



NEURO
INSTITUTE

Continuing Education for Rehabilitation Professionals



Functional Recovery: A Mixed Methods Study of the Specific Variables
Within a Post-Hospital Interdisciplinary Brain Injury Rehabilitation-
Residential Program

Victoria Harding, Ph.D., CCC/SLP, MBA, CBIT

Objectives

- In this course, participants will...
 1. Identify 13 contributors to successful outcomes provided by Post-Hospital Interdisciplinary Brain Injury Rehabilitation programs
 2. Describe means for assessing top performers versus lowest performers
 3. Describe a mixed methods research paradigm useful in assessing brain injury rehabilitation programs' environmental of care variables

Research Question

- **Who are the individuals** who make the greatest gains in function while participating in a Post-Hospital Brain Injury Rehabilitation-Residential program, as measured by the Mayo-Portland Adaptability Inventory-4 from admission to discharge?

and

- **What are the components** of the Post-Hospital Brain Injury Rehabilitation-Residential program that may contribute to these individuals' gain in function?

1998 – National Institutes of Health (NIH) Consensus Recommendations:

- Brain Injury (BI) patients receive an individualized rehabilitation program based on the unique patient's strengths and capacities, and that rehabilitation services should be modified over time to adapt the patient's changing needs (NIH, 1999).
- Individuals with moderate to severe brain injuries receive rehabilitation treatment that draws on the skills of many specialists.
- Individually tailored treatment programs in the areas of physical therapy, occupational therapy, speech-language therapy, physical medicine, psychology and psychiatry, and social support. Includes rehabilitation nurses and a team coordinator or administrator.

Background Continued

How is rehabilitation provided for individuals with brain injury?

- Rehabilitation = a problem-solving educational process aimed at reducing disability and handicap experienced by someone as a result of disease or injury (Wade, 1992)
- Goal = improve function in the home environment and in society
- Methods = skill-targeted practice through exercises and training to strengthen underlying impairments and help the individual adapt to disabilities or changes in their living spaces to make everyday activities easier.
- Medical Pathway: Acute Hospitalization → Acute Hospitalization → Rehab Hospital → Additional Therapy if required (CMS 2013).
- Individuals and their families may wish to consider the most appropriate setting to meet an individual's needs and may wish to compare programs' outcomes and specific programming constructs.

Environments of Post-Hospital Rehabilitation

Many options are available:

- Post-Hospital Interdisciplinary Brain Injury Rehabilitation – Outpatient (PHIDBIR-O)
- Post-Hospital Interdisciplinary Brain Injury Rehabilitation – Home Based (PHIDBIR-HB)
- Post-Hospital Interdisciplinary Brain Injury Rehabilitation – Day Program (PHIDBIR-DP)
- Post-Hospital Interdisciplinary Brain Injury Rehabilitation – Hospital (PHIDBIR-H)
- Post-Hospital Interdisciplinary Brain Injury Rehabilitation – Residential (PHIDBIR-R)
- Also non-rehab focused programs: independent living centers, club-house programs, school-based programs for children, and others.

*Currently, there is no consensus regarding a classification system of rehabilitation interventions and programs (Turner-Stokes L et al 2005). Programs may be described in terms of setting and content.

Research to Date

- No consensus regarding a classification system of rehabilitation interventions and programs (Turner-Stokes, L. et. Al, 2005).
- Programs may be described in terms of setting and content.
- Research efforts have focused on demonstrating positive outcomes.
- Significant variability.
- The systematic study of these environments and the identification of specific variables that are provided by these programs that significantly contribute to improvement in function remains untouched.

(Salazar, Warden & Scwab 2000; Vanderploog, Scwab & Walker 2008; Ponsford Harrington & Olver 2006; Prigatano, Klonoff & O'Brien 1984; Cicerone, Mott, Azulay & Friel 2004; Willer, Button & Rempel 1999).

The Problem

- Outcomes reported by PHIBIR-R Programs.
- Identification of specific constructs in these environments of care that are associated with positive functional outcomes.
- Stakeholder informed choice.
- Inform new program development.
- Research has focused on quantitative analysis of specific programmatic techniques or environments and has ignored the wealth of potential data in collection and analysis of qualitative data.

