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Characteristics of Subjects Who Avoid Activities and Participation Due to a Fear of Falling in Parkinson's Disease

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CHARACTERISTICS OF SUBJECTS WHO AVOID ACTIVITIES AND PARTICIPATION DUE TO A FEAR OF FALLING IN PARKINSON'S DISEASE

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ABSTRACT

Background and Purpose: The purpose of this study is to examine and identify key characteristics of and differences between people with Parkinson's Disease (PD) who exhibit moderate/high fear of falling avoidance behaviors and those that exhibit low fear of falling avoidance behaviors.

Subjects: A total of 24 subjects (5 females, 19 males; mean age= 72.2, SD=9.1) participated in this study.

Methods: A cross-sectional design was used to identify descriptive characteristics of subjects with PD associated with moderate/high levels of fear avoidance behavior (MHA) or low levels of fear avoidance (LA) as measured by the Fear of Falling Avoidance-Behavior Questionnaire (FFABQ). Then six profiles were used to test for differences between the MHA and LA groups: 1) demographic profile including age, socioeconomic status, and education; 2) a PD profile including the Unified Parkinson's Disease Rating Scale (MDS-UPDRS) and its subscales, the Hoehn and Yahr Scale, the Parkinson's Disease Questionnaire (PDQ-39) and its subscales; 3) a fall profile, including number of falls during the last month, falls in the last year, and number of falls resulting in injury; 4) a balance profile, including the Berg Balance Scale (BBS) and the Activities Specific Balance Scale (ABC); 5) a strength and conditioning profile, including the 2 minute step test (2MST), 30 second Sit to Stand Test (30STS), Timed UP and Go Test (TUGT), and the activPAL physical activity monitor; 6) and a psychological profile including the Zung Anxiety Scale (ZAS), Beck Depression Inventory (BDI), Falls Efficacy Scale (FES),

Catastrophizing About Falls Scale (CAFS), and Consequences of Falling Questionnaire (CoFQ).

Results: A significant difference was found between the LA and MHA groups in the following measures: Age, MDS-UPDRS, MDS-UPDRS ADL subscore, PDQ-39 mobility subscore, ABC, BBS, CAFS, and CoFQ.

Discussion/Conclusion: Results of this study will assist clinicians to identify possible risk factors for high avoidance behaviors in the PD population. Further research is suggested to determine if modifiable factors can be improved and subsequently decrease avoidance behaviors in this population.

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INTRODUCTION

Parkinson's Disease (PD) is an increasingly common disease among older adults, with a prevalence of 9.5 per 1000 elderly, and is expected to double by 2030.[1, 2] While falls are a common issue among older adults, with 30% of all adults 65 and older falling annually; it is a major problem among those with PD where 60.5% fall annually and 39% are recurrent fallers falling an average of 20.8 times per year.[3, 4]

PD is known to be a risk factor for falling, and increased postural instability is correlated with PD severity and fall risk.[5, 6] Falls in those with PD are associated with decreased function and quality of life along with increased risk of hospital/nursing home admission and increased mortality.[7-9]

Recurrent falls substantially increase the likelihood of injury and long-term disability in this population.[10] In 1996, Mitchell et al[11] found that 6.8% of nursing home residents in the study had PD, and PD was associated with increased activity of daily living (ADL) dependence and faster functional decline. Allen et al[4] found that fall history, longer disease history, increased motor impairment, and fear of falling were factors associated with recurrent falling.

Fear of falling can easily develop among the general elderly population with about one-third developing fear of falling after a fall event.[12] Howland et al[13] found that a recent fall is not necessary to develop fear of falling, with 20% of older individuals reporting a fear of falling without a recent fall; and among those with PD, an absence of a fear of falling is unrelated to fall history.[14] Fear of falling can lead to worry, low balance

confidence, and activity avoidance, and may effect social interaction which leads to disability.[13, 15]

Disability, as defined by the World Health Organization[16], is a physical or mental impairment which limits or restricts a person. Up to three-quarters of all adults 65 and older avoid at least one activity due to fear of falling, with 15% reporting severe activity restrictions.[17] Disability due to fear of falling carries over to those with PD, as fear of falling has been found to negatively impact quality of life through increased avoidance behaviors.[18] The reasons people develop avoidance behaviors can be varied, especially since fear of falling can develop in the absence of falls.[19] It is thought that catastrophization, defined as "thinking of the worst possible outcome" can be the root of avoidance behavior and has been described as a leading cause of disability.[20, 21]

While avoidance due to a fear of falling may initially decrease the chances of a fall, decreasing activity leads to lower activity tolerance and functional ability. The cycle of falling, and fear of falling is propagated by impaired balance due to inactivity and postural instability in those with PD.[6, 22] Fear of falling can lead to various levels of avoidance by people, which can be described as non-avoiders and avoiders.[23]

Avoiders may have a lower quality of life due to their decreased participation in society and disability due to not only physical, but also psychological factors. Understanding the role of fear-based avoidance of activities, and its relationship to activity and function is an important topic that has not been previously investigated to our knowledge. Understanding this phenomenon may help to develop more effective treatment plans for people with PD. The purpose of this study was to examine fear of

falling avoidance behaviors in people with PD and to identify possible differences in avoidance behaviors in six different profiles: demographics, severity of PD symptoms, fall history, balance, strength and conditioning, and psychological.

METHODS

Subjects

Twenty-four subjects, aged 56 to 88 (mean age=72.2, SD=9.1), with neurologist-diagnosed PD, participated in this study under University of Nevada Las Vegas Institutional Review Board approval*. Subjects were recruited through local support groups and snowball sampling techniques.

Overall study design

To answer the primary research question, a prospective, cross-sectional research design was implemented to compare a stratified group of PD subjects based on their level of avoidance behavior: moderate to high avoiders (MHA) and low avoiders (LA). Subjects were classified into MHA and LA groups based on overall FFABQ score. The FFABQ was chosen because it has been shown to measure avoidance behaviors, rather than balance confidence, self-efficacy, or fear.[23]

The FFABQ is a questionnaire consisting of 14 items related to the International Classification of Functioning, Disability, and Health (ICF) participation level activities (i.e. walking in crowded places) and asks the person to rate their avoidance behaviors on a 0-4 Likert scale with 0 being "Completely disagree" and 4 being "Completely agree".[23] A score of 20 or above placed the subject in the MHA group and a score of 19 or below placed the subject in the LA group. Twenty was chosen as the cutoff between the groups because an average score of below 20 on the FFABQ would indicate the respondent most commonly answered "Completely disagree" or "Disagree" on the 14 items about the

* Protocol # 1103-3766

subject's avoidance behaviors scored on the scale. A score of 20 or above indicated that the most common answer for the 14 items was "Unsure," "Agree," or "Completely agree," indicating higher avoidance behaviors. See Table 1 for more information regarding the FFABQ. The main component of this non-experimental design was to compare the differences in the characteristics between these two groups. Thus, subjects were assessed on one occurrence for each of the variables. See Figure 1 for study flow chart and explanation of missing variables.

Data collection

Subjects were visited and assessed in their homes to reduce the burden of travel and to allow participation of community ambulating subjects, as well as home-bound subjects. Subjects were tested over two occasions with a one-week interim period in which they wore the activPAL[†] activity monitor. During the first visit, specific tests and measures were administered, and subjects were instructed in how to wear the activPAL, which was left with them for the week between visits to gather information about their daily activity levels. Subjects were also directed to complete the self-report questionnaires left with them prior to the second visit. One week later the second visit was completed to collect the monitors and self-report questionnaires from each subject.

