilton, Laughlin, Fiedler, & Granger, 1994) and intraclass correlation coefficients of .97 to .99 (Hamilton et al., 1994). Internal consistency has been reported at .93 (Hamilton et al., 1994).

Brief Battery for Health Improvement-2 (BBHI-2). This is a 63-item self-report instrument designed to screen patients for a number of psychosocial factors that could complicate a medical condition or delay recovery. It is comprised of the following scales: Defensiveness, Somatic Complaints, Pain Complaints, Functional Complaints, Depression, and Anxiety. The manual for the BBHI-2 lists the test-retest reliability as ranging from .88 to .96 (Anxiety to Somatic Complaints) and the internal consistency as ranging from .69 to .87 (Anxiety to Somatic Complaints) (Disorbio & Bruns, 2002).

Outcome Questionnaire-45.2 (OQ-45.2). This is a 45-item self-report instrument measuring psychological distress in three domains (subjective discomfort, interpersonal relationships, and social role performance) that combine into a total score ranging from 0 to 180 (higher score indicates higher level of distress). It was designed to repeatedly measure client status throughout the course of therapy (Lambert et al., 2004). The original OQ developed in 1996 demonstrated test-retest reliabilities ranging from .78 to .84 and internal consistency ranging from .70 to .93. Lambert and colleagues in 2004 reported moderate to high concurrent validity coefficients between the total score of the OQ and all criterion measures (.41 to .89). Construct validation of the OQ suggested the use of the total score composed by summing the three subscales (Mueller, Lambert, & Burlingame, 1998).

In an attempt to account for therapy/therapists effects, a review of available feedback data at UVRMC was conducted. Data available thus far indicates that for the year of 2008, 52% of patients returned their feedback questionnaires. Of those, 79% rated their care in rehabilitation

as excellent. Individual items on the questionnaire include the following: “The rehab team provided care in a caring and supportive manner” and “The rehab team provided enough emotional support.”

Procedure

Participating patients received, as part of their admission and discharge processes, the BBHI-2 and a FIM rating. In addition, at admission they were asked to fill out a consent form and an OQ-45.2. A chart review for demographic and other relevant variables was conducted at admission and again at discharge. Those who completed the necessary forms were asked to complete the OQ-45.2 at discharge (see Table 1).

Table 1

Study procedure

Admission	Discharge
Consent Form	Chart Review
Chart Review	FIM Rating
FIM Rating	BBHI-2
BBHI-2	OQ-45.2
OQ-45.2	

Note. FIM = Functional Independence Measure; BBHI-2 = Brief Battery for Health Improvement-2; OQ-45.2 = Outcome Questionnaire-45.2.

Data and Statistical Analyses

Assessments were collected and analyzed in the following ways for each of the hypotheses using primarily SPSS 13.0 for Windows. The canonical correlation for hypothesis three was generated using SAS software, Version 9 of the SAS System for Windows. Copyright © 2002-2003, SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

- 1) First, it was predicted that patients would demonstrate physical and psychological improvement over the course of physical rehabilitation as measured by changes on the FIM, BBHI-2, and OQ-45.2 scores from admission to discharge. The three OQ-45.2 subscales and the six BBHI-2 scales were first analyzed with multivariate analyses using a repeated measures general linear model. Next, follow-up analyses on the means for admission and discharge scores on the FIM, BBHI-2, and OQ-45.2 were performed using paired *t*-tests.
- 2) Second, it was expected that there would be large changes (large effect sizes) in FIM scores with small to moderate changes (small to moderate effect sizes) in BBHI-2 and OQ-45.2 scores. Cohen's *d* effect sizes were calculated for the FIM, BBHI-2, and OQ-45.2 with the following criteria: <0.1 = trivial effect; $0.1 - 0.3$ = small effect; $0.3 - 0.5$ = moderate effect; >0.5 = large effect (Cohen, 1988). In addition, individual change on the OQ-45.2 was examined using the reliable change index (RCI) and criteria for clinically significant change (Hawley, 1995; Jacobson & Truax, 1991; Lambert et al., 2004).
- 3) Third, it was predicted that patient scores on the admission and discharge OQ-45.2 would be positively correlated with admission and discharge scores on the BBHI-2 and negatively correlated with admission and discharge FIM ratings. Canonical correlations were conducted

on the BBHI-2 and OQ-45.2 scales as well as on the FIM and the OQ-45.2 scales. Follow-up Pearson correlations were conducted on the significant canonical correlations.

- 4) Fourth, it was predicted that diagnosis, length of stay, and number of psychotherapy sessions would predict improvements on the OQ-45.2, BBHI-2, and FIM ratings from admission to discharge. One way ANOVAs were conducted using sex, length of stay, diagnosis at intake, and number of psychotherapy sessions as predictors of OQ-45.2, BBHI-2, and FIM change scores. QQ plots were used to examine the distributions OQ-45.2, BBHI-2, and the FIM at both time points to verify one way ANOVA use and all plots demonstrated normal distribution (see Appendix A). In addition, Pearson correlations were conducted between the variable of age and the OQ-45.2, BBHI-2, and FIM change scores.

In order to prepare data for analysis, change scores were calculated by subtracting scores obtained at discharge from scores obtained at admission. The data used for the majority of analyses included the OQ-45.2 total score as well as all three subscales (Subjective Discomfort, Interpersonal Relationships, and Social Role Performance), six BBHI-2 *t*-scores with patient norms (Defensiveness, Somatic Complains, Pain Complains, Functioning Complains, Depression, and Anxiety), and the FIM total score, resulting in 11 scales/subscales (subsequently referred to as scales). Positive change scores for the OQ-45.2 and the majority of the BBHI-2 scales represented improvement while negative change scores for the FIM and the Defensiveness scale of the BBHI-2 represented improvement.

Analyses included a total of 74 participants (see table 2), although only 64 participants completed the discharge OQ-45.2 and BBHI-2 paperwork (see table 3). There were 40 males and 34 females ranging in age from 21 to 87 with a mean of 62.34 ($SD=18.30$). Length of stay ranged from 3 to 34 days with a mean of 12.28 ($SD=7.01$) and was divided into three categories: one

week or less ($n=23$), one to two weeks ($n=28$), and greater than two weeks ($n=23$). The number of psychotherapy sessions ranged from 1 to 7, with a mean of 2.61 ($SD=1.21$); 4 sessions and higher were grouped together for analyses. The majority of patients ($n=69$) were discharged home while five patients were discharged to skilled nursing facilities.

Thirteen different diagnoses were found among participants and included the following: deconditioning ($n=18$), stroke ($n=12$), non-traumatic brain injury ($n=8$), traumatic brain injury ($n=7$), miscellaneous ($n=7$), multiple trauma/non-traumatic brain and spinal cord injury ($n=5$), multiple trauma/traumatic brain and spinal cord injury ($n=4$), fracture of the lower extremity ($n=3$), non-traumatic spinal cord injury ($n=3$), osteoarthritis ($n=2$), amputation of the lower extremity ($n=2$), traumatic spinal cord injury ($n=2$), and Guillain-Barré Syndrome ($n=1$). Deconditioning was the largest diagnostic category and represented patients who presented to rehabilitation with general weakness following a prolonged hospital stay, usually as a result of open heart surgery, infection, sepsis, etc.

These diagnoses were divided into two categories: CNS injury (stroke, non-traumatic brain injury, traumatic brain injury, multiple trauma/non-traumatic brain and spinal cord injury, multiple trauma/traumatic brain and spinal cord injury, non-traumatic spinal cord injury, traumatic spinal cord injury, and Guillain-Barré Syndrome) and Non-CNS injury (deconditioning, miscellaneous, fracture of the lower extremity, osteoarthritis, and amputation of the lower extremity). This resulted in 42 participants in the CNS injury group and 32 in the non-CNS injury group.