Research Aims

- 1. Determine specific constructs in PHIDBIR-R programs that have positively influenced measurable gains in function.
- 2. Determine who are the top performers and what specifically contributes to their change scores?
- 3. Understand the methodology process itself as specific to the brain injury arena regarding the survivors' functional improvement.
- 4. Promote action in applying the identified constructs as pillars of inclusion in PHIDBIR-R programs.

Methodology

Research used a sequential, two-phase *mixed methods* approach.

Phase One – WHO MADE THE GREATEST GAINS?

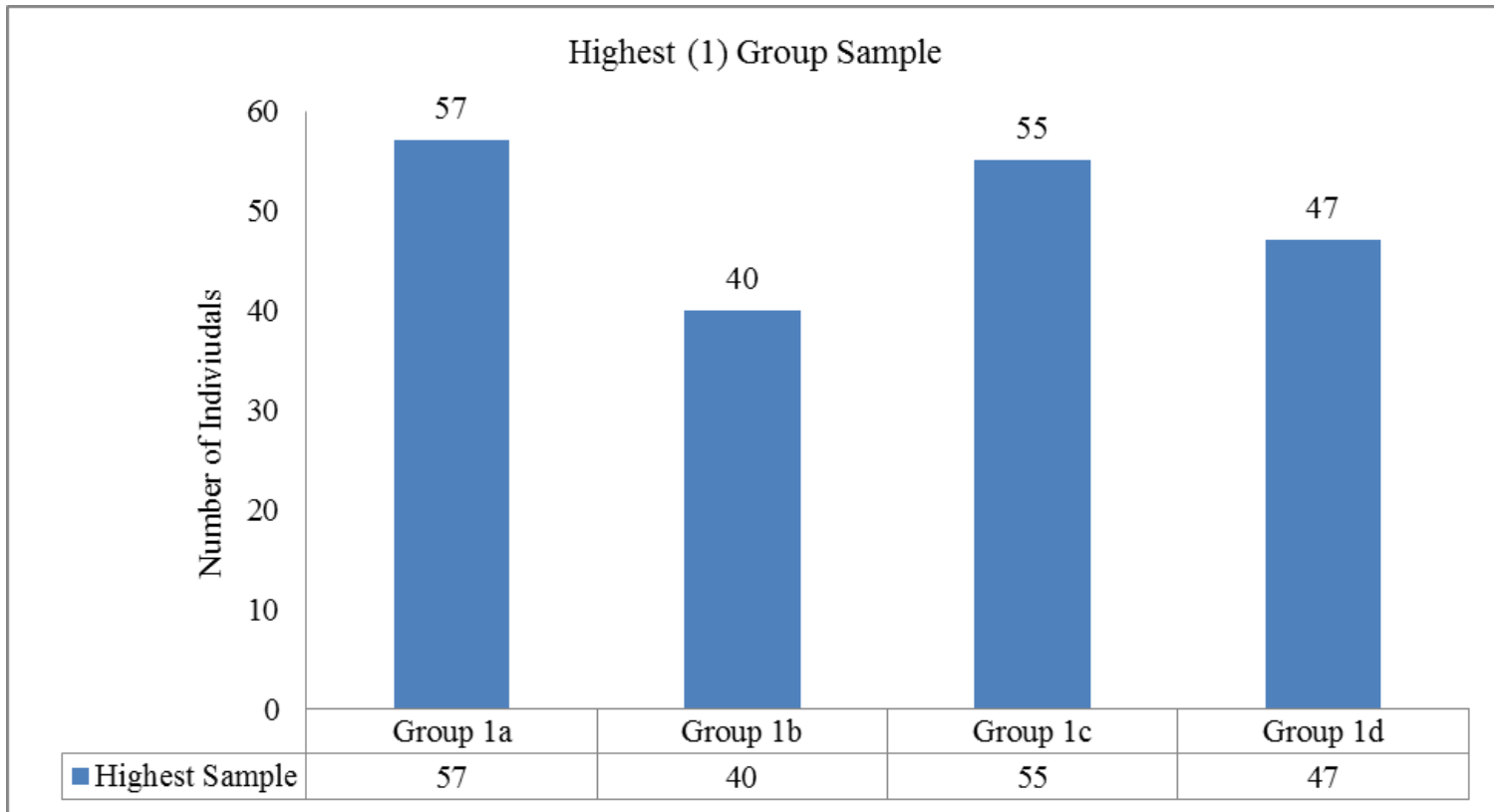
- Used a Quantitative Design
- Improvement in function was determined via quantitative analysis using an objective, psychometrically valid outcomes measurement system, the *Mayo-Portland Adaptability Inventory-4* (MPAI-4). (Lezak & Malex, 2003).
- Each individual who admitted to the PHIDBIR-R program was given the Mayo Portland Adaptability Inventory-4 (MPAI-4) (Lezak & Malec, 2003) at admission and discharge.
- A Change Score on the MPAI-4 was determined for each individual who met the selection criteria.
- **N=712**