In order to provide a comprehensive picture, data were collected from six different profiles: demographic, PD, fall, balance, strength and conditioning, and psychological.

[†]PAL Technologies Ltd, 141 St James Rd, Glasgow G4 0LT, United Kingdom.

Demographic Profile. Data in this category consists of a self-report questionnaire that provides data for age, gender, socioeconomic status, and education level.

PD Profile. This profile is a series of self-report questionnaires and researcher-scored items that measures the severity of the PD process. The Movement Disorder Society-Unified Parkinson's Disease Rating Scale (MDS-UPDRS), Hoehn and Yahr Scale, Parkinson's Disease Questionnaire (PDQ-39) were used for this profile. See Table 2 for more information regarding these scales.

Fall Profile. This profile consists of a self-report questionnaire providing subject reported data of falls during the last month and year, as well as falls resulting in injury.

Balance Profile. This profile consists of researcher-scored Berg Balance Scale (BBS) that objectively measures each subject's balance and the Activities-Specific Balance Confidence Scale (ABC) that is a measure of each subjects balance confidence. See Table 3 for more information regarding these scales.

Strength and Conditioning Profile. This profile consists of researcher-scored data to objectively measure strength, conditioning, and activity level of each subject. The two minute step test (2MST), 30 second Sit to Stand Test (30STS), Timed-Up and Go Test (TUGT) and one week of physical activity monitoring using the activPAL software were used for this profile. The activePAL software was used to measure METS, hours sitting or lying, time standing, time stepping, number of steps taken, and up/down transitions. See Table 4 for more information regarding these scales.

Psychological Profile. This profile consists of researcher scored data and self-report questionnaires that examine the mental state of each subject, along with any

psychological effect that may exist from a previous fall. The Zung Anxiety Scale (ZAS), and Beck Depression Inventory (BDI), Falls Efficacy Scale (FES), Catastrophizing about Falling Scale (CAFS), and Consequences of Falling Questionnaire (CoFQ) were used for this profile. See Table 5 for more information regarding these scales.

Data analysis

Because of a relatively small sample size and a mix of ordinal and interval data, a nonparametric Mann-Whitney test was used to analyze differences between the variable means for each measure between the MHA and LA groups. Gender from the demographic profile was not included in this portion of the analysis as only one female was grouped into the LA group according to FFABQ scores.

Also, correlations were examined using Spearman's rho (r_s) to quantify the relationship between the measured variables and the FFABQ to identify any relationships between avoidance behaviors and other examined data. All data were analyzed using SPSS version 19.0[‡] statistical software. The level of significance for all of the analyses was $\alpha = .05$.

[‡] SPSS inc, Chicago, Illinois

RESULTS

Demographic Profile. Significant differences were found in the means between the groups for age with the MHA group being 7.1 years older (p=.045). Significant data was not found for gender, socioeconomic status, education level. Values for this profile are found on Table 6.

PD Profile. Significant values were found in the MDS-UPDRS with MHA scoring 20.2 points higher (p=.013), MDS-UPDRS ADL subscale with MHA scoring 4.9 points higher (p=.034) and the PDQ-39 mobility subscore with the MHA scoring 21.1 points higher (p=.031) with the Hoehn and Yahr and full PDQ-39 scales being non-significant. See Table 7 for complete values.

Fall Profile. No significant values were found for falls during the last month, falls during the last year, nor falls resulting in injury. See Table 8 for complete values for this profile.

Balance Profile. Significant values were found for the BBS and ABC scale with the LA group scoring 12.0 points (p=.002) and 23.7 points higher (p=.004), respectively. See Table 9 for a complete list of values for this profile.

Strength and Conditioning Profile. No significant values were found for the 2MST, 30STS, TUGT, or for the ActivPal activity monitor. A complete list of values can be found in Table 10.

Psychological Profile. Significant differences were found in the CAFS and CoFQ with the MHA group scoring respectively, 3.3 points (p<.01) and 11.1 points higher (p<.01). No significant differences were found in ZAS, BDI, and FES. See Table 11 for a complete list of values for this profile.

Using Spearman's rho (r_s) for correlations, there was a statistically significant relationship between the FFABQ score and the PDQ-39- mobility subscore (r_s =.525, p=<.01),the BBS (r_s =-.490, p=.015), the ABC (r_s =-.625, p=<.01), the CAFS (r_s =.637, p=<.01), and the CoFQ (r_s =.755, p=<.01) See accompanying tables 6-12 and figures 2-7 for results and descriptive statistics of each profile examined as well as Table 13 for correlations, including data that were not statistically significant.

DISCUSSION

The study was designed to gain insight into the characteristics of those with PD that avoid activity due to a fear of falling. The results of this study show several differences between the MHA and LA groups; the MHA group was found to objectively be more affected by PD, have poorer balance, and also perceived an increased risk of falling. The LA group was found to be younger, have better balance, and higher balance confidence scores and subjective rating of their overall mobility along with lower MDS-UPDRS scores. However, there was no statistically significant difference between the two groups in both the fall profile and the strength and conditioning profile.

Increased activity avoidance due to a fear of falling was not unexpected with increasing age. Increasing age has been linked to falls and fear of falling in previous studies, and this held true in the current study. [24, 25] Older age has also been found to be a predictor of falls.[26] It is expected that this would hold true in an aging population with PD, due to the combination of increasing age and disease progression. The MDS-UPDRS was used to quantify the severity of PD for each subject, and differences between the MHA and LA groups' total MDS-UPDRS score suggest that avoidance behaviors increase in more severe cases of PD and also with increasing age.[27-30]

In the current study the mean age of MHA subjects was 7.1 years older than the LA group. We are unable to distinguish if age, increased PD severity or both were the driving factor of the increased fear of falling based avoidance. The other objective measure that showed differences between the MHA and LA groups was the BBS, which measures balance at the ICF activity level.[31] This relationship was also demonstrated with a low negative correlation (r_s =-.490) between the scores of the FFABQ and BBS. This

relationship indicates that as avoidance behaviors increase, objective measures of balance decrease. This is most likely due to the progression of PD, or in other words as PD progresses, and as people age, functional balance declines and a person is more likely to address their lack of balance by avoiding the tasks that challenge balance.[32]

The ADL subscale of the MDS-UPDRS and the PDQ-39 mobility subscore subjectively measure how PD affects daily functioning and mobility, while the ABC is a measure of balance confidence with functional tasks. These data show that the MHA group was aware of their balance deficits and decreased mobility. The PDQ-39 mobility subscore had a moderate positive correlation (r_s =.525) to FFABQ scores and the ABC also showed a moderate negative correlation (r_s =-.625) to FFABQ scores. This shows a relationship between self-balance confidence and avoidance behaviors. Clinically, this may be a key area of focus for healthcare providers. There is evidence to suggest that in the clinical setting balance confidence can be improved with skilled intervention.[33]

The CAFS and CoFQ were also shown to be different between the MHA and LA groups and moderate to high positive correlations (CAFS r_s =.637, CoFQ r_s =.755) were shown between these scores and FFABQ score. Both the CAFS and CoFQ are brief questionnaires that measure subjects beliefs about catastrophization and anxiety related to falling.[20, 34] This indicates that the MHA group catastrophized about falling to a greater degree, believing that a fall event would lead to more serious consequences than the LA group. This demonstrates a strong relationship between avoidance behaviors and catastrophic beliefs, or in other words subjects may demonstrate avoidance behaviors because they believe their life will be seriously altered if they do fall.[20] The differences in

catastrophization point to other psychological changes beyond a greater awareness of diminished abilities.