Table 2

Descriptives for all participants

	Time 1			Time 2		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
OQ-45.2 Subjective Discomfort	74	30.11	11.98	65	24.91	12.10
OQ-45.2 Interpersonal Relationships	74	7.43	5.04	65	6.00	4.49
OQ-45.2 Social Role Performance	71	7.96	4.32	63	6.97	4.00
OQ-45.2 Total	72	45.23	18.43	64	37.72	18.76
BBHI-2 Defensiveness	71	47.83	10.90	61	51.41	9.98
BBHI-2 Somatic Complaints	71	51.80	8.57	62	47.02	6.05
BBHI-2 Pain Complaints	73	47.25	9.62	61	44.61	8.07
BBHI-2 Functional Complaints	71	52.89	10.06	62	52.61	9.69
BBHI-2 Depression	72	46.06	9.36	61	43.11	9.71
BBHI-2 Anxiety	71	48.04	12.39	61	45.18	13.34
FIM Total	74	64.46	15.97	74	95.31	15.90

Table 3

Descriptives for participants with admission and discharge data

	Time 1			Time 2		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
OQ-45.2 Subjective Discomfort	65	30.03	12.30	65	24.91	12.10
OQ-45.2 Interpersonal Relationships	65	6.97	5.01	65	6.00	4.94
OQ-45.2 Social Role Performance	63	7.87	4.50	63	6.97	4.00
OQ-45.2 Total	64	44.75	19.04	64	37.72	18.76
BBHI-2 Defensiveness	62	47.50	10.85	61	51.41	9.98
BBHI-2 Somatic Complaints	62	52.24	8.76	62	47.02	6.05
BBHI-2 Pain Complaints	64	47.75	9.63	61	44.61	8.07
BBHI-2 Functional Complaints	62	53.05	10.15	62	52.61	9.69
BBHI-2 Depression	63	46.75	9.65	61	43.11	9.71
BBHI-2 Anxiety	62	48.48	12.77	61	45.18	13.34
FIM Total	65	63.82	16.54	65	95.63	15.23

Preliminary analyses revealed one subject who represented an outlier. Participant 57 was a 50-year-old female with breast cancer metastatic to brain and liver who was in inpatient rehabilitation due to deconditioning after chemotherapy and radiation. Areas of the brain affected included the left parietal lobe, posterior aspect of the midbrain, pons, medulla, right and left cerebellar hemispheres. Medications at the time of admission were listed as Motrin, Ativan, Potassium, Decadron, Neutra-Phos, Lovenox, Mylanta, Pepcid, Tylenol, Ambien, Phenergan, milk of magnesia, and Dulcolax. Three of these (Ambien, Ativan, and Decadron) list depression, anxiety, and/or mood changes as possible side effects.

Participant 57 received 4 psychotherapy visits during her 6-day stay which primarily focused on relaxation training as she was reportedly not sleeping well. Her OQ-45.2 total score increased from 25 at admission to 122 at discharge. Given her diagnosis, her initial score (which was well below the community norm of 45) may have been a reflection of underreporting, denial of symptoms, and/or potentially compromised insight from her metastatic disease affecting brain function and was considered likely to be invalid. Due to her extreme scores, the majority of analyses are reported with and without participant 57 (see table 4).

Table 4

Descriptives for participants with admission and discharge data excluding participant 57

	Time 1			Time 2		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
OQ-45.2 Subjective Discomfort	64	30.19	12.33	64	24.16	10.55
OQ-45.2 Interpersonal Relationships	64	7.05	5.01	64	5.73	4.49
OQ-45.2 Social Role Performance	62	7.95	4.50	62	6.66	3.19
OQ-45.2 Total	63	45.06	19.03	63	36.38	15.53
BBHI-2 Defensiveness	61	47.33	10.86	60	51.37	10.06
BBHI-2 Somatic Complaints	61	52.28	8.83	61	46.93	6.07
BBHI-2 Pain Complaints	63	47.92	9.61	60	44.62	8.14
BBHI-2 Functional Complaints	61	52.98	10.22	61	52.57	9.77
BBHI-2 Depression	62	46.90	9.65	60	43.17	9.78
BBHI-2 Anxiety	61	48.74	12.71	60	45.22	13.45
FIM Total	64	63.64	16.61	64	95.61	15.35

CHAPTER FOUR

RESULTS

Hypothesis 1

To address the first hypothesis, the three OQ-45.2 subscales and the six BBHI-2 scales were analyzed with multivariate analyses using a within subjects repeated measures general linear model. Results indicated a significant overall improvement from admission to discharge with a Wilks' Lambda of .60, $F(9,46)=3.42$, $p<0.01$. Next, the means for admission and discharge scores on the FIM, BBHI-2, and OQ-45.2 were analyzed using a series of paired *t*-tests. Because of an overall effect, a correction for multiple testing was not applied. Eight of the 11 *t*-tests were significant with and without participant 57 (see tables 5 and 6), demonstrating statistically significant improvement from admission to discharge.

The *t*-scores for BBHI-2 Defensiveness and FIM total score were negative due to the fact that an increase in scores represents improvement. On the BBHI-2, an examination of the description for Defensiveness indicated that a low score was suggestive of symptom magnification or a cry for help and in fact a higher score represents improvement.

Table 5

Results of paired *t*-tests using all participants

	<i>t</i>	Significance
OQ-45.2 Subjective Discomfort	3.33	.001*
OQ-45.2 Interpersonal Relationships	1.68	.098
OQ-45.2 Social Role Performance	1.55	.127
OQ-45.2 Total	2.88	.005*
BBHI-2 Defensiveness	-3.00	.004*
BBHI-2 Somatic Complaints	4.99	.000*
BBHI-2 Pain Complaints	3.14	.003*
BBHI-2 Functional Complaints	2.70	.746
BBHI-2 Depression	3.12	.003*
BBHI-2 Anxiety	2.04	.046*
FIM Total	-17.82	.000*

**p* < .05

Table 6

Results of paired *t*-tests excluding participant 57

	<i>t</i>	Significance
OQ-45.2 Subjective Discomfort	4.79	.000*
OQ-45.2 Interpersonal Relationships	2.79	.007
OQ-45.2 Social Role Performance	2.71	.009
OQ-45.2 Total	4.76	.000*
BBHI-2 Defensiveness	-3.07	.003*
BBHI-2 Somatic Complaints	5.06	.000*
BBHI-2 Pain Complaints	3.29	.002*
BBHI-2 Functional Complaints	0.30	.768
BBHI-2 Depression	3.18	.002*
BBHI-2 Anxiety	2.17	.034*
FIM Total	-17.69	.000*

**p* < .05*Hypothesis 2*

Effect sizes (using Cohen's *d*) were calculated for the 11 scales on the 64 participants who completed both admission and discharge data (see table 7). It was predicted that there would be large effect sizes for the FIM and small to moderate effect sizes for the OQ-45.2 and the BBHI-2. Results supported this hypothesis and demonstrated larger effect sizes overall when calculated without participant 57 (see table 8).

Table 7

Effect sizes for 64 participants

	Cohen's <i>d</i>	Descriptor
OQ-45.2 Subjective Discomfort	.42	Moderate
OQ-45.2 Interpersonal Relationships	.20	Small
OQ-45.2 Social Role Performance	.21	Small
OQ-45.2 Total	.37	Moderate
BBHI-2 Defensiveness	.37	Moderate
BBHI-2 Somatic Complaints	.69	Large
BBHI-2 Pain Complaints	.35	Moderate
BBHI-2 Functional Complaints	.04	trivial
BBHI-2 Depression	.38	Moderate
BBHI-2 Anxiety	.25	Small
FIM Total	2.00	Large

Individual change on the OQ-45.2 was examined using the reliable change index (RCI) and criteria for clinically significant change (Hawley, 1995; Jacobson & Truax, 1991). This was first conducted on all participants. Results indicated that 2 participants deteriorated (increased by 14 points), 42 participants were unchanged, and 20 participants improved (decreased by 14 points). The two participants who deteriorated included participant 57, whose OQ-45.2 scores increased from 25 to 122 as previously discussed, as well as participant 11, whose OQ-45.2 scores increased from 34 to 49. Participant 11's scores, while representing deterioration due to an increase of 15 points, started out below the community norm (45) and remained within normal functioning (below 64) at discharge and thus is considered generally psychologically healthy.

The OQ-45.2 can be interpreted with a cutoff score between 63 and 64 that differentiates between normal (below 64) and abnormal functioning (64 and higher). At admission, 10 participants obtained a score of 64 or higher on the OQ-45.2. Of these 10 participants, 2 participants were unchanged while 8 participants improved (decreased by 14 points and below 64).

Table 8

Effect sizes excluding participant 57

	Cohen's <i>d</i>	Descriptor
OQ-45.2 Subjective Discomfort	.53	Large
OQ-45.2 Interpersonal Relationships	.28	Small
OQ-45.2 Social Role Performance	.33	Moderate
OQ-45.2 Total	.50	Large
BBHI-2 Defensiveness	.39	Moderate
BBHI-2 Somatic Complaints	.71	Large
BBHI-2 Pain Complaints	.37	Moderate
BBHI-2 Functional Complaints	.04	trivial
BBHI-2 Depression	.38	Moderate
BBHI-2 Anxiety	.27	Small
FIM Total	2.00	Large

Hypothesis 3

Canonical correlations were conducted on the BBHI-2 and OQ-45.2 scales as well as on the FIM and the OQ-45.2 scales. Results suggested an overall significant correlation between the BBHI-2 and the OQ-45.2 with a squared canonical correlation of 0.30, $p < 0.05$. A squared canonical correlation of 0.02 for the FIM and OQ-45.2 scales was not significant. Follow-up Pearson correlations between the OQ-45.2 total score and the six BBHI-2 scales were conducted. Because of an overall effect, a correction for multiple testing was not applied. Results with and without participant 57 demonstrated significant correlations between the OQ-45.2 total score and five of the six BBHI-2 scales (results for all participants): Defensiveness, $r = -.31$, $p < 0.05$; Somatic Complaints, $r = .33$, $p < 0.01$; Pain Complaints, $r = .37$, $p < 0.01$; Depression, $r = .29$, $p < 0.05$; Anxiety, $r = .29$, $p < 0.05$; Functional Complaints did not yield a significant correlation.