Methodology

Phase One – WHO MADE THE GREATEST GAINS?

- The Change Score was determined by subtracting the post-test total standardized score, (as gathered at discharge from the PHIDBIR-R program) from the pre-test total standardized score (as gathered at admission to the two PHIDBIR-R program) for all participants during the identified twelve-month period.
- Change Scores assigned to one of four groups representing their change category of highest; high-mid; mid-low; lowest.

Methodology



Data Analysis

Group			Mean change	
Sample	<i>N</i>	Change score range	in participation T-score	SD
1a	57	19-34	22.31	3.99
1b	40	16-18	16.65	.735
1c	55	13-15	14.11	.831
1d	47	12-12	12	0

Interaction of Participant Characteristics and Outcome by Group 1.

Characteristic	Group 1a Highest 25%	Group 1b High-Mid 25%	Group 1c Mid-Low 25%	Group 1d Lowest 25%
Sample Size	57	40	55	47
Age	46	45	42	42
Male / Female %	67 / 33	73 / 27	86 / 14	83 / 17
TBIs %	68	63	66	53
CVAs %	14	23	11	21
Anoxia / Hypoxia %	2	5	11	6.4
Length of Stay (months)	5.1	4.7	3.8	4.8
Onset of Injury to Admission (months)	6.5	14.0	4.6	18.0

Data Analysis



Rank Order of Q1 – Group 1 MPAI-4 Change Scores

Sub	Pseudo	Admit T-score Abilities	Admit T-score Adjustment	Admit T-score Participation	Discharge T-score Abilities	Discharge T-score Adjustment	Discharge T-score Abilities	Total Gains
1	August	109	64	74	37	42	40	128
2	Emery	42	36	46	-4	-6	28	106
3	Riley	55	50	59	31	-6	40	99
4	Dylan	45	43	53	29	-6	28	90
5	Chris	59	60	74	35	36	36	86
6	Pat	50	41	49	29	-6	36	81
7	Logan	63	58	53	34	28	34	78
8	Ryan	66	57	69	45	35	41	71
9	Lou	74	62	65	50	38	43	70
10	Rene	52	42	44	25	19	25	69
11	Robin	51	38	69	49	-6	50	65
12	Gray	44	43	45	12	33	25	62
13	Blake	55	39	48	31	19	31	61
14	Peyton	50	48	50	29	10	49	60
15	Jessie	37	30	40	-4	24	28	59
16	Casey	77	55	65	42	47	49	59
17	Phoenix	77	55	65	42	47	49	59
18	Sidney	49	56	48	34	42	19	58

Data Analysis

Predictive findings:

- Step-wise multiple regression analyses were also conducted to determine predictors of functional outcome using discharge Participation T-scores
- First on the Highest Group (n=199)
- Chose those items that were most closely associated with change in score from Lewis and Horn's (2013) findings:
 - **Abilities:** mobility; motor speech; verbal communication; attention/concentration; memory and fund of information.
 - **Adjustment:** impaired awareness; inappropriate social; anxiety; and depression.
 - **Participation:** initiation; self-care; and residence (level of independence in the home)

Data Analysis

Predictive findings:

- These significant predictor variables were then entered into a stepwise in a regression analysis to identify predictors of discharge T-scores for the Highest-High – Group (**n=57**)
- This analysis revealed three significant predictors:
 - Self-care
 - Initiation
 - Residence

