Physical Therapy and Rehabilitation
ISSN 2055-2386 | Volume 5 | Article 18

HOAJ
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Original Research Open Access

Measurement of space and motion discomfort in persons with vestibular disorders

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Abstract

Background: The purpose of this paper was to estimate the test-retest agreement and to describe the discriminative validity of measures recorded from the Situational Characteristics Questionnaire-extended (SitQe) for the identification of space and motion discomfort in subjects with balance/vestibular disorders in comparison to healthy control subjects.

Methods: A cross-sectional descriptive study was conducted with eighty-nine patients with balance and/or vestibular disorders and 44 control subjects. All patients completed the SitQe at a tertiary care ambulatory out-patient balance and vestibular clinic. Test-retest agreement for individual SitQe items was tested in a subsample of fifteen people with balance/vestibular disorders and 20 control subjects. The SitQe consists of 105 questions. A$\chi 2$ analysis was used to determine if there were differences in response rates indicative of discomfort for patients versus control subjects. Data were made categorical and compared between no symptoms while performing the activity versus mild or worse symptoms during the activity.

Results: Median test-retest agreement at the item level was good to excellent across all related situational categories. Seventy-six out of 105 variables were significantly different between the control subjects and patients with balance and/or vestibular disorders at $p<0.01$.

Conclusion: Patients with vestibular disorders reported symptoms for many of the daily life activities during which the control group had few, if any, symptoms. These items may provide the clinician with some insight into which activity (ies) might be difficult for a person living with a balance and/or vestibular disorder. Clinicians might want to consider probing more about common activities that can provoke dizziness in order to better target interventions.

Keywords: Dizzines, vestibular, rehabilitation, outcomes, motion sensitivity

Introduction

Persons with vestibular deficits often develop an over reliance on visual inputs, resulting in visual dependence [1]. When patients over rely on visual input, balance can be affected. Patients may not use other available sensory inputs for postural control, and situationally provoked dizziness may result as a consequence [1].

Psychologic factors appear to influence how people respond to and perceive situational dizziness [2,3]. Staab and Ruckenstein [4] have suggested that persons with vestibular disorders may develop mild situational phobias because of their fear of developing dizziness. They suggest that some patients may avoid certain situations that the perceive may provoke their dizziness.

Situational dizziness has been shown to be a negative predictor for return to full function in persons with vestibular disorders [5-8]. "Space and motion discomfort" (SMD) was chosen for use throughout this paper to describe dizziness that is provoked by visually provocative situations (i.e. grocery stores, malls, ceiling fans) [9]. The clinical recognition of SMD and its effects on patient outcome may be an important and under-recognized element of patient management.

There are a few instruments in the literature that include items that attempt to quantify SMD in persons with balance

doi: 10.7243/2055-2386-5-18

and vestibular disorders [10-14]. The instruments currently in use that quantify aspects of SMD include the Vertigo Symptom Scale (VSS) [13], the Vertigo Handicap Questionnaire (VHQ) [14], the Vestibular Activities of Daily Living Scale (VADL) [12,15], and the Vestibular Rehabilitation Benefit Questionnaire (VRBQ) [10,11]. The VSS includes feelings of disorientation [13], the VHQ and the VADL include an item related to having difficulty in a grocery store [12,13,15], the VSS has a visual disturbance item [13], the VRBQ includes items such as having difficulty traveling and avoiding situations that previously did not cause symptoms [10,11]. A comprehensive tool that describes the range of potential provocative stimuli that can provoke SMD in patients with vestibular and balance disorders is not commonly used clinically.

A previously developed questionnaire was modified to attempt to capture how people perceive their SMD [9]. The original motivation for the development of the Situational Characteristic Questionnaire (Sit Q) was to determine if various situations caused discomfort in people with anxiety disorders [9]. In patients with anxiety disorders, SMD was associated with balance abnormalities [16,17]. Furthermore, high levels of SMD were found in patients with vestibular disorders as compared to patients with hearing loss [9].

The Situational Characteristics Questionnaire-extended (SitQe) was developed to attempt to include additional vestibular items that patients commonly report as problems. Twenty new items were generated and added to the SitQe based on the clinical experience of three of the authors with over 80 years of combined experience with people with balance/vestibular disorders. The SitQe has been used as an outcome measure previously in persons with uncompenstated peripheral vestibular disorders [8]. After physical therapy intervention, Pavlou et al noted a 75% decrease in symptoms in a grocery store after intervention [8]. The SitQe used by Pavlou et al [8] was able to identify change over time in patients with vestibular disorders. The SitQe in the Pavlou paper was used to assess SMD over time from physical therapy interventions, yet the reliability and validity of the instrument had not been reported.