Catastrophization, with regards to musculoskeletal pain, is a well-researched topic and is regarded as an important variable in predicting long-term disability. Research by Flink et al[35] suggests that catastrophization results from an unpleasant stimulus causing fear, anxiety, and hyperarousal, which then results in avoidance behavior. When combined with negative previous beliefs, the cycle can continue unbroken in an individual, leading to greater levels of catastrophization and avoidance.[35] Previous beliefs about falling may influence those in the MHA group to perseverate and continue to catastrophize without a significant difference in total number of falls or overall activity levels. However, catastrophization has not been well researched in other areas, including fear of falling.

Although the data supports differences in disease severity, ADL function and balance between the groups, no difference was found between the groups' fall history. This indicates avoidance may be a positive factor in reducing falls. Previous research has been inconsistent regarding the effect fear and decreased balance confidence have on falling in this population. In 2010, Thomas et al[14] showed that an increased fear of falling decreased risk of falls in those with PD. Whereas, Mak et al[36] found that lower ABC scores were predictive of recurrent falls among subjects with PD. Stel et al[32] in 2004 showed falling among a general elderly population was associated with decreased physical activity, increased number of indoor falls, and decreased physical performance. It is possible that there is a short term decrease in falls as fear of falling develops, with a subsequent increase as the person becomes deconditioned and finds simpler tasks more

challenging. Those in the MHA group may be falling during less challenging situations due to more pronounced sequelae of PD, namely decreased postural stability, reaction times, and bradykinesia which decrease the ability to appropriately react to unforeseen balance perturbations. More research is needed to understand the etiology of falls in this population.

As previously mentioned there was no statistically significant difference between the two groups in both the fall profile and the strength and conditioning profile. One previous study by Landers et al[37] suggested that the MDS-UPDRS, MDS-UPDRS ADL subscale, and BBS are the best standardized scales to discriminate between fallers and non-fallers in the PD population. While the current study did demonstrate that there was a significant difference between the MHA and LA in all three of these scales, it did not demonstrate a significant difference in the number of falls. We believe that this study did not have similar results in regards to the number of falls due to a small sample size and one subject who was an outlier in the LA group who had a very high number of falls. Without the outlier, the LA group only fell 1.67 times in the last year versus 14.5 times.

Other limitations included a relatively homogeneous population of subjects which were almost entirely community ambulating men. ActivPal monitors did not properly record with six subjects due to device malfunction, lost device, or the device was compromised by water exposure. Continuation of the present study is recommended to increase the sample size and power of the study and additional research is recommended to explore cause and affect relationships of fear of falling avoidance behaviors in the PD and possible treatments.

CONCLUSIONS

Results of this study will assist clinicians to identify possible risk factors for high avoidance behaviors in the PD population. Avoidance behaviors in people with PD are multifactorial, with differences measured both subjectively and objectively. Some of the differences found between the two groups could be addressed with physical or cognitive behavioral therapy treatments. Further research is suggested to determine if modifiable factors can be improved and subsequently decrease avoidance behaviors in this population.

APPENDIX A- Tables

Table 1. FFABQ

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity
Fear of Falling Avoidance-Behavior Questionnaire (FFABQ)[23]	Quantifies Avoidance behavior due to fear of falling	14	Overall test-retest reliability was .812 (95% confidence interval (CI): .706 to .883)[23]	Found to be a valid measure of avoidance behaviors in elderly people who are healthy, and people with PD or CVA.[23]

Table 2. PD characteristics

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity in PD
MDS-UPDRS[38]	A clinical rating scale for PD that has 4 parts: I. Non motor experiences of daily living ; II. Motor experiences of daily living; III. Motor examination; IV. Motor complications	65	High internal consistency (Chronbach' s α= 0.79 – 0.93 across parts)[38]	Showed correlation with original UPDRS (p=0.96)[38]
Hoehn and Yahr[39]	Staging scale that provides a general estimate of clinical function in PD.	5	Demonstrates reliability for stages 2-4[39]	Significant correlations between Hoehn and Yahr staging, β-CIT SPECT scanning and fluorodopa PET scanning suggesting convergent validity.[39]
PDQ39[40]	Respondents must affirm one of five categories (from never to always), because of their PD, they have experienced the problem defined by each item during the past month.	39	Chronbach' s α= 0.72 – 0.95; test-retest reliability .76 – 0.93[40]	Most widely used disease specific patient completed rating scale in PD.[40]

Table 3. Balance Profile

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity
Berg Balance Scale (BBS)[31]	Researcher rated assessment of balance tasks	14 tasks, total score 0 (increased fall risk)-56 (decreased fall risk)	ICC=0.98[31, 41]	Considered reference standard in determination of fall risk
Activities-Specific Balance Confidence Scale (ABC)[42]	Based on Bandura's theory of self –efficacy, this scale quantifies confidence in the ability to maintain balance while performing selected activities	16	Test-retest ICC=0.94 among a group of 36 individuals with PD; Chronbach's α=0.92[42]	Correlates with the TUG (r=-0.44, p=0.03) and PDQ-8 (r=0.51, p=0.01) [42]

Table 4. Strength and Conditioning Profile

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity
2 Minute Step Test (2MST)[43, 44]	Functional measure of aerobic capacity associated with lifestyle tasks such as walking and stair negotiation	Subject marches in place with knees achieving a set height for a total of 2 minutes	Moderate positive correlation with 6-Minute Walk Test (6MWT) (r=0.36; p=0.04)[44]	Validated that 2MST can be used in place of 6MWT for elderly[44]
30 second Sit-to-Stand Test (30STS)[45]	Assesses lower body strength	Subject performs multiple sit to stands from a chair for 30 seconds	ICC=0.84 for men and 0.92 for women[45]	Demonstrates ability to predict falls (if ≤ 14.5Xs sensitivity = 0.88, specificity= 0.70) [45]
Timed Up and Go Test (TUGT)[46-48]	A timed test of functional mobility	Three components (standing up, walking, sitting down) where greater than 30 seconds indicated dependence in mobility	Intra- and interrater values ranging from .93 to .99[47, 48]	Correlated with Functional Independence Measure (FIM) (-.59 at p<.001) in older subjects, Tinetti Balance scores r=-.55, Tinetti gait (r=-.53), and walking speed (r=.66) where longer performance times predicted fall occurrence and ADL decline in community dwelling older people[47,48]

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity
Activity monitor[49, 50]	Device attached to patient thight that measures activity leveal	Measures: hours (hrs) sitting or lying, hrs standing, hrs stepping, up/down transitions, metabolicequivalent of tasks (METs)	Inter-device reliability of step number and cadence: ICC (2,1) $\geq$.99[49, 50]	Absolute percentage error <1% for outdoor ambulation, $\leq$ 2% for walking speeds $\leq$ 0.67 m/s[49, 50]

