Concurrent validity evidence of partial weight bearing lower extremity performance measure

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Concurrent Validity Evidence of a Partial-weight Bearing Lower Extremity Performance Measure

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In partial fulfillment of the requirements for the degree of
Master of Science in Biomedical Sciences

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Concurrent Validity Evidence of Partial Weight Bearing Lower Extremity Performance Measure

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Conducted in Cooperation with
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To meet the requirements of
Master of Science in Biomedical Sciences with a concentration in Physical Therapy

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Abstract

Objective: To assess the ability of the partial weight-bearing (PWB) squat tests using the inclined squat apparatus to produce valid measurements in individuals with lower extremity dysfunction. It will do so by comparing the partial weight bearing squat tests to other lower extremity functional performance tests that have been proven to be reliable and valid sources of measurement.

Background: There are few tests that can be done to assess an individual’s ability to perform lower extremity functional activities early in their rehabilitation process, when they have limited weight-bearing abilities. Some lower extremity tests such as the hop tests are too aggressive for these particular individuals. Open kinetic chain assessment has been used as a solution but it has been proven that these measures poorly correlate with lower extremity function.

Methods and Measures: 30 subjects with a lower extremity dysfunction were recruited (mean age 49.4 with SD of ± 15.79 years) for participation. Subjects underwent various tests, which included the partial weight bearing 30 repetition and 20 second squat tests; distance hopped in a single leg hop test, timed stair ambulation, and timed walking 50 feet. All tests were performed in random order. Bivariate Pearson’s correlation was used to find a possible relationship between the PWB squat tests and the hop, walking, and stair ambulation test. Linear regression was also assessed for the PWB squat tests ability to predict outcomes in the other tests as well.

Results and Conclusion: The data collected found a correlation between the two PWB squat tests and the hop, walking, and stair ambulation tests. It was also found that there was a linear relationship between each PWB squat tests and the other tests. Based on these results it was concluded that the PWB squat tests using the inclined squat apparatus produced valid measures of lower extremity function.
In the physical therapy setting there is a group of testing known as functional performance tests. These tests are used to assess the progression of the patient in the rehabilitation process and if they can return to preinjury activities. Specific types of functional performance tests are those for the lower extremities. Common tests included in this category are the hop test and lateral step up test. These tests are considered closed kinetic chain activities but there are tests done under open kinetic chain conditions. Many studies have been conducted about the use of the closed kinetic chain activities and have resulted in evidence of their use in the clinical setting.

Most of the literature regarding lower extremity functional tests is on the assessment of the single leg hop test. There have been various studies done on its reliability and validity. Bogla and Keskula provided evidence of the hop test reliability in a study in which they tested the reliability of triple hop, cross over, single hop in twenty healthy subjects. It tested the subjects over a two-day period and compared the scores of each test between the two days. From the results it was found that there were no statistically significant difference in the hop tests scores from the first day and second day. As a result they concluded that with the use of practice trials the hop tests were reliable sources of information. There are also articles on the validity of hop tests. Itoh et al assessed the sensitivity, an aspect of validity, of a series of hop tests called the FAT ability test. The FAT consisted of four types of hops, including the single leg hop. The authors used subjects that had an ACL deficiency to perform these various hops. In addition, the subjects were assessed for a positive Lachman’s, pivot shift, and KT 1000 tests to determine ACL deficiency. Results of the study provided the percentage of individuals that demonstrated asymmetry between the involved and uninvolved leg in each hop test. It was found that 82% of
the subject population demonstrated asymmetry in at least one of the four-hop test. From this information the authors concluded that these series of hop tests produced valuable measurements of lower extremity function in persons with ACL deficiency.  

Although studies provide evidence of lower extremity performance tests’ ability to produce reliable and valid results, they fail to address other concerns. The specific concerns are that to perform the closed kinetic chain lower extremity performance test, it requires a great amount of stability or weight bearing capabilities to perform them. There are few studies that address functional performance tests that can be used for the individual who does not have full stability at the knee. In the studies mentioned previously the test subjects were healthy or were able to fully weight bear at the time of the study. Rudolph et al give an example of this in a study. Their study involved individuals with ACL deficient knees and aimed to identify movement strategies used in absence of the major knee stabilizer. One of the ways it was to identify this was to have subjects perform the single leg hop test while recording EMG activity. In discussion of the results the authors’ stated that subjects, who had a great amount of knee instability or sustained a recent injury, declined the hop test.  