Presently, there is no specific self-report tool to describe SMD in patients with balance/vestibular disorders. Space and motion symptoms may affect rehabilitation outcomes in persons with vestibular disorders. Therefore, it is important for clinicians to be able to recognize these symptoms as they may commonly manifest in patients with vestibular disorders. The purpose of this study was twofold: 1) to estimate the test-retest agreement for individual SitQe items in persons with balance/vestibular disorders and 2) to describe the known-groups validity of measures recorded from the SitQe to identify SMD in subjects with balance/vestibular disorders in comparison to healthy control subjects. This study is a first step in the development of a clinically feasible tool to measure SMD in persons with vestibular dysfunction.

Methods

Participants

The data of eighty-nine vestibular patients who had completed the SitQe were examined and compared with data collected on 44 normal control subjects who had participated in other research studies in our laboratory. The study was approved by the Biomedical Institutional Review Board of the University of Pittsburgh. Twenty-four of the control subjects had normal test results including calorics, positional testing, oculomotor exam and rotational chair testing. The remaining 20 control subjects had no complaints of dizziness or balance problems for entry into the study.

Data on control subjects were obtained from research records established because of their participation in this study and other past and ongoing research studies. The patients were diagnosed clinically, aided by the vestibular laboratory tests of a tertiary University ENT clinic. Patient diagnoses were established by a neurologist who specializes in otology with over 30 years of specialty practice experience. All patients seen by the neurologist had undergone vestibular testing (calorics, positional testing, oculomotor exam, and rotational chair testing) and were diagnosed with vestibular or balance dysfunction.

Patient diagnoses included: BPPV (n=26), unspecified dizziness (n=19), unilateral hypofunction (18), disequilibrium of aging (n=8), central vestibular dizziness (n=6), Ménière's (n=3), migraine-related dizziness (n=3), labyrinthine concussion (n=2), mal de debarquement (n=2), bilateral hypofunction (n=1), and cervicogenic dizziness (n=1). Those with unspecified dizziness (n=19) had borderline abnormal vestibular test results and the physician was unable to specify a definitive vestibular diagnostic designation.

Patients with balance and vestibular disorders were sent the questionnaire in the mail and were asked to bring the form completed to the clinic. No instructions other than the instructions on the form were provided. Participants were permitted to leave blank up to 20% of the items for the questionnaire to be considered complete. For example, not all people had experienced buses or airplanes after their vestibular event, and therefore did not complete those items.

The questionnaire takes approximately 5-10 minutes to complete, depending on the persons reading abilities. The physical therapist reviewed the completed SitQe upon patient arrival, which were then scanned and scored.

Instrument: The SitQe

The SitQe is an expansion of the original Sit Q and was administered as a paper and pencil test without concomitant interviews or review and pursuit of missing responses. For the original SitQ, reliability and validity data were published in Jacob, Woody et al [9]. Reliability ranged from r=0.66-0.87 for the different categorical sections of the instrument; Cronbach's alpha varied between 0.67-0.88. To establish test-retest agreement for the individual items, the SitQe was administered to

doi: 10.7243/2055-2386-5-18

a sub-sample of 35 persons (15 with vestibular disorders, 20 without) on two occasions across a time interval of 3 days to one week.

The instructions for the SITQe are:

"Below are some situations that may elicit discomfort or anxiety for you. We are interested in whether certain characteristics of the situation bother you in comparison with other characteristics of the same situation. Please circle:

3 If you are very much bothered by the characteristic
2 If you are moderately bothered by the characteristic
1 If you are mildly bothered by the characteristic
0 If you are not bothered by the characteristic"

The additional 20 Likert items that were added to create the SitQe were based on the clinical experience of a physical therapist and two physicians who has worked with patients with vestibular disorders with a combined work experience with persons with vestibular disorders of 95 years. The instructions were:

"Are you bothered by any of the following:

3 Very bothered
2 Moderately bothered
1Mildly bothered
0 Not bothered"

In the SitQe, the item response was coded binarily as either "discomfort absent," if the participant circled "0," or "present," for responses 1-3 above.

Data analysis

The frequency count of responses signifying "discomfort present" was determined separately for control subjects and patients. Test-retest agreement for presence of discomfort for each SitQe item across two administrations to the subsample was estimated using Cohen's kappa statistic. The median kappa value and corresponding inter-quartile range was reported across categories of SitQe items (car, bus, supermarket and others).