Table 5. Psychological profile

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity
Zung Anxiety Scale (ZAS)[51, 52]	A self-rating instrument for anxiety disorders	20 items that are identified by- a little, some, good part, or most of the time.	PPV=90.1% NPV=67.1%[52]	Sensitivity=71.1% Specificity= 88.3%[52]
Beck Depression Inventory (BDI)[53, 54]	Most widely used instrument for measuring the severity of depression based on symptoms	21	Internal consistency reliability (0.88)[54]	BDI, including somatic items, are reliable and valid in populations with PD.[54]
Falls Efficacy Scale (FES)[55, 56]	Measures level of confidence about falling during activities of daily living	10 items each scored from 1 (very confident) to 10 (not confident at all)	Test-retest reliability of r=0.71; internal consistency of α=0.90[56]	Established construct validity; high correlation with ABC[56]
Catastrophizing about Falling Scale (CAFS)[20]	Quantifies level of catastrophizing with regards to falling	3 items	High internal consistency (Chronbach's α= 0.83)[20]	Questionnaire shown to relate to concerns about falling and mobility restrictions.[20]

Standardized scale	Construct	Number of items	Evidence for reliability	Evidence for validity
Consequences of Falling Questionnaire (CoFQ)[34]	Measures loss of functional independence and damage to identity	12	Chronbach's α= 0.94 and test-retest reliability 0.75.[34]	Shown to have good test-retest reliability over a 6 month period.[34]

Table 6. Results from Demographic Profile

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
Age	**34**	**-2**	**0.045**	**24**	**72.21**	**9.11**	**56**	**88**
MHA				15	74.87	9.52	57	88
LA				9	67.78	6.70	56	82
Socio-Economic Status	**36.5**	**-0.31**	**0.753**	**24**	**5.67**	**2.28**	**2**	**10**
MHA				15	5.80	1.87	2	8
LA				9	5.22	2.77	2	10
Education	**39.5**	**-1.53**	**0.126**	**5.78**	**5.78**	**9.11**	**4**	**8**
MHA				14	5.50	1.23	4	8
LA				9	6.00	1.16	4	8

Table 7. Results from PD Profile

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
UPDRS	**23.5**	**-2.49**	**0.013**	**23**	**73.61**	**18.74**	**46**	**125**
MHA				14	80.71	19.00	64	125
LA				9	62.56	12.37	46	101
UPDRS ADL subscale	**29.5**	**-2.12**	**0.034**	**23**	**18.87**	**5.08**	**10**	**29**
MHA				14	20.79	5.03	13	29
LA				9	15.89	3.69	10	28
UPDRS Motor subscale	**44.5**	**-1.17**	**.243**	**23**	**33.22**	**13.49**	**12**	**60**
MHA				14	36.07	13.57	19	60
LA				9	30.00	12.71	12	51
Hoehn and Yahr	**45.000**	**-1.39**	**.164**	**24**	**2.33**	**.996**	**1**	**5**
MHA				15	2.567	1.05	1	5
LA				9	2.050	.832	1	3
PDQ39	**39.000**	**-1.70**	**.089**	**24**	**34.72**	**12.71**	**11.5**	**64.7**
MHA				15	38.75	13.30	21.8	64.7
LA				9	29.23	8.98	11.5	40.4
PDQ mobility subscale	**31.5**	**-2.15**	**0.031**	**24**	**40.94**	**21.52**	**5**	**92.5**

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
MHA				15	48.83	20.63	25.0	92.5
LA				9	27.78	16.56	5	70
PDQadl	**47.000**	**-1.23**	**.221**	**24**	**40.97**	**20.55**	**4.1**	**75.0**
MHA				15	45.83	21.65	12.5	75.0
LA				9	36.26	18.97	4.1	66.7
PDQstigma	**56.000**	**-.703**	**.482**	**24**	**18.75**	**21.49**	**0**	**87.5**
MHA				15	20.42	26.12	0	87.5
LA				9	15.01	19.59	0	50

Table 8. Results from Fall Profile

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
Falls in the last month	**61.000**	**-.484**	**.629**	**24**	**3.92**	**17.29**	**0**	**85**
MHA				15	.53	8.34	0	2
LA				9	8.60	26.85	0	85
Falls in the last year	**67.000**	**-.030**	**.976**	**24**	**8.17**	**26.18**	**0**	**130**
MHA				15	3.40	4.09	0	12
LA				9	14.50	40.62	0	130
Falls resulting in injury	**42.500**	**-1.79**	**.072**	**24**	**.42**	**.65**	**0**	**2**
MHA				15	.60	.737	0	2
LA				9	.30	.675	0	2

Table 9. Results from Balance Profile

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
Berg Balance Scale	**16.5**	**-3.05**	**0.002**	**24**	**43.29**	**11.42**	**8**	**56**
MHA				15	38.8	12.214	8	51
LA				9	50.78	3.801	45	56
ABC	**19**	**-2.89**	**0.004**	**24**	**62.88**	**21.09**	**20.9**	**93.1**
MHA				15	54.01	19.48	20.9	77.5
LA				9	77.67	14.87	29.7	93.1

Table 10. Results from Strength and Conditioning Profile

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
2MST	**41.000**	**-1.39**	**.166**	**23**	**56.30**	**34.79**	**0**	**129**
MHA				14	48.57	37.69	0	129
LA				9	68.33	27.43	32	125
30STS	**38.000**	**-1.59**	**.113**	**23**	**10.43**	**5.78**	**.00**	**26**
MHA				14	8.57	4.70	.00	18
LA				9	13.33	6.36	7	26
TUGT	**33.000**	**-1.89**	**.059**	**23**	**19.38**	**28.50**	**6.50**	**148.00**
MHA				14	24.71	35.89	8.29	148.00
LA				9	11.08	3.78	6.50	17.00
activPAL METS	**22.000**	**-1.49**	**.135**	**18**	**32.63**	**1.67**	**30.10**	**37.08**
MHA				11	32.31	1.96	30.10	37.08
LA				7	33.11	1.01	31.56	34.27
activPAL time sit/lay	**34.000**	**-.408**	**.684**	**18**	**18.54**	**2.97**	**12.03**	**23.26**
MHA				11	18.58	3.47	12.03	23.26
LA				7	18.49	2.21	14.14	20.46
activPAL time standing	**32.000**	**-.589**	**.556**	**18**	**4.17**	**2.06**	**.73**	**8.40**
MH				11	3.94	2.32	.73	8.40

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
A								
LA				7	4.54	1.66	2.71	7.70
activPAL time stepping	**20.000**	**-1.67**	**.094**	**18**	**1.11**	**.814**	**.01**	**3.16**
MHA				11	.934	.914	.01	3.16
LA				7	1.39	.576	.63	2.16
activPAL steps taken	**18.000**	**-1.85**	**.063**	**18**	**5154.39**	**3940.91**	**18.00**	**15958.4**
MHA				11	4409.44	4688.68	18.00	15958.40
LA				7	6325.02	2179.05	2803.00	9487.33
activPAL up/down	**28.500**	**-.906**	**.365**	**18**	**52.97**	**14.58**	**24.00**	**86.80**
MHA				11	52.17	14.71	37.80	86.80
LA				7	54.21	15.44	24.00	74.00