Hypothesis 4

One way ANOVAs were conducted using sex, length of stay, diagnosis, and number of psychotherapy sessions as predictors of OQ-45.2, BBHI-2, and FIM change scores. Diagnosis (categorized into CNS injury and non-CNS injury) was a significant predictor of change on the FIM scale ($F(1,72) = 4.27$, $p = .04$) and number of psychotherapy sessions (with four sessions and higher group together) was a significant predictor of change on the OQ-45.2 Social Role Performance scale ($F(3,56) = 3.26$, $p = .03$), with and without participant 57. Pearson correlations were conducted between age and the 11 change scores. No significant correlations were found with or without participant 57.

CHAPTER FIVE

DISCUSSION

Current Study

The number of psychological measures utilized with a medical population is increasing as more areas of physical health incorporate measures of emotional functioning into a biopsychosocial approach (Bruns & Disorbio, 2009; Claiborn, 2006; Guyatt et al., 1993; Merkouris, Apostolakis, Pistolas, Papagiannaki et al., 2009; Poole, Murphy, & Nurmikko, 2009). All of medicine is recognizing the importance of mental health in physical rehabilitation and the need for using a rapidly and easily completed reliable and valid measure of psychological well-being with this population. While a number of measures exist, the OQ-45.2 has been well-researched with a psychotherapy population but never before assessed in a clinical feasibility study in rehabilitation patients. Its brevity makes it an attractive candidate for a population that may have limited time, motor skills, and visual acuity. This study investigated the psychological improvement of medical patients over the course of physical rehabilitation using the OQ-45.2 as well as the BBHI-2, which has already been normed on a variety of medical populations.

Overall, the results of this study suggest that the OQ-45.2 is suitable for quantifying psychological improvement of inpatient physical rehabilitation patients. Results generally support the hypothesis that patients demonstrate physical and psychological improvement over the course of physical rehabilitation as measured by changes on the FIM, BBHI-2, and OQ-45.2 scores from admission to discharge. These changes were reflected in effect sizes (Cohen's *d*) that were in the small to moderate range and into the large range without participant 57, consistent with the hypothesis.

The OQ-45.2 is a unique measure in this study in that it incorporates the idea of clinically significant change using criteria developed by Jacobson and Truax (1991). Using their formula, Lambert and colleagues (2004) calculated a cut-off score (between 63 and 64) to differentiate normal and abnormal functioning. Reliable change is reflected with a change of 14 points. Clinically significant change occurs when both criterion of the cut-off score and reliable change are met. In the past, the OQ-45.2 has been used with a clinical population of psychotherapy clients who typically enter therapy with a score higher than 63. Presumably, medical patients are a sample of the general population, which may or may not be experiencing psychological distress.

This was reflected in the current mixed sample of rehabilitation patients with multiple etiologies, in which only 10 of the 74 participants obtained scores above 63 on their admission OQ-45.2's. Of these 10, no participants deteriorated, 2 participants were unchanged, and 8 participants improved. It is difficult to make inferences with such a small sample and it is important to keep in mind that in addition to representing a small subsample of the hospital population, it is also reflective of two sampling time points across an average of just 14 days. This is quite different than what is typically seen when using the OQ-45.2 during the course of psychotherapy where treatments last weeks or months. Nevertheless the gains made in rehabilitation patients who report initial high levels of psychological disturbance were substantial.

The OQ-45.2 can provide the clinician with useful data regarding a trend of improvement in emotional/mental health versus deterioration that can be used in therapy as well as in team meetings with other rehabilitation and medical professionals. Initial scores could be used to target specific patients for more intense psychological interventions during their stay in

inpatient rehabilitation, and if their OQ-45.2 scores are still elevated (63 or higher) at discharge, a referral for outpatient psychotherapy and psychiatric consultation might be warranted.

As previously stated, the BBHI-2 was designed to be used in a medical setting and has been normed on a variety of medical populations (Disorbio & Bruns, 2002). The current study found an overall correlation between OQ-45.2 and the BBHI-2 although correlations between the OQ-45.2 and the Depression and Anxiety subscales of the BBHI-2 were surprisingly small. In examining the individual items loading onto various scales of the BBHI-2 it appears that many of the items included in the Depression and Anxiety scales appear to relate specifically to physical health. In addition, items loading onto other scales could tap into anxiety and depression as well. Overall, the smaller than expected correlation between these particular BBHI-2 scales and the OQ-45.2 total score may be due to the observation that the OQ-45.2 measures DSM-IV-TR depression and anxiety while the BBHI-2 assesses these constructs as they relate to patients' current physical illness. This suggests that the BBHI-2 cannot serve as a substitute for measures designed to quantify psychological disturbance.

Notably, the change score for the FIM was not correlated with the OQ-45.2 change scores, suggesting that the amount of psychological improvement from admission to discharge was not correlated with the amount of physical improvement during the same time period as measured by these instruments. It has been demonstrated in the literature that psychological factors do in fact impact physical recovery (Bruns & Disorbio, 2009; Claiborne, 2006; Proctor, Wade, Woodward, Pendleton, Baldwin, et al., 2008). Thus, the lack of correlations between these measures of physical and psychological recovery may represent a discrepancy in methods of administration; the FIM is a clinician-rated measure while the OQ-45.2 is a self-rated measure.

Finally, the OQ-45.2 appears to be a generally robust measure, largely unaffected by, and uncorrelated with, many of the variables that differ among physical rehabilitation patients including age, sex, diagnosis and length of stay. The number of psychotherapy sessions did appear to predict change on the OQ-45.2 Social Role Performance scale. However, it is important to keep in mind that confirmatory factor analysis research indicates that the OQ-45.2 total score is a valid unitary construct. Given the small sample size in this study, and the lack of significant correlations, results involving the Social Role Performance scale independent of the total score should not be overemphasized. This relationship should be explored further in future research. Overall these results suggest that this measure can appropriately be used on a heterogeneous medical population in addition to its primary use with a psychotherapy population.

Limitations

The primary limitation of this study was the short period of time available for data collection which resulted in a number of difficulties. Over the course of approximately seven months, 74 participants were enrolled. Of these, 64 participants completed both the admission and discharge questionnaires, resulting in a loss of approximately 14%. This 14% was lost due a failure on the part of the experimenter to obtain discharge data when the patients were discharged unexpectedly or over the weekend when staff was less informed about the study taking place.

In addition, there was a short time period available for data collection on each participant given that the average length of stay was 12.26 days. Inpatient rehabilitation units are influenced by the effects of managed care where insurance companies pay for only a certain number of days for each patient, depending on their condition. According to internal program evaluation at

UVRMC, the average length of stay has shortened over the years whereas in 2002 it was actually greater than one month for some diagnoses.

The patients were heterogeneous as discussed above, differing on variables such as diagnosis, length of stay, and number of psychotherapy sessions as well as age and sex. To address random heterogeneity of the subjects, these variables were coded and analyzed. Overall, this heterogeneity did not appear to affect the results of the changes seen in the OQ-45.2 scores from admission to discharge.

The completion of the OQ-45.2 relies heavily on the ability to read and write, effectively excluding many patients who could do neither. This resulted in a selection bias and limited generalizability of the results of this study. These results cannot be generalized to the populations that were excluded from the study such those with severe TBIs or strokes resulting in aphasia and apraxia.

Future Research

Sample size limitations constrained the number and type of variables (diagnosis, length of stay, number of psychotherapy sessions, or change scores) that could reliably be examined to relate to the OQ-45.2, it would be worthwhile to establish comprehensive norms for various diagnoses on the OQ-45.2 similar to what the developers of the BBHI-2 have done on a medical population. Using a larger sample would allow the researcher to stratify diagnoses and develop “profiles” for patients of various diagnoses. These “profiles” might include information such as cutoffs for normal and abnormal functioning which may differ from the numbers currently used in the psychotherapy population as well as projected change scores from admission to discharge. This may effectively create different criteria for clinically significant change in a medical population.

In this study, participant 57 represented a significant outlier. However, her metastatic cancer represented an unusual diagnosis in this particular sample while a larger sample might in fact capture similar patients. A post hoc chart review was conducted in the hopes of further illuminating her situation. Two months post-discharge a brain MRI showed significant decrease in size and enhancement of the multiple brain metastases which was noted to represent an interval response to chemotherapy. Four months post-discharge a note from a cancer clinic noted no evidence of progressive liver disease. Seven months post-discharge an oncology report noted reduction of brain metastases but a new onset of lymph node and bone metastases. There were no more recent medical records available for review and there was no report of outpatient psychological treatment. Perhaps if the results of the OQ-45.2 were known at the time of her stay on the rehab unit, greater care could've been taken in following up with her psychological care.