To examine the association between the report of discomfort and the presence of vestibular disorders, a chi-squared analysis with Yates correction of the resulting 2 x 2 table was used for each item to determine statistical group differences. Because the analyses involved multiple comparisons, target significance level was set at $p<0.01$. Group differences in the frequency of subjects reporting discomfort associated with each item were described as proportional differences in reports of discomfort and using the arcsine transformation and effect size index as described by Cohen [**18**]. Proportional differences are ineffective effect size measures because the variance and the power to detect a true difference in proportions are dependent on the location of the proportions on the binomial scale of zero to 1. The effect size index (h) derived from the arcsin transformation of proportions provides a uniform indicator of the proportional difference in discomfort between groups that is not subject to the variance difference due to the contributing proportion values. The effect size index (h) derived from the transformation of proportions can range from 0 (no proportional difference) to 3.14 (100% difference).

Results

Mean age of the control group was 43±17 years (range 22-83). The gender distribution was 28 females (64%) and 16 (36%) males. The mean age of the patients was 59±18 (range 22-89). The gender distribution was 60 females (67%) and 29 males. Test-retest agreement of individual items. Test-retest agreement across 3 days to 1-week testing intervals for SitQe items in situational categories was good to excellent in 35 subjects (15 with vestibular disorders and 20 without). Median kappa statistics for estimates of test-retest agreement ranged from 0.69 for using escalators (6 items) to 0.89 for activities performed while taking a shower (2 items). **Table 1** presets the median and inter-quartile range kappa agreement estimates across categories of SitQe items.

Table 1. Test re-test agreement for Situational Characteristic Questionnaire extended (SitQe) Categories: Median Kappa ratings of agreement, number of items and agreement inter-quartile range across categories.

Category	Number of Items	Median Kappa	Inter-quartile Range
Riding in car as passenger	16	0.80	0.70-0.89
Buses	8	0.73	0.64-0.80
Supermarkets	6	0.78	0.76-0.89
Large fields or open squares	4	0.80	0.71-0.90
Tunnels	4	0.87	0.86-0.90
Movie Theaters	6	0.75	0.63-0.79
Airplanes	9	0.80	0.7-0.88
Elevators	13	0.81	0.73-0.88
Escalators	6	0.69	0.66-0.75
Going up stairways	2	0.72	0.60-0.83
Driving a car	5	0.79	0.68-0.87
Walking	4	0.70	0.66-0.75
In a shower	2	0.89	0.87-0.91
Mobility and ADL items†	20	0.74	0.61-0.88

†The difference between the original Sit-Q and the SitQe is the addition of 20 Likert items that include mobility and ADL items.

Association between items reported as provoking discomfort and subject group. The median percent of non-responses to items from all subjects was 8% (8 items). Among individual items, airplane (25%), bus (22%), aerobics (21%), and dancing (18%) items had the greatest non-response rates for all subjects. Non responses for the control subjects were negligible. In control subjects, 16 items displayed non-responses. The maximum number of non-responses for any item was 2 (5%), which was observed on two of the elevator items. In subjects with vestibular disorders, the median percent of non-responses was 11% (12 items). The greatest percent of non-responses

doi: 10.7243/2055-2386-5-18

to individual items in persons with vestibular disorders was seen for the various airplane items (range 34-37%).

Seventy-six of the 105 SitQe items (72%) demonstrated a significant association (at $p<0.01$) between symptom provocation and vestibular disorders. The average effect size for the difference between the proportion of healthy subjects and subjects with a vestibular disorder who reported symptoms was 0.93 for items with a significant association between symptom report and subject group. The greatest effect size of difference in the proportion of subjects in each group reporting situational discomfort was observed in the group of mobility and ADL items.

Tables 2-4 present the differences between persons with balance and vestibular disorders and healthy controls in perception of SMD. The item results have been categorically reduced for ease of interpretation in **Tables 2-4** compared to the order within the SitQe. In the SitQe, the categories (i.e. riding as a passenger in a car, buses, supermarkets, etc.) are ordered in a manner to prevent carryover of responses from one category to another. **Table 2** presents the proportion and effect size of difference for subjects in both groups reporting discomfort associated with transportation-related situations. The average significant difference in the proportion of group members reporting discomfort was 26% (effect size 0.72) across the transportation items with a significant association between discomfort and subject group. The group differences in proportion of subjects reporting on these items ranged from 17% ("riding on an empty bus") to 48% ("looking out window while traveling in a car").