Table 11. Results from Psychological Profile

	Mann-Whitney U	z	Sig (2-tailed)	N	Mean	Std. Deviation	Min	Max
ZAS	**61.000**	**-.389**	**.698**	**24**	**37.75**	**6.70**	**24**	**49**
MHA				15	37.47	7.85	24	49
LA				9	38.10	4.33	34	48
BDI	**54.500**	**-.779**	**.436**	**24**	**12.21**	**7.89**	**0**	**41**
MHA				15	13.60	9.25	0	41
LA				9	10.70	4.90	0	18
FES	**47.000**	**-1.22**	**.221**	**24**	**27.42**	**13.99**	**11**	**59**
MHA				15	30.13	15.02	11	59
LA				9	24.60	12.06	12	46
CAFS	**9.500**	**-3.52**	**.000**	**24**	**6.71**	**2.27**	**3**	**11**
MHA				15	7.93	1.62	6	11
LA				9	4.67	1.66	3	12
CoFQ	**6.000**	**-3.67**	**.000**	**24**	**27.50**	**7.99**	**5**	**40**
MHA				15	31.67	5.56	20	40
LA				9	20.56	6.54	5	35

Table 12. Subject Demographics

		Low Avoiders	Mid-High Avoiders
Mean Age in Years		67.8	74.9
Gender	Males	8	11
	Females	1	4
Total House Hold Income	0-10K	0	0
	10-20k	2	1
	20-30k	0	0
	30-40k	1	1
	40-50k	1	2
	50-75k	1	2
	75-100k	1	2
	100-150k	1	2
	150-200k	0	0
	200k+	1	0
	Not reported	1	5
Highest Education Completed	Never Attended	0	0
	Grades 1-8	0	0
	Grades 9-11	0	0
	High School Graduate	0	3

		Low Avoiders	Mid-High Avoiders
	College 1-3 years	2	5
	College 4 or more years	4	3
	Master's degree	2	2
	Professional degree	1	1
	Doctorate	0	0
	Not Reported	0	1
Deep Brain Stimulator	Yes	1	2
	No	8	13

Table 13. Spearman's rho (r_s) correlations to FFABQ score

	Correlation Coefficient	Sig. (2-tailed)	N
Age	.396	.055	24
Gender	.215	.312	24
SES	-.044	.863	18
Education	-.219	.315	23
HY	.254	.231	24
UPDRS	.307	.154	23
UPDRS- mental subscale	.302	.162	23
UPDRS- ADL subscale	.262	.227	23
UPDRS- motor subscale	.032	.862	23
UPDRS- complications	.001	.998	23
PDQ39	.227	.286	24
PDQ39- mobility subscale	.525	.008	24
PDQ39- ADL subscale	.064	.766	24
PDQ39- emotions subscale	.013	.953	24
PDQ39- stigma subscale	-.031	.886	24
PDQ39- social support subscale	-.376	.070	24
PDQ39- cognition subscale	.372	.074	24
PDQ39- communication subscale	-.125	.562	24
PDQ39- body discomfort subscale	.058	.789	24
Falls in the last month	-.037	.864	24
Falls in the last year	.032	.883	24
Falls resulting in injury	.133	.535	24

	Correlation Coefficient	Sig. (2-tailed)	N
BBS	-.490	.015	24
ABC	-.625	.001	24
2MST	-.139	.528	23
30 STS	-.355	.097	23
TUGT	.294	.174	23
METs	-.113	.656	18
Time sitting or laying	.098	.698	18
Time Standing	-.122	.630	18
Time Stepping	-.116	.647	18
Steps Taken	-.201	.425	18
Up down transitions	-.057	.821	18
ZAS	-.250	.239	24
BDI	.036	.866	24
FES	.301	.153	24
CAFS	.637	.001	24
CoFQ	.755	.000	24