This study investigated psychological distress of patients during their stay in an inpatient physical medicine rehabilitation unit. While results are promising, showing general psychological improvement, it is worth questioning whether these gains are maintained after discharge. Specifically, do patients maintain their level of psychological functioning after three months post-discharge? O'Connor, Cano, Thompson, and Playford (2005) found that most patients did not. Future research using larger sample sizes could address this by administering the OQ-45.2 at a 3 to 12-month follow-up.

Anecdotally, as a clinical neuropsychology student working at UVRMC, the author was in a unique position to implement results from this study as they became available. It is important to note that the OQ-45.2 data was coded and the author was blind to the admission and discharge scores of particular patients during data collection and analysis. However, the BBHI-2 was standard procedure and as such, was available for clinical review. At UVRMC there is a

weekly meeting attended by the various disciplines – nursing, physical therapy, occupational therapy, speech therapy, nutrition, social work, psychology, neuropsychology, pharmacology, and case managers. In these meetings the author was in a position to observe how the Depression and Anxiety subscales in particular were utilized by the psychologists and shared with the rest of the team members to benefit the patients. As previously stated, the current results of the OQ-45.2, including data regarding individual change, could be clinically beneficial during such meetings, especially since they provide discrepant data about degree of anxiety and depression.

Given the wide use of the OQ-45.2 in mental health settings, it is anticipated that future research will verify the appropriateness of the OQ-45.2 for a medical population, and specifically rehabilitation patients, in the context of a biopsychosocial approach to physical illness and recovery. This research may further illuminate the role of psychological well-being in physical recovery.

REFERENCES

- Anderson, E.M., & Lambert, M.J. (2001). A survival analysis of clinical significant change in outpatient psychotherapy. *Journal of Clinical Psychology, 57*, 875-888.
- Babcock-Parziale, J.L. & Williams, M.D. (2006). Historical perspective on the development of outcomes measures for low-vision and blind rehabilitation in the Department of Veterans Affairs. *Journal of Rehabilitation Research & Development, 43*(6), 793-808.
- Berry, C. & Kennedy, P. (2002). A psychometric analysis of the Needs Assessment Checklist (NAC). *Spinal Cord, 41*, 490-501.
- Brosseau, L., Philippe, P., Potvin, L., & Boulanger, Y.L. (1996). Post-stroke inpatient rehabilitation: I. Predicting length of stay. *American Journal of Physical Medicine & Rehabilitation, 75*(6), 422-430.
- Bruns, D., & Disorbio, J.M. (2009). Assessment of biopsychosocial risk factors for medical treatment: A collaborative approach. *Journal of Clinical Psychology in Medical Settings, 16* (2), 127-147.
- Bryant, R.A., Marosszeky, M.B., Crooks, J., & Gurka, J.A. (2000). Posttraumatic stress disorder after severe traumatic brain injury. *The American Journal of Psychiatry, 157*(4), 629-631.
- Burke, D.T., Shah, M.K., Dorvlo, A.S.S., & Al-Adawi, S. (2005). Rehabilitation outcomes of cardiac and non-cardiac anoxic brain injury: A single institution experience. *Brain Injury, 19*(9), 675-680.
- Caeiro, L., Ferro, J.M., Santos, C.O., & Figueira, M.L. (2006). Depression in acute stroke. *Journal of Psychiatry & Neuroscience, 31*(6), 377-383.
- Cassem, E.H. (1990). Depression and anxiety secondary to medical illness. *The Psychiatric Clinics of North America, 13*(4), 597-612.

- Claiborne, N. (2006). Effectiveness of a care coordination model for stroke survivors: A randomized study. *Health and Social Work, 31*(2), 87-96.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New Jersey: Lawrence Erlbaum.
- Collin, C., Wade, D.T., Davies, S., & Horne, V. (1988). The Barthel ADL Index: A reliability study. *International Disability Studies, 10*, 61-63.
- Denollet, J. (1993). Emotional distress and fatigue in coronary heart disease: The Global Mood Scale (GMS). *Psychological Medicine, 23*(1), 111-21.
- Disorbio, J.M., & Bruns, D. (2002). *Brief Battery for Health Improvement 2*. Minneapolis, MN: NCS Pearson, Inc.
- Ditunno, J.F., Burns, A.S., & Marino, R.J. (2005). Neurological and functional capacity outcome measures: Essential to spinal cord injury clinical trials. *Journal of Rehabilitation Research & Development, 42*(3), 35-42.
- Duncan, P.W., Goldstein, L.B., Horner, R.D., Landsman, P.B., Samsa, G.P., & Matchar, D.B. (1994). Similar motor recovery of upper and lower extremities after stroke. *Stroke, 25*(6), 1181-1188.
- English, C.K., Hillier, S.L., Stiller, K., & Warden-Flood, A. (2006). The sensitivity of three commonly used outcome measures to detect change amongst patients receiving inpatient rehabilitation following stroke. *Clinical Rehabilitation, 20*, 52-55.
- Feighner, J., Robins, E., Guze, S. et al. (1972). Diagnostic criteria for use in psychiatric research. *Archives of General Psychiatry, 26*, 57-83.
- Fischer, J., & Mathieson, C. (2001). The history of the Glasgow Coma Scale: Implications for practice. *Critical Care Nursing Quarterly, 23*(4), 52-58.

- Folstein, M.F., Folstein, S.E., & McHugh, P.R. (1975). Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, *12*(3), 189-198.
- Guyatt, G.H., Feeny, D.H., & Patrick, D.L. (1993). Measuring health-related quality of life. *Annals of Internal Medicine*, *118*, 622-629.
- Hagberg, K., Brånemark, R., & Hägg, O. (2004). Questionnaire for Persons with a Transfemoral Amputation (Q-TEA): Initial validity and reliability of a new outcome measure. *Journal of Rehabilitation Research & Development*, *41*(5), 695-706.
- Hamilton, B.B., Laughlin, J.A., Fiedler, R.C., & Granger, C.V. (1994). Interrater reliability of the 7-level functional independence measure (FIM). *Scandinavian Journal of Rehabilitation Medicine*, *26*(3), 115-119.
- Harter, M.C., Conway, K.P., & Merikangas, K.R. (2003). Associations between anxiety disorders and physical illness. *European Archives of Psychiatry and Clinical Neuroscience*, *253*(6), 313-20.
- Hatfield, D. R., & Ogles, B. M. (2004). The use of outcome measures by psychologists in clinical practice. *Professional Psychology: Research and Practice*, *35*(5), 485-491.
- Hawley, D.R. (1995). Assessing change with preventative interventions: The Reliable Change Index. *Family Relations*, *44*(3), 278-284.
- Hevey, D., McGee, H.M., & Horgan, J. (2004). Responsiveness of health-related quality of life outcome measures in cardiac rehabilitation: Comparison of cardiac rehabilitation outcome measures. *Journal of Consulting and Clinical Psychology*, *72*(6), 1175-1180.
- Howard, K.I., Kopta, S.M., Krause, M.S., & Orlinsky, D.E. (1986). The dose-effect relationship in psychotherapy. *American Psychologist*, *41*, 159-164.

- Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology, 59*, 12-19.
- Kedera, S.W., Lambert, M.J., & Andrews, A.A. (1996). How much therapy is really enough? A session-by-session analysis of the psychotherapy dose-effect relationship. *Journal of Psychotherapy Practice & Research, 5*(2), 132-151.
- Khodr, B., Howard, J., Watson, K., & Khalil, Z. (2003). Effect of short-term and long-term antioxidant therapy on primary and secondary aging neurovascular processes. *Journals of Gerontology: Series A: Biological Sciences and Medical Sciences, 58A*(8), 698-708.
- Kidd, D., Stewart, G., Baldry, J., & Johnson, J. (1995). The Functional Independence Measure: A comparative validity and reliability study. *Disability and Rehabilitation: An International, Multidisciplinary Journal, 17*(1), 10-14.
- Küchler, T., Wood-Dauphinée, S. (1991). Working with people who have cancer: Guidelines for physical therapists. *Physiotherapy Canada, 43*(4), 19-23.
- Lambert, M. J., Burlingame, G. M., Umphress, V. J., Hansen, N. B., Vermeersch, D. A., Clouse, G. C., & Yanchar, S.C. (1996). The reliability and validity of the Outcome Questionnaire. *Clinical Psychology and Psychotherapy, 3*, 249-258.
- Lambert, M. J., Morton, J. J., Hatfield, D., Harmon, C., Hamilton, S., Reid, R. C., et al. (2004). *Administration and scoring manual for the Outcome Questionnaire (OQ 45.2)*. Wilmington, DL: American Professional Credentialing Services.
- Lambert, M. J. & Ogles, B. M. (2004). The efficacy and effectiveness of psychotherapy. In M. J. Lambert (Ed.). *Bergin & Garfield's Handbook of psychotherapy and behavior change* (5th Ed., pp. 139-193). New York: Wiley.