The proportion of subjects in both groups reporting discomfort and the effect size difference with environmental/architectural/activity situations are shown in **Table 3**. The average proportional group difference for environmental/architectural/activity items with a significant association between report of discomfort and subject group was 31% (effect size 0.72), ranging from 17% ("riding and empty elevator"/"sitting in theatre in aisle seat") to 64% ("walking down corridor looking to side").

Table 4 presents the proportional differences and effects sizes between persons with vestibular disorders and control subjects on SitQe mobility and ADL items. The average proportional difference between vestibular and control subjects on mobility and ADL items with a significant discomfort-subject group association was 45% (effect size 1.16), ranging from 15% ("looking in mirror"/"lying in bed") to 73% ("picking up item from floor").

Discussion

The SitQe items appear to have good to excellent test-retest agreement in a mixed group of people with balance and vestibular disorders, suggesting that the tool is repeatable [**18**]. The results describe a range of commonly encountered situations that provoke SMD more frequently in patients with balance and vestibular disorders compared with healthy subjects. Seventy-six of the 105 items (72%) supported different responses between patient and control subject groups. Many of the items on the SitQe can effectively discriminate the perception of SMD in persons with balance and vestibular disorders from healthy subjects.

The investigators were not suggesting that clinicians should use a 105-item questionnaire but were suggesting that items that might increase symptoms should be included. Later work will shorten the tool to make it more clinically feasible for use in patient practice settings.

This study was conducted in an urban setting with a mixture of urban and suburban subjects. It is impossible to determine if patients or control subjects are avoiding or are simply not exposed to the situations that were probed in the SitQe. Of the 36 transportation items, 20 were different between subject groups with car items (57% of the 21 car items) having the greatest number of differences between groups. Many of the subjects had access to private transportation, which may have affected the results. It is not clear if the differences noted were because people avoid other forms of transportation or whether riding in a car is extremely difficult. Page and Gresty [**19**] have reported several cases of persons with vestibular disorders having increased difficultly with driving. Murray et al [**20**] reported that 1/3 of their patients with unilateral hypofunction had difficulty with driving, climbing ladders, and concentrating.

Airplane questions do not appear to be particularly discriminative between people with and without vestibular disorders. Sitting on the airplane aisle was the only question that was different between patient and control subjects, suggesting that vestibular dysfunction alone does not increase people's sensitivity to air flight. Twenty-five percent of the total number of respondents did not complete the airplane items. One possible explanation is that there is less exposure to airplane travel and thus there was no basis on which to describe their discomfort. Another potential explanation is that the patients may have had changes in their perceptions because of their vestibular/balance disorders and appeared to be less sure of how they would feel on a bus or in an airplane compared to control subjects. Patients may not have been exposed to air travel since their diagnosis and there is no option for "not applicable" on the questionnaire. In addition, socio-economic factors may have confounded the likelihood of a non-response on airplane items as air travel is more common in upper socio-economic demographics. Reasons for non-responses on the questionnaire should be investigated but was beyond the scope of this study.

The only mobility/ADL item that was not significant between the control and vestibular subjects was "sitting". All other mobility items were more bothersome to persons living with vestibular disorders than control subjects. These data suggest that many normal activities that one performs daily cause discomfort performing the activity. Rolling over in bed, showering, reading, watching a fast action television

doi: 10.7243/2055-2386-5-18

Table 2. Transportation items: Proportion of persons reporting being at least mildly bothered (89 patients and 44 control subjects) with group proportion differences and effect sizes (h) for differences.