Data Analysis



Predictors of Discharge Participation T-scores for Group 1a

Predictor Variable	Stepwise Regression		Final Beta	p-value
	R-Square Added	Cumulative R-Square		
Self-care	.73	.73	.457	p < .0001
Initiation	.10	.83	.377	p < .0001
Residence	.04	.87	.259	p < .0001

Methods

- **Phase Two** (Qualitative) used an
 - **Inductive methodology** (Thomas, 2006)
 - Began with participants' views, explored emerging patterns, theories and potential generalizations through an open-ended interviewing technique (Creswell & Plano Clark, 2011; Merriam, 2009).
 - A person-to-person interview focused on generating data on the PHIDBIR-R program experiences will guide the collection.
 - Semi-structured interviews took place in a private setting within a home or a private office.
 - Interviews took 30-90 minutes and were recorded via audiotape.
 - Audiotaped interviews were transcribed verbatim for the analysis and were stored on both a password-protected computer and a memory stick stored in a locked filing cabinet to which only the researcher maintained access.
- At seven interviews, initial data coding indicated that saturation of theme was reached. An additional three interviews confirmed this.
- A total of ten individuals were interviewed.

Methods



Strategy	Sample	Goal	Analysis
<u>QUANTitative</u> Analysis of MPAI Data: scores at admission compared to scores at discharge	All program completers within past twelve months from all sites Oct 1, 2012 – Sept 30, 2013 N=712	Identify 50 participants with the greatest overall reduction in T-scores (indicates reduction in disability)	Serial assessment using a repeated measures design
<u>QUALitative</u> data collection: Semi-structured interviews	10-50 participants with greatest functional gains, and their family members	Identify emerging themes of the rehab program associated with functional improvement	Identification of common and individual themes/constructs

Phase 2 – Data coding

- Credibility Procedures:
 - Process Notes
 - Member Checking
 - Peer Review
 - Memo Writing
- Coding: (use of Nvivo 10®)
 - Line-by-line coding will be used to take segments of data apart and name each with a concise, descriptive term.
 - Then, analysis will use a focused, selective phase of coding that identifies the most significant, or frequent, codes to organize the data and begin to identify common themes. Codes and data will be compared with each other.
 - Conceptualize how the substantive codes may relate to each other as potential hypothesis which may be integrated into a theoretical model.

Data Analysis – Phase 2

- Saturation reached at 10 individuals interviewed
- Thirteen themes and four major categories emerged
- Engaged, passionate and effusive responses

Categories, Themes, and Idea Clusters

Category (1, 2, 3, 4) Theme (a, b, c, d)	Idea Cluster 1	Idea Cluster 2	Idea Cluster 3
(1) Support			
<i>(a) Paid Staff</i>	Supportive Stance	Attitude	Skill
<i>(b) Program Peers</i>	Collectiveness Feeling	Competition	X
<i>(c) Family Support</i>	Frequency of Visits	Involvement in Treatment	X
<i>(d) Higher Power</i>	Saved from Death	Source of Strength	Control of Outcomes
(2) Therapies			
<i>(a) Staff Skills</i>	Specialties	Availability; Individual Treatment	X
<i>(b) Self-Assessment</i>	Describe Adaptation	Attitude of Self-Efficacy	X
<i>(c) Equipment or Techniques</i>	Level of Supervision	X	X
(3) Continuum of Care			
<i>(a) Time of Treatment</i>	After Hospital Experience	Community Integration	X
<i>(b) Accessing</i>	Real World	X	X
<i>(c) Levels of Care</i>	Progress in One Setting	X	X
(4) Environment of Care			
<i>(a) Daily Schedule</i>	Structured Day	Work Ordered Day	X
<i>(b) Physical Set Up</i>	Home-Like	Barrier-Free	X
<i>(c) Location and Setting</i>	Community Imbedded	Transportation	Proximity to Home

Emergent Themes

- **Paid program staffs' support.**

“staff support is what helped me more than anything, because I'm like - they care. They talk with me and get me to do a lot of stuff and seem to care that I get it right. They were encouraging. They're not leaving me sitting in this room all day like in the hospital. I was out there participating even in neighborhood like stuff” (Sawyer, 4)

- **Peers in the program provide motivation or support.**

“When I met R, I got much more excited. He was hurt real, real bad. Much worse than me. But he was so positive, it was just incredible. I thought - If he could do it. He made the whole place better for us” (Angel 9).