- Lambert, M. J., Ogles, B., & Masters, K. (1992). Choosing outcome assessment devices: An organizational and conceptual scheme. *Journal of Counseling and Development, 70*, 527-539.
- Lau-Walker, M. (2004). Cardiac rehabilitation: The importance of patient expectations – a practitioner survey. *Journal of Clinical Nursing, 13*(2), 177-184.
- Maclean, N., & Pound, P. (2000). A critical review of the concept of patient motivation in the literature on physical rehabilitation. *Social Science & Medicine, 50*, 495-506.
- Merkouris, A., Apostolakis, E., Pistolas, D., Papagiannaki, V., Diakomopoulou, E., & Patiraki, E. (2009). Quality of life after coronary artery bypass graft surgery in the elderly. *European Journal of Cardiovascular Nursing, 8*, 74-81.
- Mueller, R., Lambert, M. J. & Burlingame, G. M. (1998). Construct validity of the Outcome Questionnaire: A confirmatory factor analysis. *Journal of Personality Assessment, 70*, 248-262.
- Nair, D.G., Fuchs, A., Burkart, S., Steinberg, F.L., & Kelso, J.A.S. (2005). Assessing recovery in middle cerebral artery stroke using functional MRI. *Brain Injury, 19*(13), 1165-1176.
- Nugent, J.A., Schurr, K.A., & Adams, R.D. (1994). A dose-response relationship between amount of weight-bearing exercise and walking outcome following cerebrovascular accident. *Archives of Physical Medicine and Rehabilitation, 75*(4), 399-402.
- O'Connor, R.J., Cano, S.J., Thompson, A.J., & Playford, E.D. (2005). The impact of inpatient neurorehabilitation on psychological well-being on discharge and at 3 month follow-up. *Journal of Neurology, 252*, 814-819.
- Pietrapiana, P. Bronzino, M.P., Perino, C., & Rago, R. (1997). Acquired brain injury physical rehabilitation. In J. León-Carrión (Ed.), *Neuropsychological rehabilitation:*

Fundamentals, innovations and directions (pp. 227-251). Delray Beach, FL: GR/St Lucie Press.

Pobuda, T. (2008). The effects of time limited dynamic psychotherapy on self-reported distress in HIV-positive gay men. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 69(1-B), 693.

Poole, H.M., Murphy, P., & Nurmikko, T.J. (2009). Development and preliminary validation of the NePIQol: A quality-of-life measure of neuropathic pain. *Journal of Pain and Symptom Management*, 37(2), 233-245.

Proctor, R., Wade, R., Woodward, Y., Pendleton, N., Baldwin, R., Tarrier, N., Horan, M., & Burns, A. (2008). The impact of psychological factors in recovery following surgery for hip fracture. *Disability and Rehabilitation*, 30(9), 716-722.

Ryan, T., Enderby, P., & Rigby, A.S. (2006). A randomized controlled trial to evaluate intensity of community-based rehabilitation provision following stroke or hip fracture in old age. *Clinical Rehabilitation*, 20, 123-131.

Schasfoort, F.C., Bussmann, J.B.J., & Stam, H.J. (2000). Outcome measures for complex regional pain syndrome type I: An overview in the context of the international classification of impairments, disabilities, and handicaps. *Disability and Rehabilitation*, 22(9), 387-398.

Schepers, V.P.M., Ketelaar, M., Van De Port, G.L., Visser-Meily, J.M.A., & Lindeman. (2007). Comparing contents of functional outcome measures in stroke rehabilitation using the International Classification of Functioning, Disability and Health. *Disability and Rehabilitation*, 29(3), 221-230.

- Scheuringer, M., Grill, E., Boldt, C., Mittrach, R., Müllner, P., & Stucky, G. (2005). Systematic review of measures and their concepts used in published studies focusing on rehabilitation in the acute hospital and in early post-acute rehabilitation facilities. *Disability and Rehabilitation*, 27(7/8), 419-429.
- Shea, M.P. (2000). The demand for outcomes: The OQ-45.2 at BHS (Maryland). *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 61(2-B), 1096.
- Sherbourne, C.D., Jackson, C.A., Meredith, L.S., Camp, P., & Wells, K.B. (1996). Prevalence of comorbid anxiety disorders in primary care outpatients. *Archives of Family Medicine*, 5(1), 27-34.
- Skinner, A., & Turner-Stokes, L. (2006). The use of standardized outcome measures in rehabilitation centres in the UK. *Clinical Rehabilitation*, 20, 609-615.
- Sopena, S., Dewar, B.K., Nannery, R., Teasdale, T.W., & Wilson, B.A. (2007). The European Brain Injury Questionnaire (EBIQ) as a reliable outcome measure for use with people with brain injury. *Brain Injury*, 21(10), 1063-1068.
- Spivack, G., Spettell, C.M., Ellis, D.W., & Ross, S.E. (1992). Effects of intensity of treatment and length of stay on rehabilitation outcomes. *Brain Injury*, 6(5), 419-434.
- Stilwell, P., Stilwell, J., Hawley, C., & Davies, C. (1998). Measuring outcome in community-based rehabilitation services for people who have suffered traumatic brain injury: The Community Outcome Scale. *Clinical Rehabilitation*, 12, 521-531.
- Strain, J.J. (1979). Psychological reactions to chronic medical illness. *The Psychiatric Quarterly*, 51(3), 173-183.
- Tedstone, J.E., & Tarrier, N. (2003). Posttraumatic stress disorder following medical illness and treatment. *Clinical Psychology Review*, 23(3), 409-448.

- Thorslund, K.W. (2007). Solution-focused group therapy for patients on long-term sick leave: A comparative outcome study. *Journal of Family Psychotherapy, 18*(3), 11-24.
- Tooth, L., McKenna, K., & Geraghty, T. (2003). Rehabilitation outcomes in traumatic spinal cord injury in Australia: Functional status, length of stay and discharge setting. *Spinal Cord, 41*, 220-230.
- Umphress, V. J., Lambert, M. J., Smart, D. W., Barlow, S. H., & Clouse, G. (1997). Concurrent and construct validity of the Outcome Questionnaire. *Journal of Psychoeducational Assessment, 15*, 40-55.
- Vermeersch, D. A., Lambert, M. J., & Burlingame, G. M. (2000). Outcome Questionnaire-45: Item sensitivity to change. *Journal of Personality Assessment, 74*, 242-261.
- Vermeersch, D. A., Whipple, J. L., Lambert, M. J., Hawkins, E. J., Burchfield, C. M., & Okiishi, J. C. (2004). Outcome Questionnaire: Is it sensitive to changes in counseling center clients? *Journal of Counseling Psychology, 51*, 38-49.
- Wells, K.B., Golding, J.M., & Burnam, M.A. (1988). Psychiatric disorder in a sample of the general population with and without chronic medical conditions. *American Journal of Psychiatry, 145*, 976-981.
- Wells, K.B., Rogers, W., Burnam, M.A., Camp, P. (1993). Course of depression in patients with hypertension, myocardial infarction, or insulin-dependent diabetes. *The American Journal of Psychiatry, 150*(4), 632-638.
- Wise, M.G., & Rouchell, A. (1990). Psychiatric disorders in the medically ill. *The Journal of the Louisiana State Medical Society: Official Organ of The Louisiana State Medical Society, 142*(10), 31-34.

- Wolfson, A.M. (2000). Multidisciplinary physical rehabilitation and the Functional Independence Measure (FIM): Decisional heuristics, biases, and subjective probability analysis. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 60(9-B), 4917.
- Zigmond, A.S. & Snaith, R.P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, 67(6), 361-370.

APPENDIX A

Functional Independence Measure

FIM (motor)	FIM (cognitive)
Self-care A. Feeding B. Grooming C. Bathing D. Dressing upper body E. Dressing lower body F. Toileting	Communication N. Comprehension O. Expression
Sphincter control G. Bladder management H. Bowel management	Social cognition P. Social interaction Q. Problem solving R. Memory
Mobility Transfer: I. Bed, chair, wheelchair J. Toilet K. Tub, shower	
Locomotion L. Walk/wheelchair M. Stairs	

FIM Rating Scale:

Independent: Another person is not required for the activity.

7 – Complete Independence: All tasks are safely performed without modification, assistive devices, or aids, and within reasonable time.

6 – Modified Independence: Activity requires any one or more than one of the following: An assistive device, more than reasonable time or with safety (risk) considerations.

Dependent: Another person is required for either supervision or physical assistance for the tasks to be performed.

Modified Dependence: The subject expends half (50%) or more of the effort. The levels of assistance required:

5 – Supervision or setup: The subject requires no more help than standby, cuing or coaxing, without physical contact or, needs assistive devices.

4 – Minimal contact assistance: With physical contact the subject requires no more help than touching, and the subject expends 75% or more of the effort.

3 – Moderate assistance: The subject requires more help than touching, or expends half (50%) or more (up to 75%) of the effort.