APPENDIX B- Figures

Figure 1. Study Design

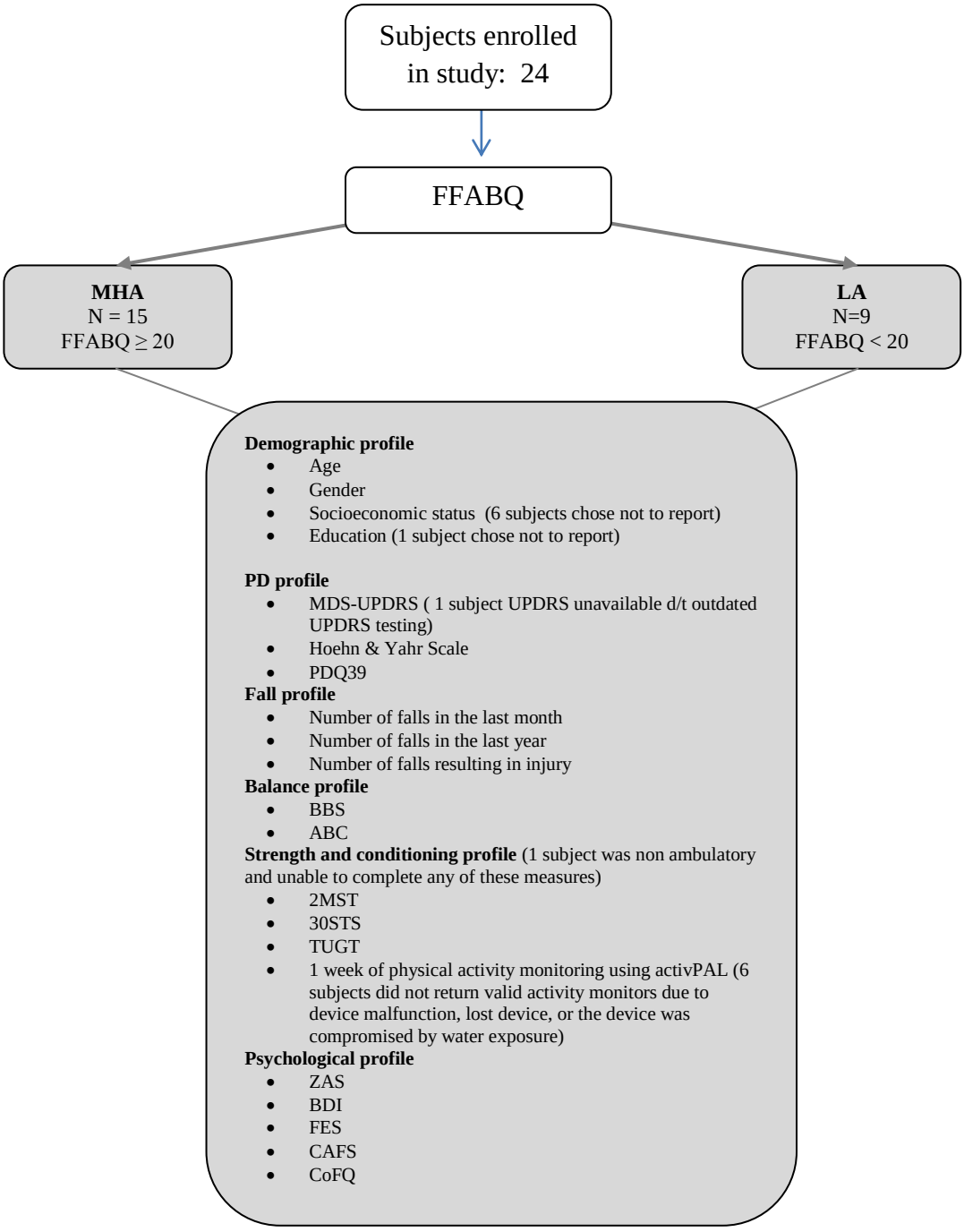


Figure 2. Results from Demographic Profile

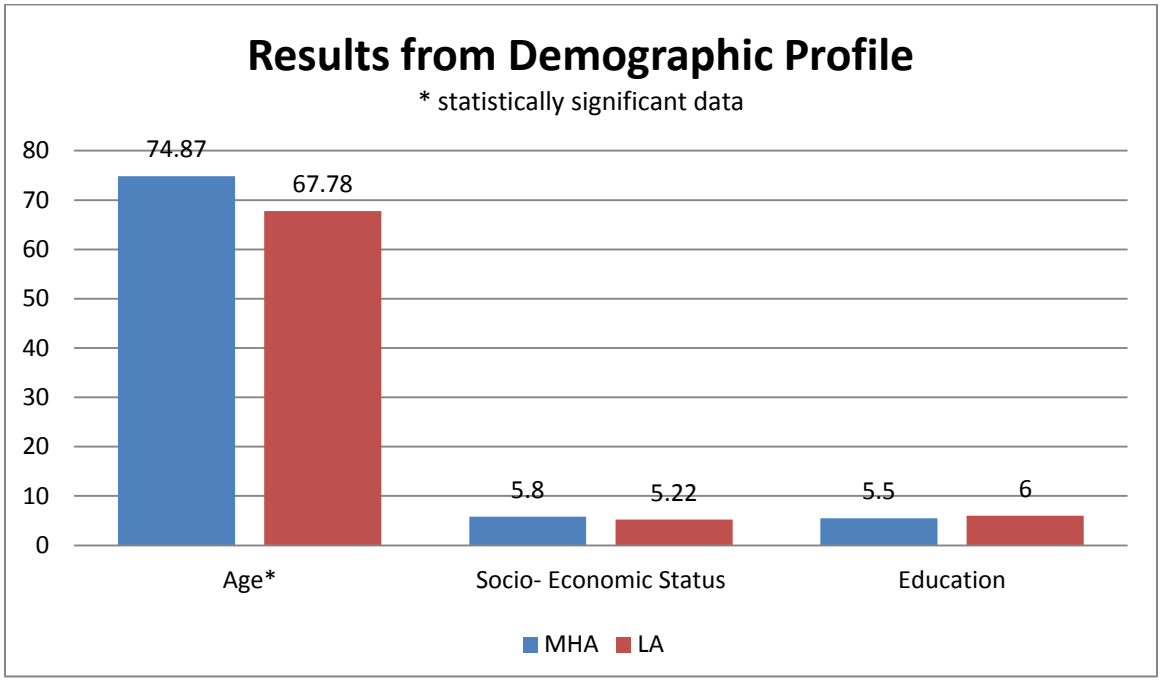


Figure 3. Results from PD Profile

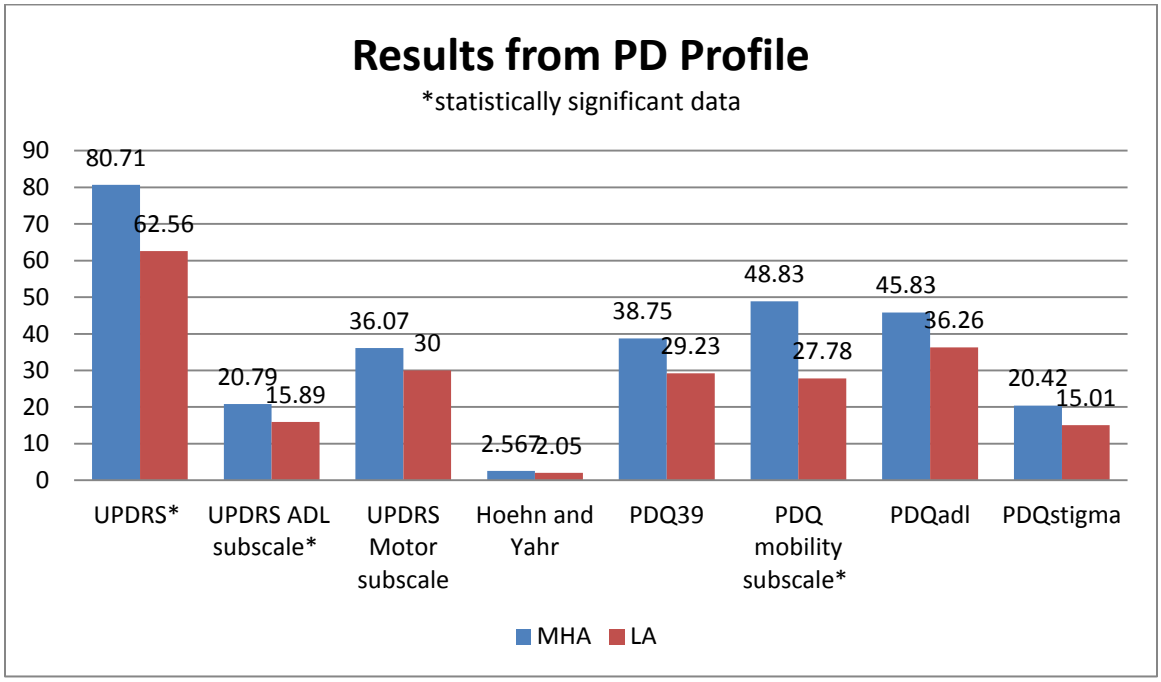


Figure 4. Results from Fall Profile