Emergent Themes

- **Family support helped to achieve gains**

“It was beneficial being close to family because I had that connection and they could learn all of my exercises and my strategies and help me with them when I went home on the weekends and even after I got discharged.” (Marion, 4)

- **A higher power provided success.**

“He said something about being blessed and I was like, ‘Oh, mother***ker. He's going to be all into God and s**t.’ And that was when I was devoutly atheist and now I'm talking about God all the time. It's because I can't really explain why I've done so good. At some point I started saying prayers, so it feels like they were answered.” (Angel 9).

Emergent Themes

- **Therapies: Staff Skills**

“They just have more one on one time than at the hospital. They had a lot more patients at [name of hospital] and the doctor recommended that I do these spring exercises twice a day, so I would do it on days when they could help. But at [name of program], I was able to do twice a day every single day. So that was very really good at getting success.” (Angel, 3)

- **Therapies: Self-assessment**

“After thinking about it for a bit, I took a pair of needle-nosed pliers put them in my left hand and then got the pliers onto the swivel. So, I was able to use the pliers as my left hand and then my right hand is just as dexterous as it ever was. I was able to change that hook from a hook to a lure. That was big for me that I was taught how to figure stuff like that on my own. So my hand might not work perfect, but I can still get a job done, you know?” (Sawyer, 5)

Emergent Themes

- **Therapies: Equipment or techniques.**

“They took an hour in the community to do things. All the staff were trying to be on the same page...which is very hard to do because you're dealing with so many different people and different personalities. If you work this shift—and you might not see Richard, but you might see Joseph or somebody else—you might not know new things that they've learned in Speech or whatever. That's the hardest thing. But overall, they did quite well in coming together and making it all work. It was just good that it was all real stuff that we were doing. Sure there were protocols, but **we were practicing what we really needed to do when we got home.**” (Phoenix1).

Emergent Themes

- **Continuum of Care: Timing**

“I knew it was time for me to make a change because I was going from being having nurses do everything for me, to go to more the intermediate kind of thing where I could do some things. It was time.” (Marion, 3)

- **Accessing this level of care as part of the continuum.**

“It’s more intense because it’s all the time, which is different from the hospitals because you are still getting better from being really, really sick. This is a different type of getting better. Not just healing your bones and your skin and stuff, but now you’re thinking you know? (Ryan, 3)

Emergent Themes

- **Providing different levels of care within the program**

“...but that was really cool how I started out on the first floor in room eight. Then after a while they moved me over to M's room, which was-- they moved M somewhere else and moved me to M's old room. M's old room was huge. It had a big sized fridge in it and a small kinda kitchen. I was getting better then and could do some more cooking stuff with the microwave and stuff then and I needed to be able to practice in the type of place that I was going to live in when I left there. Like the type of place that I live in now.” (Phoenix, 2).

- **Environment of Care: Following a daily schedule**

“It helped me to know what was going to happen from minute to minute. I could plan on it because new was hard for me then. Also, I got so that I was in a regular routine like I was in my life before.” (Leslie, 2).