Complete Dependence: The subject expends *less* than 50% of the effort. Maximal or total assistance is required for the activity. The levels of assistance required are:

2 – Maximal assistance: The subject expends less than 50% of the effort, but at least 25%.

1 – Total assistance: The subject expends less than 25% of the effort.

**CONSENT and AUTHORIZATION DOCUMENT
INTERMOUNTAIN INSTITUTIONAL REVIEW BOARD**

TITLE: Evaluation of Psychological Recovery in Patients with Major Medical Illnesses

PRINCIPAL INVESTIGATOR: Kelly M. James, M.A. (801) 357-7540

CO-INVESTIGATOR(S): James L. Snyder, Ph.D. (801) 357-7540
Erin D. Bigler, Ph.D. (801) 422-4287
William Gray, M.S. (801) 357-7540

SPONSOR: N/A

LOCATION: Utah Valley Regional Medical Center (UVRMC)

BACKGROUND:

You are being invited to take part in a research study because you have been admitted to UVRMC Physical Medicine and Rehabilitation. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with friends, and relatives if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you volunteer to take part in this research study. Previous research has shown that psychological recovery and physical recovery are connected and patients with a more positive outlook tend to recover more quickly from physical illness and injury. However, we currently do not have a way to consistently evaluate the psychological well-being of patients going through rehab. In order to remedy this problem, we are conducting a study to determine whether a commonly used measure of psychological well-being during psychotherapy (the Outcome Questionnaire-45.2; OQ-45.2) can be used to assess psychological well-being during physical rehabilitation. Although you may receive only one visit from the psychologist on staff, we are interested in your mood and emotions throughout your stay in rehab. This research may help us determine if the OQ-45.2 can be used for medically ill patients like yourself.

STUDY PROCEDURE:

During this study, you will be asked to complete a questionnaire called the Outcome Questionnaire (OQ-45.2) at admission and discharge. The OQ-45.2 takes approximately 5-7 minutes to complete.

RISKS:

There are no known physical risks associated with this research. However, we will be collecting a number of demographic variables including age, which can sometimes be used as an identifier and could result in a minimal risk to your privacy.

BENEFITS:

We cannot promise any direct benefits from your being in the study. However, by participating in this research you will enable us to better assess mental health during physical recovery. The information we get from this study may help us to treat future rehabilitation patients better.

PERSON TO CONTACT:

If you have questions about the research or related matters you may contact Kelly James or Dr. James Snyder at (801) 357-7540.

INSTITUTIONAL REVIEW BOARD:

If you have questions regarding your rights as a research subject, or if problems arise which you do not feel you can discuss with the Investigator, please contact the **Intermountain Office of Research at 1-800-321-2107.**

INJURY NON-COMPENSATION STATEMENT:

In the event you sustain injury resulting from your participation in the research project, UVRMC can provide to you emergency and temporary medical treatment and will bill your insurance company. Since this is a research study, payment for any injury resulting from your participation in this research study may not be covered by some health insurance plans. If you believe that you have sustained an injury as a result of your participation in this research program, please contact the investigator as soon as possible. You may also contact the **Intermountain Office of Research at 1-800-321-2107.**

VOLUNTARY PARTICIPATION:

It is up to you to decide whether or not to take part. If you do decide to take part you will be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. This will not affect the relationship you have with the investigator or staff nor standard of care you receive.

UNFORESEEABLE RISKS:

There are no potential unforeseeable physical risks. However, we will be collecting a number of demographic variables including age, which can sometimes be used as an identifier and could result in a minimal risk to your privacy.

RIGHT OF INVESTIGATOR TO WITHDRAW:

You may withdraw from the study at any time without penalty. Kelly James or Dr. Snyder can withdraw you without your approval. A possible reason for withdrawal includes if your condition worsens and you need to return to ICU or another part of the hospital.

COSTS TO SUBJECTS AND COMPENSATION:

There are no additional costs to you that result from the research.

NEW INFORMATION:

Due to the nature of this study, we do not anticipate any significant new findings during the course of the research which would affect your continued participation.

NUMBER OF SUBJECTS:

We expect about 50 patients from UVRMC Rehabilitation unit will be enrolled in this study. We are not collaborating with other facilities or universities at this time.

CONFIDENTIALITY/ AUTHORIZATION FOR USE OF YOUR PROTECTED HEALTH INFORMATION

Intermountain Healthcare has a commitment to protect your confidentiality. Federal regulations require that you understand how your protected health information (PHI) is used for this study.

This is the information we will use:

- Brief Battery for Health Improvement-2 (BBHI-2) scores

- Functional Independence Measure (FIM) ratings
- Age
- Gender
- Diagnosis
- Length of stay
- Number of psychology visits
- Medications
- Discharge disposition
- Support system at discharge
- Scheduled outpatient therapies

In records and information disclosed outside of INTERMOUNTAIN, your information will be assigned a unique code number. We will keep the key to the code in a secure file.

Others who will have access to your protected health information for this research project include Intermountain's Institutional Review Board (the committee that oversees research studying people) and authorized members of the Intermountain workforce who need the information to perform their duties (for example: provide treatment, to ensure integrity of the research, and for accounting or billing matters), and others as required by law.

Signing this document means you allow us, the researchers in this study, and others working with us to use protected health information about your health for this research study. You can choose whether or not you will participate in this research study. However, in order to participate you have to sign this consent form.

You may change your mind later and ask us to stop using or disclosing your protected health information. **This must be done in writing.** You must either give this notice, called a revocation, in person to the Principal Investigator, the Principal Investigator's staff, or mail it to Kelly James at Attention Rehab Unit; UVRMC 1034 N 500 W, Provo, UT 84604. If you revoke this authorization, we will not be able to collect new information about you, and you will not be able to participate in the study. However, we can continue to use information we have already started to use in our research, as needed to maintain the integrity of the research.

Just so you know, if we send protected health information about you outside Intermountain, based on this or any other authorization you sign, we cannot guarantee that the recipient will not redisclose your protected health information to a third party. The recipient of the information may not be required to abide by this Authorization or applicable federal and state law governing the use and disclosure of your protected health information.

You have a right to information used to make decisions about your health care. However, your information from this study will not be available during the study; it will be available after the study is finished.

This authorization lasts until this study is finished.

For more information about my rights to my protected health information, how to revoke this authorization, and how Intermountain uses my health information, I may ask to see or obtain a copy of the Intermountain Notice of Privacy Practices.

I hereby acknowledge that I have received or been offered a copy of Intermountain's Notice of Privacy Practices.

CONSENT:

I confirm that I have read and understand this consent and authorization document and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. I understand that sections of any of my medical notes may be looked at by responsible individuals from UVRMC. I give permission for these individuals to have access to my records. I will be given a signed copy of the consent and authorization form to keep.

I agree to participate in this research study and authorize you to use and disclose health information about me for this study, as you have explained in this document.

Participant's Name (Print) [this line must be included]

Participant's Signature

Date

Name of Person Obtaining Authorization and Consent

Signature of Person Obtaining Authorization and Consent

Date

If the participant is unable to give consent and authorization, consent and authorization is given by the following authorized personal representative of the individual:

Name of Authorized Personal Representative

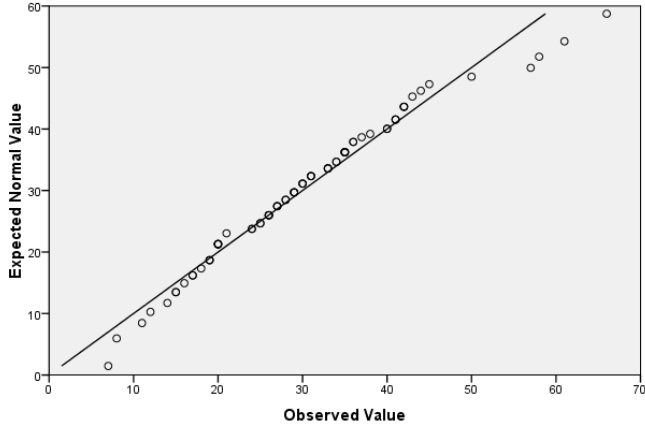
Signature of Authorized Personal Representative

Date

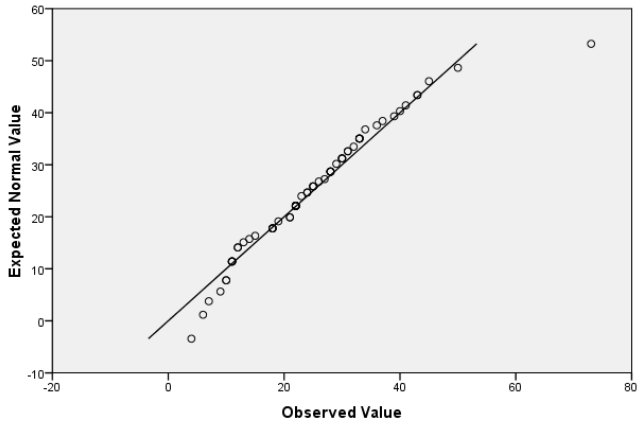
If the participant is unable to give authorization and consent, describe the legal representative's authority to act for the individual: _____