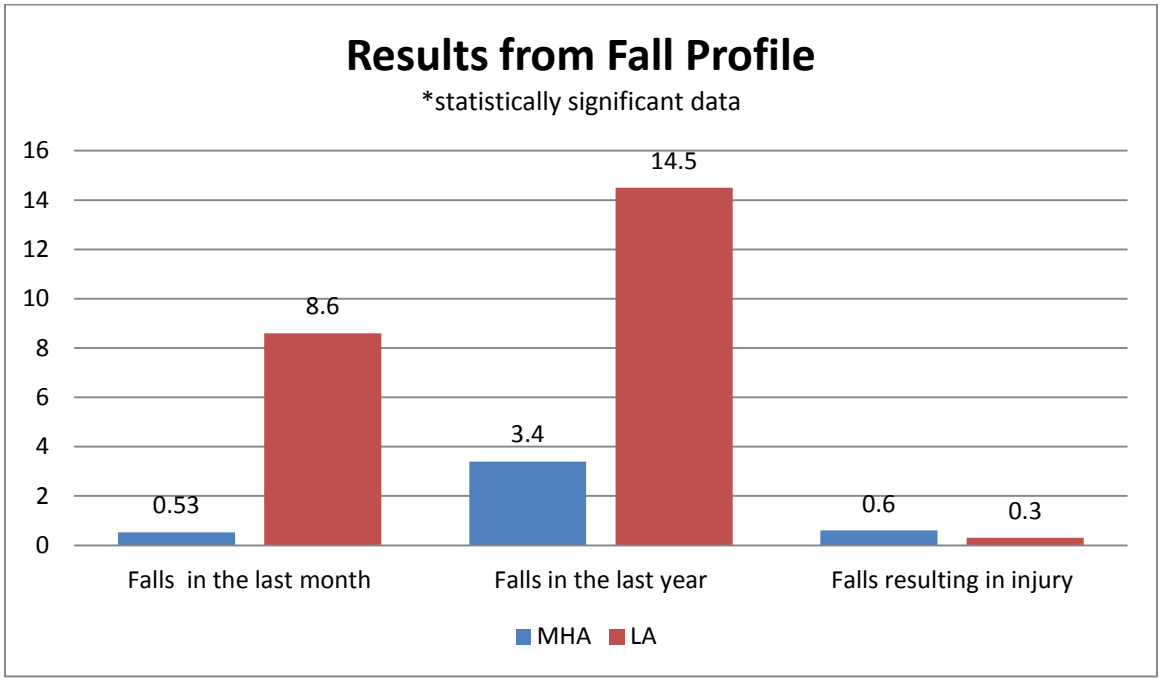


Figure 5. Results from Balance Profile

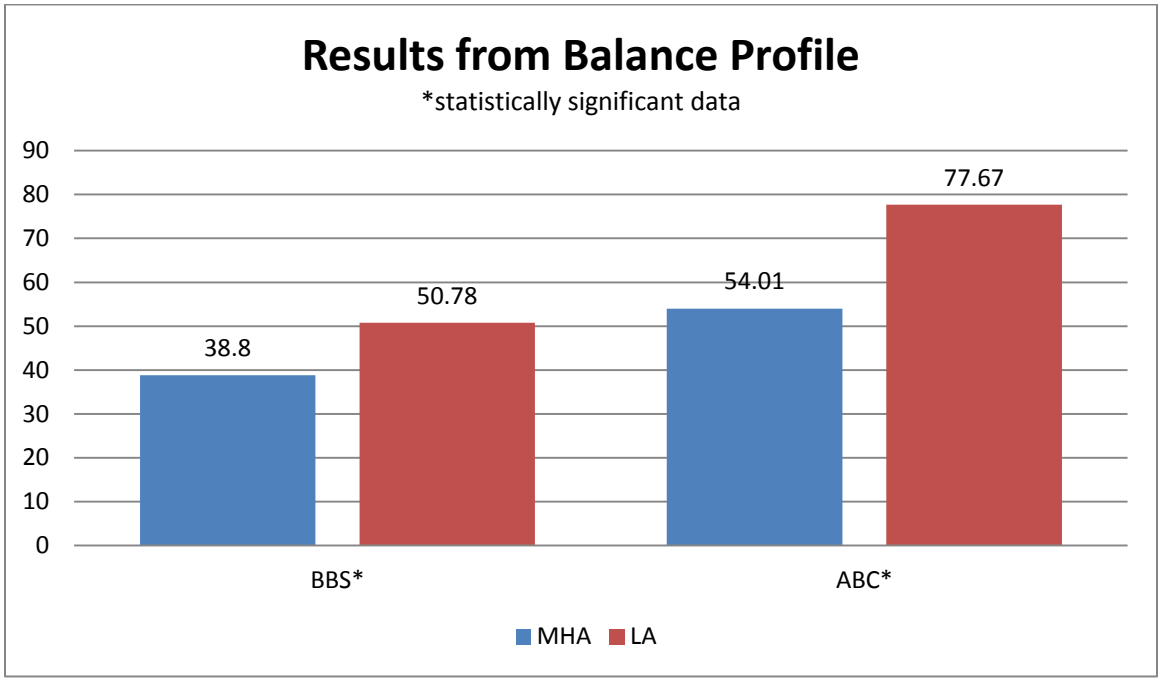


Figure 6. Results from Strength and Conditioning Profile

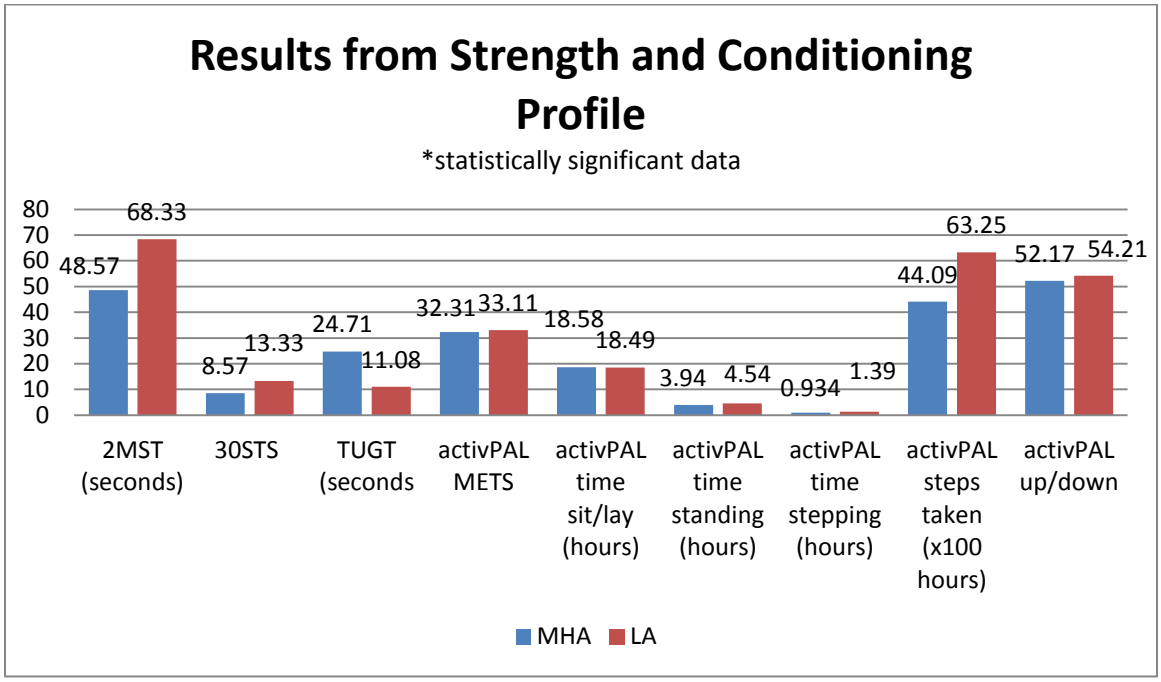
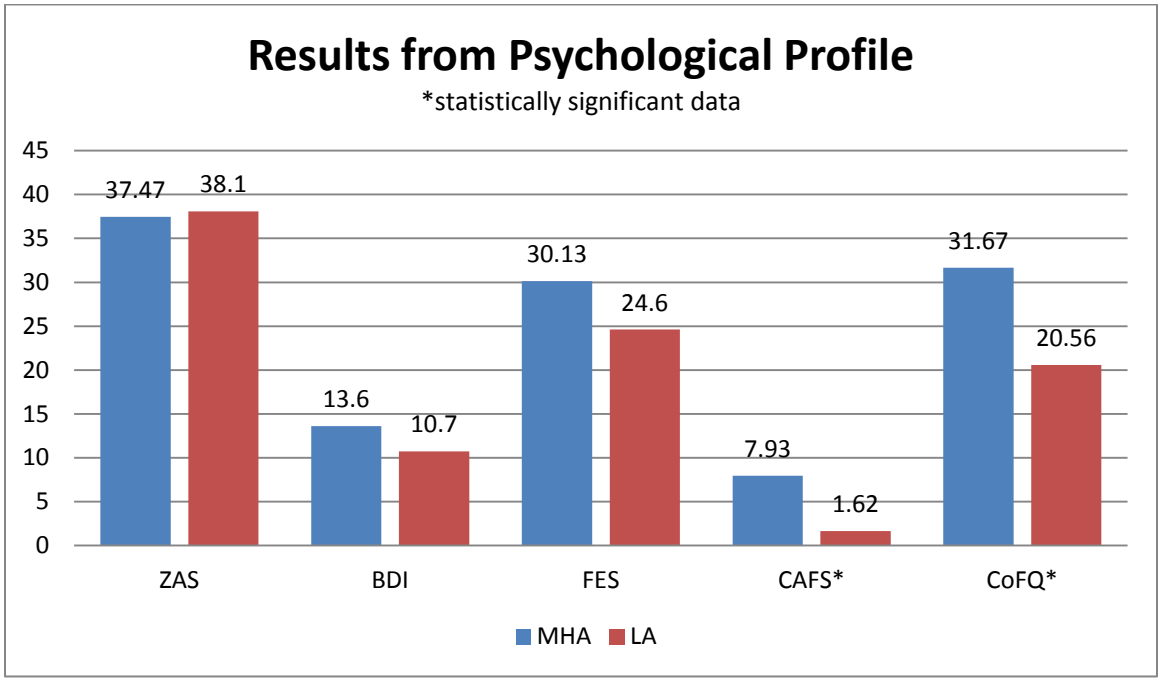