Item	Patient (%)	Control (%)	Proportional Difference	h
Car Uphill	34	5	29	0.79*
Car Downhill	38	14	24	0.57*
Car Bumpy Road	47	27	20	0.42
Car Smooth Road	20	2	18	0.65*
Car Straight Road	23	2	21	0.70*
Car Winding Road	58	33	25	0.51*
Car Wide Road	22	0	22	0.96*
Car Narrow Road	41	26	15	0.31
Car on limited access road	30	9	21	0.55*
Car unlimited access road	27	0	27	1.08*
Car riding in front seat	31	7	24	0.64*
Car riding in back seat	48	27	21	0.44
Car Change Speed	50	18	32	0.69
Car riding at steady speed	19	0	19	0.90
Car Reading	68	36	32	0.64*
Car Window	48	0	48	1.52*
Drive wipers off	10	0	10	0.64
Drive wipers on	23	2	21	0.72*
Drive no shade	11	0	11	0.68
Drive partial shade	26	11	15	0.39
Drive complete shade	13	0	13	0.74
Bus standing platform	56	23	33	0.68*
Bus sit	23	2	21	0.72*
Bus sitting on aisle	23	9	14	0.38
Bus sitting by window	23	7	16	0.47
Bus still	31	7	24	0.65*
Bus moving	41	16	25	0.57*
Bus crowded	45	36	9	0.19
Bus empty	19	2	17	0.62*
Tunnel Straight	43	14	29	0.66*
Tunnel Curve	54	21	33	0.70*
Tunnel End	26	9	17	0.46
Tunnel side	45	21	24	0.52*
Airplane altitude change	54	41	13	0.25
Airplane altitude steady	22	9	13	0.37
Airplane landing	49	50	-1	-0.02
Airplane taking off	48	48	0	0.01
Airplane flying smoothly	20	7	13	0.38
Airplane flying in turbulence	68	75	-7	-0.16
Airplane sitting by window	29	11	18	0.45
Airplane sitting on aisle	29	11	18	0.45
Airplane sitting middle seat	39	31	8	0.17

*$p<0.01$

doi: 10.7243/2055-2386-5-18

Table 3. Architectural/Environmental/Activity Items: Proportion reporting being at least mildly bothered in 89 patients and 44 control subjects with group proportion differences and effect sizes (h) of difference.

Item	Patient (%)	Control (%)	Proportional Difference	h
Elevator stationary	13	9	4	0.12
Elevator Moving (vs. stationary)	44	16	28	0.63*
Elevator crowded	41	34	7	0.13
Elevator empty	19	2	17	0.62*
Elevator going up	36	9	27	0.68*
Elevator going down	38	9	29	0.73*
Elevator standard	25	5	20	0.60*
Elevator glass walls	45	24	21	0.45
Elevator start	40	7	33	0.83*
Elevator steady	27	2	25	0.81*
Elevator stop	44	11	33	0.77*
Elevator middle	41	16	25	0.57*
Elevator wall	26	2	24	0.79*
Escalator up	42	0	42	1.41*
Escalator down	43	5	38	0.98*
Escalator somebody in front	29	2	27	0.85*
Escalator nobody in front	26	0	26	1.07*
Escalator holding rail	31	0	31	1.18*
Escalator not holding rail	73	18	55	1.17*
Stairways close to wall	30	2	28	0.88*
Stairways center	58	9	49	1.12*
Supermarket Crowded	48	34	14	0.29
Supermarket market empty (vs. crowded)	24	0	24	1.02*
Supermarket near exit	18	0	18	0.88*
Supermarket far from exit	25	2	23	0.76*
Supermarket looking at end of aisle (while walking down aisle)	43	2	41	1.15*
Supermarket looking at items on shelf	58	7	51	1.20*
Walking Straight	38	0	38	1.33*
Walking Turning	63	2	61	1.55*
Walking Corridor Look Straight	44	2	42	1.17*
Walking Corridor Look Side	73	9	64	1.44*
Shower rinse hair	45	2	43	1.19*
Shower wash arms	24	0	24	1.02*
Theatre sitting in middle of row	32	11	21	0.53
Theatre sitting on aisle	19	2	17	0.62*
Theatre front row	56	27	29	0.60*
Theatre back row	30	5	25	0.71*
Theatre wide	23	2	21	0.72*
Theatre narrow	23	5	18	0.55
Field open without boundaries	26	2	24	0.79*
Field enclosed with boundaries	27	5	22	0.64*
Field Edge	22	0	22	0.98*
Field Middle	26	5	21	0.62*

*$p<0.01$

doi: 10.7243/2055-2386-5-18

Table 4. Mobility/ADL Items: Proportion reporting being at least mildly bothered in 89 patients and 44 control subjects with group proportion differences and effect size (h) of difference.