Furthermore, it was discussed that the hop test was too challenging of an activity for these individuals and commented that more studies should address this. As a result, the question that remains is what functional performance test can be done to evaluate performance in individuals with a great amount of instability or limited weight bearing capabilities? Furthermore, there is the question of how to functionally test someone early in the rehabilitation process. It has been suggested that these individuals can use open kinetic chain testing such as isokinetic testing and manual muscle test. However, it has been proven that these activities do not strongly correlate with the individual’s functional ability.
A possible solution was given in a study by Munich et al. This study attempted to assess the use of squat tests in a partial or 50% weight-bearing condition. The apparatus used to perform squats under partial weight bearing is called the Total Gym. It consists of an adjustable inclined track with a sliding body board and a foot platform at the distal end of the apparatus. The inclination allowed for the performing of squat exercise in a gravity-lessened position. As a result, subjects were able to squat at least 65% of their body weight. The author’s purpose of the study was to assess the test-retest reliability of the partial weight bearing squat tests in its assessment of lower extremity function. Healthy subjects, with no history of lower extremity injury were required to do as many single legs squats possible in twenty seconds and were timed in fifty repetitions of single leg squats. A week later the protocol was performed again. Results exhibited that there was test-retest reliability in the measurements from the inclined apparatus. Therefore, the authors concluded that the partial weight bearing squat tests are reliable tools to assess lower extremity performance. The authors further noted that the inclined apparatus could be used for patients that only have partial weight bearing capabilities, i.e. ACL reconstruction, meniscal repair, and arthroscopy.

Providing evidence of reliability of the inclined apparatus was instrumental in that reliability ensures that the results of a test are reproducible. However, validity has yet to be confirmed for these partial weight bearing (PWB) squat tests. Proof of the partial weight bearing squat tests validity would confirm the results of the tests were true measurements of lower extremity performance. Due to this; the purpose of this study is to study the validity of the PWB squat tests using the inclined apparatus to produce valid measurements. It will do so by comparing its measurements with other tests of lower extremity performance that have been proven to be reliable and valid measures. These tests include hop test, stair ambulation, and
walking. In addition, this particular study examines the partial weight bearing squat tests’ ability to produce valid measurements for individuals who have a lower extremity dysfunction. Such information could provide evidence of more effective ways to test patients with limited weight bearing abilities and have a positive effect on their physical therapy treatment.

Methods

Design

A correlation study with six dependent variables was performed. The six dependent variables included the distance (cm) a person could hop on one foot in a single hop, the number (count) of single leg squat repetitions a person could perform in 20 seconds, the amount of time (seconds) it required to complete 30 single leg squat repetitions, the time (seconds) it required the subject to ascend a flight of stairs, the time (seconds) it required the subject to descend a flight of stairs, and the time (seconds) it required to walk 50 feet.

Subjects

This investigation recruited 30 participants from Toledo area outpatient physical therapy and orthopedic surgeon offices. The recruitment process involved distributing information letters that contained information about the study, procedures, and its inclusion/ exclusion criteria. This letter was distributed to the clinicians of physical therapy and orthopedic surgeon offices. In turn they distributed the letters to patients who were prospective subjects. Prospective subjects were individuals that had lower extremity dysfunction. As it related to this study dysfunction was classified as any condition that caused a reduced ability of the lower extremities to perform everyday activities, like walking, or stair climbing.
The inclusion criteria of having a lower extremity dysfunction could be the result of many common diagnoses. Examples of these diagnosis included, low back pain, osteoarthritis of the hip or knee, foot/ankle strain of lower extremity musculature, heel fracture, healed surgery and hip, knee, or foot/ankle sprain. Other inclusion criteria of the study included subjects that were healthy individuals that were at least 18 years old. Subjects that were excluded from the study were those who were pregnant or whose mental abilities did not allow them to follow directions appropriately.

Apparatus

This study used is a partial weight bearing exercise device called the Total Gym (Engineering Fitness International Inc., San Diego, CA). This apparatus consists of a mobile board that slides on an inclined track and a platform located at its distal end (Figure 1). Subjects performed the two single leg squat tests, 20-second and 30 repetition PWB squat tests, using the Total Gym. Evidence of the Total Gym’s test-retest reliability is provided in a study by Munich et. al. In the study the two squat tests were performed on the Total Gym and it produced ICC values of .89 and .9 indicating its reliability.

Figure 1. The Total Gym device for PWB testing
Procedures

During the testing session, subjects were instructed to do a series of activities. These activities included completing as many single legged squats on the inclined squatting apparatus during 20 seconds, completing 30 single legged squats while timed, hopping on one foot, stair ambulation, and walking a distance of 50 feet. These activities were not performed in any defined order. However, there were some precautionary procedures taken before each test. Before the PWB squat tests, a goniometer was used to measure the subjects’ knee flexion while in a squat. Measurement was to insure knee flexion was equal to or less than 90 degrees in the squatted position. Additionally, subjects were instructed to perform each test at their own pace.

Single Leg Hop Test

This test measured the distance that a subject could maximally hop on one foot. Because this test is an aggressive test of lower extremity performance, it was at the subjects’ discretion to perform this activity. Subjects who participated in this activity were instructed to perform the hop test within the maximal ability that was safe and comfortable for their lower extremity injury. After an initial hop, individuals were given an opportunity to perform another hop. For measurement of the distance hopped, investigators measured the distance from the heel of the foot before the hop, to the place where the heel landed at the end of the hop. Once the distances for each hop were found the best hop measurement was recorded.

Stair Climbing Test

In this test subjects were required to ascend and descend a flight of stairs as fast as possible while being timed. Investigators considered ascension and descension of the stairs as
two separate tests and approximately 24 steps were used. The time of the subjects’ ascension and
descension of the stairs was measured with a stopwatch in seconds.