QQ Plots

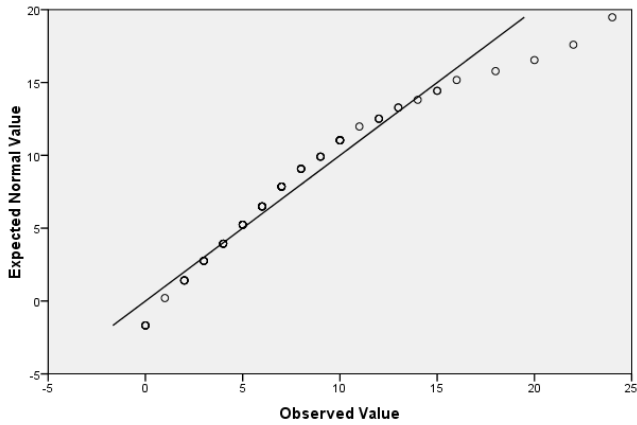
Normal Q-Q Plot of OQ subjective discomfort time1



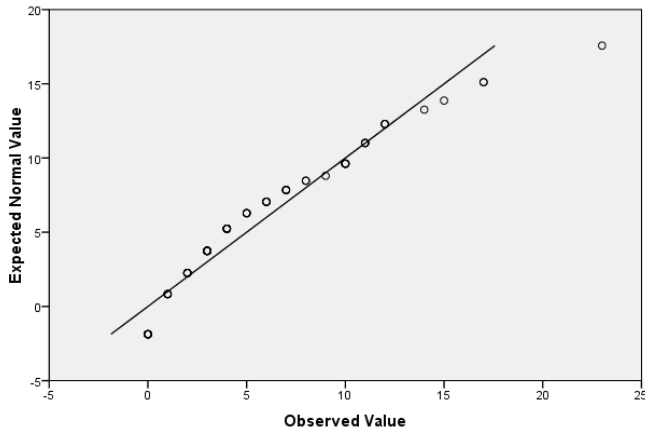
Normal Q-Q Plot of OQ subjective discomfort2



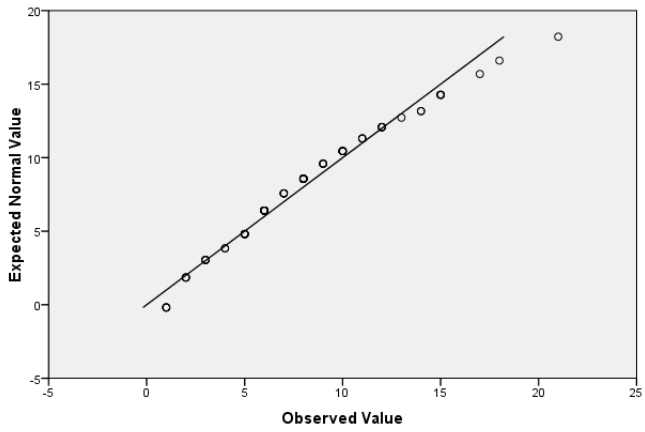
Normal Q-Q Plot of OQ interpersonal relationships time1



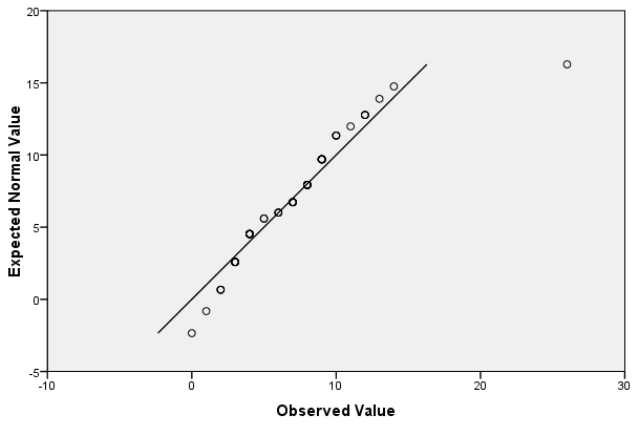
Normal Q-Q Plot of OQ interpersonal relationships2



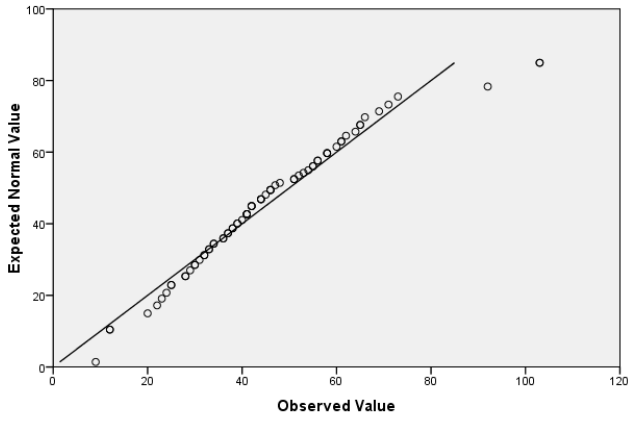
Normal Q-Q Plot of OQ social role performance time1



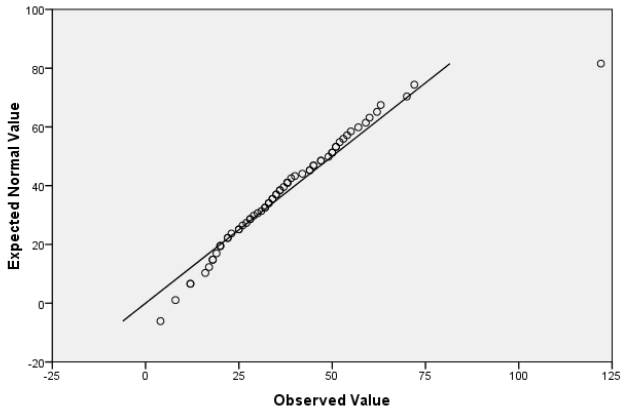
Normal Q-Q Plot of OQ social role performance2



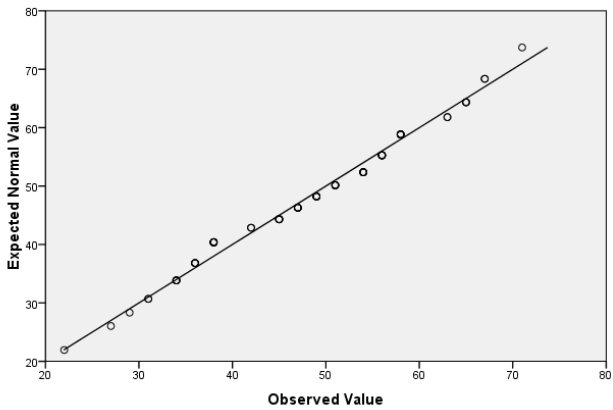
Normal Q-Q Plot of OQ total score time1



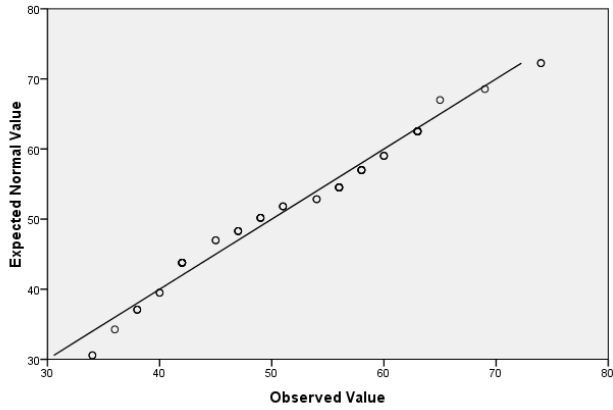
Normal Q-Q Plot of OQ total score2



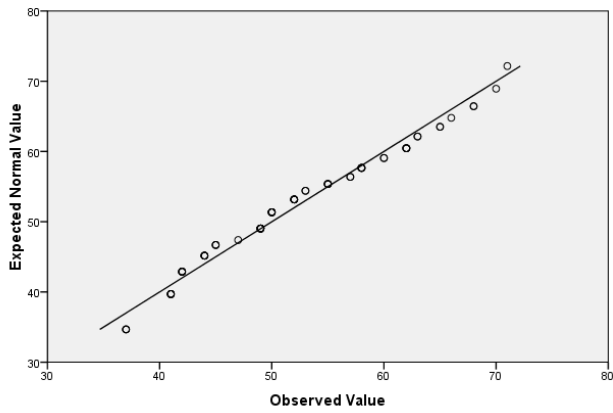
Normal Q-Q Plot of BBHI Defensiveness Patient1