Item	Patient (%)	Control (%)	Proportional Difference	h
Aerobic exercise	66	2	64	1.60*
Rolling over in bed	47	0	47	1.51*
Close eyes while in shower	76	11	65	1.45*
Look up tall buildings	81	16	65	1.42*
Look down from high places	80	48	32	0.68*
Lean back in chair	80	16	64	1.38*
Read newspaper close	46	16	30	0.67*
Writing	28	0	28	1.12*
Reach high shelf	66	0	66	1.90*
Pick up from floor	80	7	73	1.68*
Look in Mirror	15	0	15	0.80*
Merry Go Round	80	21	59	1.26*
Roller coaster	46	28	18	0.37*
Dancing	62	2	60	1.53*
Look at Ceiling fans	58	19	39	0.83*
Lying in bed	15	0	15	0.80*
Putting on jacket	19	2	17	0.62*
Watch fast action TV	49	2	47	1.27*
Sitting	11	0	11	0.68
Discomfort worsen throughout the day	51	5	46	1.14*

*$p<0.01$

program, or picking things off the floor are activities that are often performed daily, suggesting that vestibular dysfunction affects people throughout their day. Cohen and Kimball's Vestibular ADL scale [12,15] and the Vestibular Rehabilitation Benefit Questionnaire [10,11] include two of the above five mobility items. The Vertigo Symptom Scale [13] and the Vertigo Handicap Questionnaire [14] do not include any of the above five items, whereas the Dizziness Handicap Inventory [21] includes one of the items (rolling over). Obviously, several of the ADL items on the SitQe are not currently captured with commonly used vestibular questionnaires.

Several possible explanations have been suggested to explain why people become dizzy or have increased postural sway in different visual environments. These include the background viewed, the position of the stimuli on the background, and the velocity and spatial frequency of the visual scene [22-26]. Guerraz et al [27] suggest that the symptoms in patients with vestibular disorders that are provoked in previously normal circumstances are partly due to increased visual dependence after vestibular insult. Some patients report becoming disoriented when things are perceived to be moving within their peripheral visual field [17,28,29].

Balance disorders have been described in persons with panic/phobic disorders [3,4,16,17,30-32]. Odman and Marie [33] suggest that the vestibular system or anxiety may be driving the space and motion discomfort often reported by patients seen in physical therapy for dizziness. They report that space and motion phobia (a pathological degree of SMD) with its associated avoidance is common in persons with "chronic subjective dizziness", which now might be called persistent postural perceptual dizziness [34-36]. The vestibular deficit augmented by anxiety tendency may produce the unusual responses that persons with vestibular disorders experience in certain daily life situations. Other authors have suggested that persons living with Méinere's disease have anxiety because of their "intolerance of uncertainty" [37]. Fear of experiencing dizziness can possibly change behavior.

The use of questionnaires that probe persons with vestibular dysfunction about their space and motion symptoms appears particularly important, as other subjective self-report measures of balance such as the Activities-specific Balance Confidence scale [38] are not sensitive to identify visual complaints associated with vestibular dysfunction [8]. It appears to be important for clinicians to be aware of functional and situational difficulties in order to design the best intervention program in order to reduce their level of disability [18].

Persons with vestibular disorders are not only affected by their dizziness and balance dysfunction but also experience discomfort in their ability to perform activities in their communities such as riding in a car and going shopping. Treating

doi: 10.7243/2055-2386-5-18

only the person's physical limitations may not be optimal. It is important to recognize that patients may present with both vestibular symptoms and discomfort at performing common activities of daily living.

Future plans for the SitQe tool include using factor analysis to determine which items are critical for identifying persons with vestibular dysfunction and to identify subtypes of discomfort, e.g., visual dependence vs. surface dependence in the control of balance. We also hope to compare the findings of the SitQe to other qualitative and quantitative physical therapy measures.

Conclusion

Patients with vestibular disorders respond differently to questions about their situationally specific SMD symptoms compared to subjects without known vestibular disorders.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Authors' contributions	SLW	GFM	RGJ	JMF
Research concept and design	✓	✓	✓	✓
Collection and/or assembly of data	✓	--	--	--
Data analysis and interpretation	✓	✓	✓	✓
Writing the article	✓	✓	✓	✓
Critical revision of the article	✓	✓	✓	✓
Final approval of article	✓	✓	✓	✓
Statistical analysis	--	✓	--	--

Acknowledgement

The authors would like to thank Anita Lieb, MS who was helpful with the data acquisition and compliance issues with the institutional review board.

Publication history

Editor: Mohammad H. Hadadzadeh, Wheeling Jesuit University, USA.
Received: 08-Sept-2018 Final Revised: 03-Nov-2018
Accepted: 07-Nov-2018 Published: 16-Nov-2018

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Citation:
Whitney SL, Marchetti GF, Jacob RG and Furman JM. **Measurement of space and motion discomfort in persons with vestibular disorders**. *Phys Ther Rehabil*. 2018; **5**:18. http://dx.doi.org/10.7243/2055-2386-5-18