Figure 7. Results from Psychological Profile



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VITAS

Russell Gourlie

Education

University of Nevada–Las Vegas **Las Vegas, Nevada**

- Doctorate of Physical Therapy
- Expected graduation date: May 2013

Brigham Young University
Provo, Utah

- B.S. in Exercise Science
- Minor in Business Management
- August 2009

Professional Experience

Select Physical Therapy—Warm Springs Jan 2013-April 2013 **Las Vegas, Nevada**
Clinical Internship–Outpatient Orthopaedics

- Used various manual therapies including augmented soft tissue mobilization and grades I-V joint mobilizations in treating patients

Sunrise Hospital **Oct 2012-Dec 2012** **Las Vegas, Nevada**
Clinical Internship–Acute Rehabilitation

- Evaluated and treated patients with diagnoses ranging from joint replacements to spinal cord injuries and acute/late onset cerebrovascular accidents

St. Rose Dominican Hospital—San Martín **July 2012-Sept 2012** **Las Vegas, Nevada**
Clinical Internship–Acute Care

- Evaluated and treated patients in intensive care, intermediate and cardiac care, medical-surgical units
- Applied negative pressure wound therapy to a variety of different wounds

Physical Therapy Partners of Nevada **June 2011-July 2011** **Fernley, Nevada**
Clinical Internship–Rural

- Extensively used Mechanical Diagnosis Therapy in the evaluation and treatment of patients
- Practiced in outpatient orthopaedics, home health and acute care settings

ATS Physical Therapy **Sept-2008-May 2010** **Reno, Nevada**
Physical Therapy Technician

- Maintained a clean and safe environment for staff and patients
- Applied therapeutic modalities
- Charted and recorded patients progress

Mentored Research Experience

Student Investigator **In progress**
Investigated characteristics of subjects who avoid activities and participation due to a fear of falling in Parkinson's Disease

- Administered several questionnaires/tests to subjects
  - Unified Parkinson's Disease Rating Scale, Timed Up and Go Test, Mini Mental State Exam, Berg Balance Scale

Memberships/Certifications

APTA & NPTA Member since 2010

- Member of Orthopaedic Section of APTA

Boy Scouts of America

- Assistant Scoutmaster 2008-2009, 2011-Present

American Heart Association CPR Certification

- Expires May 2012

Golden Key Honor Society

Phi Kappa Phi Honor Society

Continuing Education

Understand and Explain Pain **Aug 2010** **Las Vegas, Nevada**

- Covered current concepts in pain theory and treatment of chronic pain conditions

Nevada Physical Therapy Association **June 2009-Present** **Las Vegas, Nevada**

- Various southern district meetings with a variety of topics including:
  - Dupytren's Contracture, Rotator cuff pathology, Lumbar spine mechanics in contortionists, Electrophysiology, Parkinson's Disease, Balance assessment and intervention

Pertinent Skills

Fluent in written and spoken Spanish

Spencer Sorensen

Education

2010-2013 **University of Nevada - Las Vegas, NV**

- Planned graduation May 2013; Doctorate of Physical Therapy
- Graduate Assistant
    - 20 hrs. / week of extracurricular research, mentoring, teaching, and varied assignments during 2nd year

2006-2010 **Brigham Young University, UT**

- Bachelor of Science in Exercise Sciences, Minor in Gerontology
- Academic Scholarship
- 3.66 GPA

Clinical Rotations

1/2013-Current **Lake View Hospital, UT**

- Acute care physical therapy in stroke certified hospital
- Provided care for patients with a variety of acute conditions including stroke, CHF, COPD, TKA, THA, spinal fusion, ORIF and TBI
- Directed group therapeutic exercise for acute orthopedic surgeries

10/2012-12/2012 **Tim Soder Physical Therapy, NV**

- Outpatient manual physical therapy
- Provided care for patients with a variety of surgical and non-surgical orthopedic conditions as well as sports related injury
- Experience with aquatic therapy

7/2012-9/2012 **Health South- Henderson, NV**

- Rehabilitative physical therapy
- Provided care for patients with a variety of neurological and orthopedic conditions
- Experience with AutoAmbulator, Bioness, and Saebo dynamic splints

6/2011-7/2011 **Southern Utah Physical Therapy, UT**

- Outpatient manual physical therapy
- Provided care for patients with a variety of orthopedic conditions

Research 2010-2013 **Mentored Group Research**

- Characteristics of Subjects Who Avoid Behavior Due to a Fear of Falling in Parkinson's Disease; experience with standardized balance and Parkinson's disease rating scales

Service 2004-2006 **Missionary Service, LDS Church, Monterrey, Mexico**

- Fluent Spanish speaker
- Supervised up to 20 volunteers and provided daily local service

Membership 2010-Current **Member of APTA, UPTA**

Additional **CPR and AED Certified**

Rithea Vong

Education

- California State University of San Bernardino- San Bernardino, CA
  Bachelor of Science- Kinesiology with concentration in Physical Therapy-2008

- University of Nevada, Las Vegas-Las Vegas, NV
  Doctor of Physical Therapy-2013

Student Clinical Experience

- Underserved Area- Kelly Hawkins Physical Therapy-Pahrump, NV
  6/20/2011-7/29/2011

- Outpatient- St. Rose Dominican Hospital-San Martin Campus-Las Vegas, NV
  7/16/2012-9/28/2012

- Acute Care- Spring Valley Hospital-Las Vegas, NV
  10/8/2012-12/19/2012

- Rehabilitation- HealthSouth Desert Canyon Rehabilitation Hospital- Las Vegas, NV 1/14/2013-4/5/2013

Professional Association Membership

- American Physical Therapy Association
  2010-Current

- Nevada Physical Therapy Association
  2010-Current

Conference Attendance

- APTA Combined Sections Meeting- New Orleans, LA
  February 2011

Research

- Landers M, Young D, Gourlie R, Sorensen S, Vong R. Characteristics of subjects who avoid activities and participation due to a fear of falling in Parkinson's disease