Emergent Themes

- **Environment of Care: The physical plant or set up**

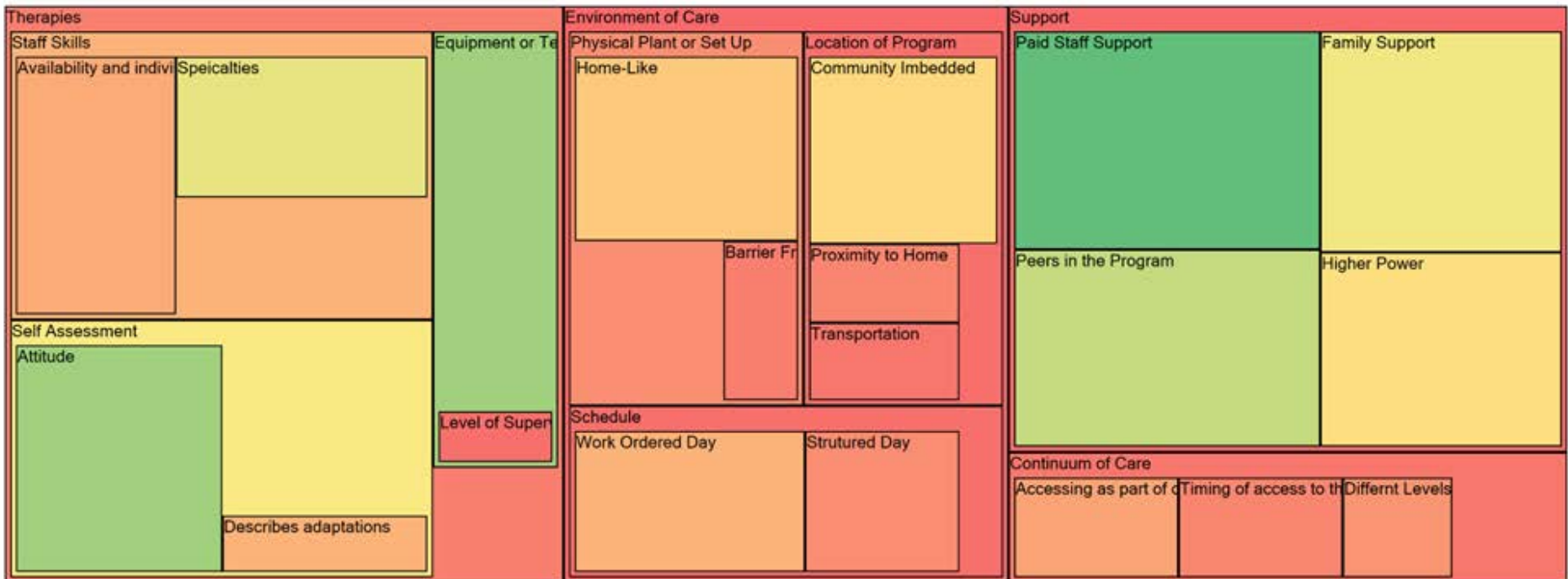
It was a regular-- It was a house like this one I live in now, except with a ramp in front and you got much more one on one time. It was more like being at home. That helped because it was real. (Angel, 4)

- **Environment of Care: Location/setting of the program contributed to success**

Yeah, going over to the YMCA every day at one I really liked - it might seem strange but - I really liked my trips to CVS right down the street, maybe a block away to CVS to go get my toiletries and stuff. You know shampoo, body wash. Having everything right there outside the front door is just a premier situation. If I would've been in a hospital and then I probably never would have met anybody to practice this stuff. (Gray, 1)

Data Analysis

Nodes compared by number of items coded



Conclusions

- Data showed that individuals who made the greatest improvements as measured by the MPAI-4 experienced fewer problems in the areas of:
 - Self-care
 - Initiation
 - Residence

when compared to the other 26 items the test measured.

— These three categories account for the most amount of change in MPAI-4 scores among those who were determined to make the greatest improvements.

Conclusions

- The results support a framework for new program development and perhaps accreditation —pointing towards compulsory construct inclusion, training, supports and services in PHIDBIR-R programs.
- Individuals served, their families and funders, should receive education about these environmental and programmatic essentials so that they make an informed choice about which PHIDBIR-R program they may wish to choose for their rehabilitation needs.
- Advocates, public policy makers and the rehabilitation industry should also be made aware of these core program components associated with positive outcomes so that these elements can be considered when conceiving of best means to promote optimal outcomes following brain injury and rehabilitation participation.

Conclusions

- Provides a better understanding of the methodology process itself as specific to the brain injury arena
- Confirms that qualitative interviews with brain injury survivors treated in a PHIDBIR-R program contribute to a more comprehensive and nuanced insight regarding the survivors' functional improvement

Recommendations

- Additional studies exploring similar phenomena are clearly needed.
 - Studies that focus on those least successful performers
 - Utilize different participation selection criteria
 - Additional studies that use a mixed methods design. These studies can focus not merely on identifying if significant improvement is realized, but how this improvement is created.

| Comments/Questions