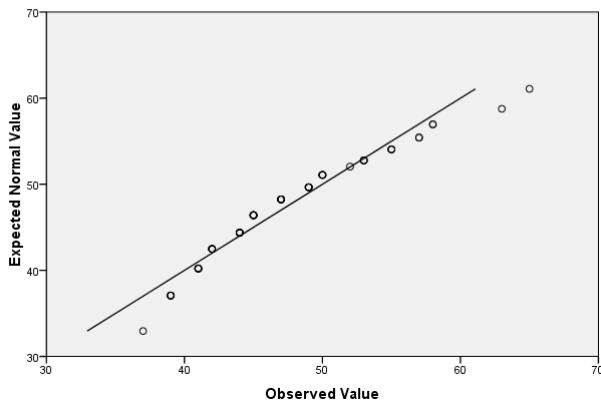
Normal Q-Q Plot of BBHI Defensiveness Patient2



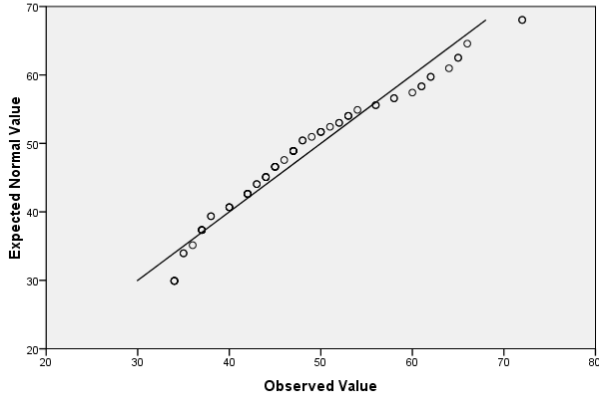
Normal Q-Q Plot of BBHI Somatic Complaints Patient1



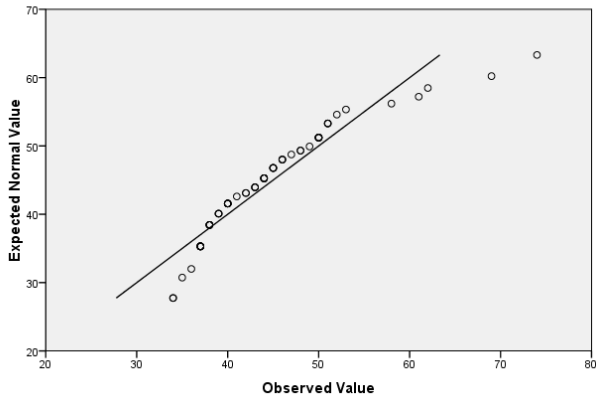
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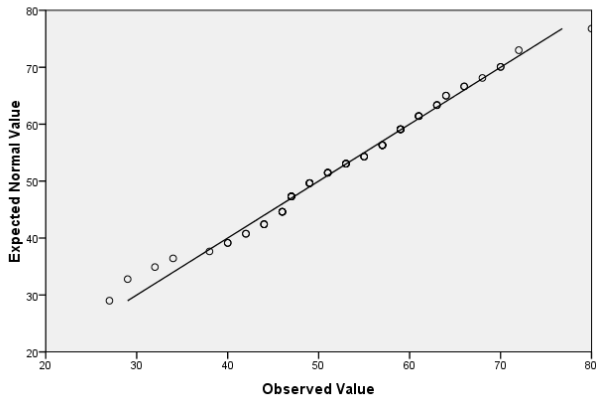
Normal Q-Q Plot of BBHI Pain Complaints Patient1



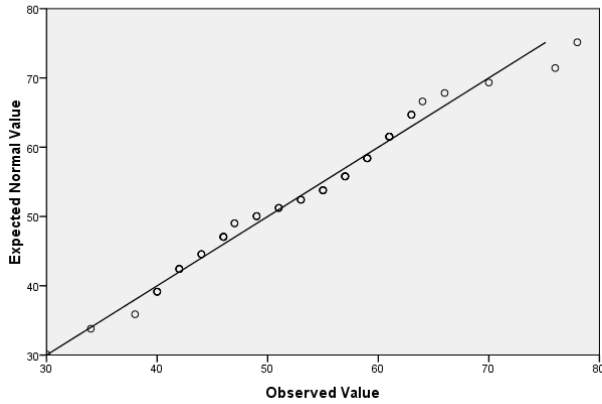
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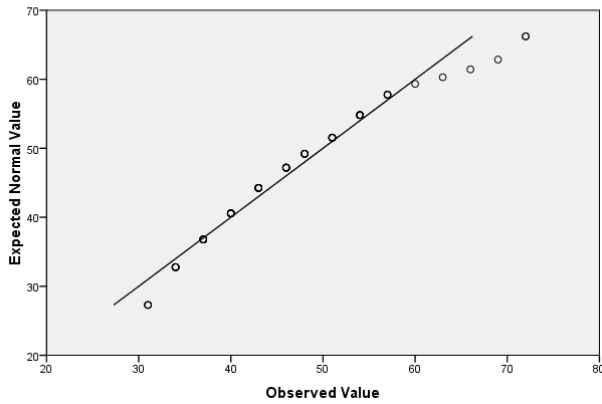
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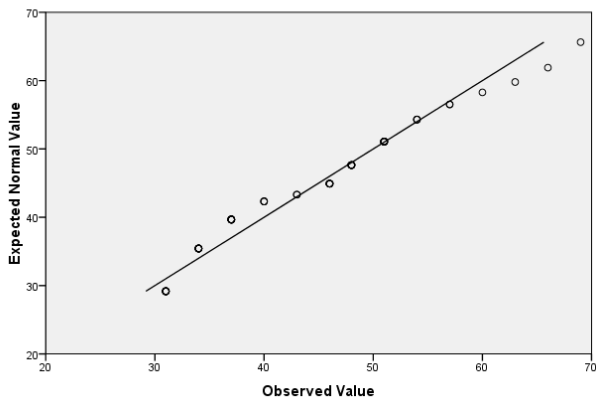
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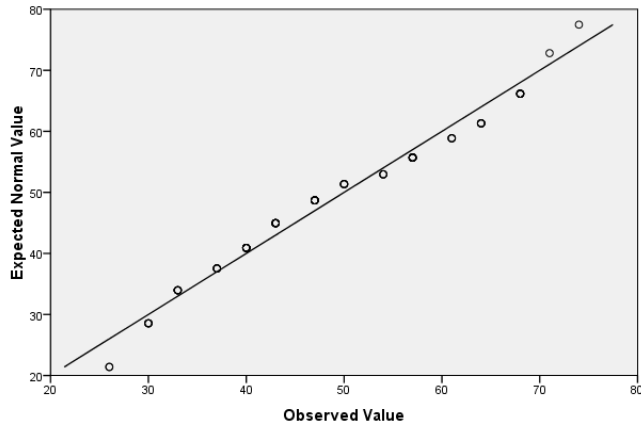
Normal Q-Q Plot of BBHI Depression Patient1



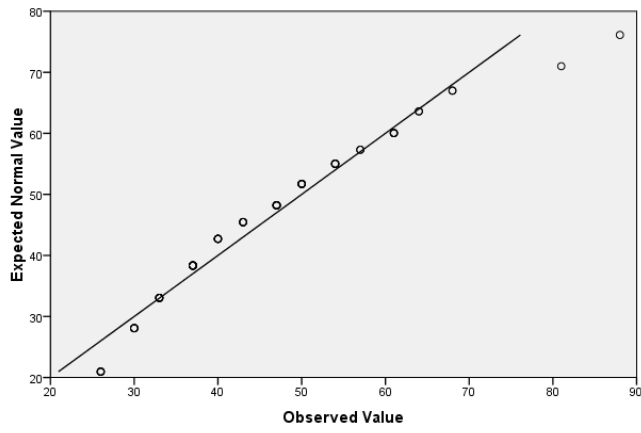
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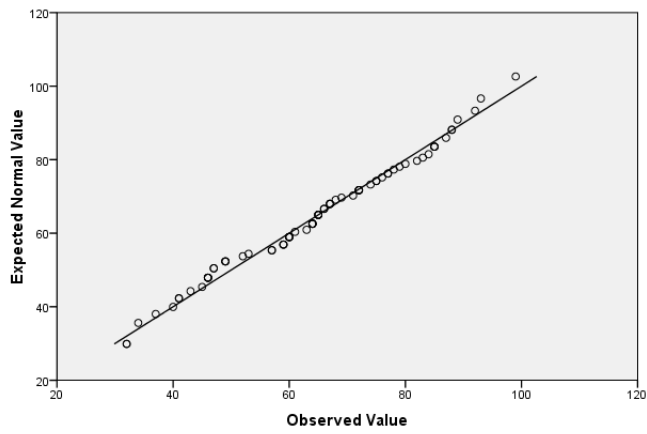
Normal Q-Q Plot of BBHI Anxiety Patient1



Normal Q-Q Plot of BBHI Anxiety Patient2



Normal Q-Q Plot of FIM Total1



Normal Q-Q Plot of FIM Total2