**Walk Test**

Participants were instructed to walk a distance of 50 feet and investigators recorded the
amount of time it required for the individual to cover the distance. Subjects underwent this test
twice.

**20-Second PWB Squat Test**

Subjects were required to do as many single leg squats as possible during 20 seconds,
using the inclined squat apparatus. In addition, both lower extremities were tested but one at a
time. Prior to the test, subjects were instructed on the proper procedure for performing squats and
were allowed practice trials to gain confidence in the performance of the test. After the practice
trials, subjects underwent the actual testing. To complete each squat the subjects moved the knee
through a range of motion that began with 0° extension to the maximum of 90° flexion. Although
this was the permitted range of motion, the subject could only flex the knee within the pain free
and safe limits that the lower extremity injury would have allowed.

**Timed 30-Repetition Squat Test**

In this test the subjects were required to perform 30 single leg squats using the Total
Gym. The investigators recorded the amount of time necessary to complete 30 repetitions of
single leg squats. Each lower extremity was tested separately but one at a time. The remaining
part of the protocol and precautions for this test resembled the 20-second PWB squat test.
Additional Data Collected

Data was collected from the subjects before or after the testing session, regarding their age, gender, affected lower extremity (right, left, or both), the lower extremity diagnosis, and specifics about possible intervention for their lower extremity dysfunction. Interventions included physical therapy treatment, self-treatment, or no treatment.

Data Analysis

After data was collected from the results of each test, it was analyzed for correlation and linear regression. Bivariate Pearson’s correlation was used to find possible correlation. The significance of the results of the tests was based on a one-tailed test with a p-value < .05.

A simple linear regression was also analyzed in the data collected. Linear regression was used to explain how the results of the PWB squat tests predicted estimated changes in patient performance on other functional activities. The slope of the regression model was examined with significance set at p< .05.

Results

Subject Demographics

Descriptions of the subjects are provided in Table 1. These include gender, mean age, injury information, and knee range of motion for testing. Table 2 provides the mean performance for subjects on each of the dependent variables.
Table 1. Subject characteristics (n = 30).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>18 female, 12 male</td>
</tr>
<tr>
<td>Mean age ± SD</td>
<td>49.4 years ± 15.79 years</td>
</tr>
<tr>
<td>Lower extremity involvement</td>
<td>35 injured, 25 uninjured (n = 60 legs)</td>
</tr>
<tr>
<td>Mean days since injury ± SD</td>
<td>159.7 days ± 187.2 days</td>
</tr>
<tr>
<td>Mean knee flexion during PWB tests ± SD</td>
<td>69.3° ± 3.6°</td>
</tr>
</tbody>
</table>

Table 2. Mean values for each of the dependent variable performance tests

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Injury Status</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWB 20 second test (reps)</td>
<td>Injured</td>
<td>17.91 ± 6.27</td>
</tr>
<tr>
<td></td>
<td>Uninjured</td>
<td>21.76 ± 5.51</td>
</tr>
<tr>
<td>PWB 30 repetition test (sec.)</td>
<td>Injured</td>
<td>41.82 ± 23.67</td>
</tr>
<tr>
<td></td>
<td>Uninjured</td>
<td>31.35 ± 9.48</td>
</tr>
<tr>
<td>Hop (cm.)</td>
<td>Injured</td>
<td>111.68 ± 29.07</td>
</tr>
<tr>
<td></td>
<td>Uninjured</td>
<td>130.19 ± 31.49</td>
</tr>
<tr>
<td>Stairs up (sec.)</td>
<td>Bilateral</td>
<td>13.47 ± 5.37</td>
</tr>
<tr>
<td>Stairs down (sec.)</td>
<td>Bilateral</td>
<td>14.21 ± 6.24</td>
</tr>
<tr>
<td>Walking (kph)</td>
<td>Bilateral</td>
<td>5.86 ± 2.34</td>
</tr>
</tbody>
</table>

Reliability

Table 3 gives the reliability ICC values of the measurement taken from the six functional performance tests. It was found that all the tests produced measurements that were reliable.
Table 3 ICC values for reliability of the functional performance test

<table>
<thead>
<tr>
<th>Functional performance test</th>
<th>ICC value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWB 20 second test</td>
<td>.89</td>
</tr>
<tr>
<td>PWB 30 repetition test</td>
<td>.96</td>
</tr>
<tr>
<td>Hop test</td>
<td>.78</td>
</tr>
<tr>
<td>Walk test</td>
<td>.99</td>
</tr>
<tr>
<td>Ascending stairs</td>
<td>.93</td>
</tr>
<tr>
<td>Descending stairs</td>
<td>.94</td>
</tr>
</tbody>
</table>

Correlation

Table 4 displays the correlation values, represented by the r-value, between the two PWB squat tests and the other functional performance tests. It was found that all functional tests correlated with the PWB 20 second and 30 repetition squat tests. In addition, all correlation values were statistically significant at p-value p < .05.
Table 4 Correlation values for the PWB 20 second test and the PWB 30 repetition test

<table>
<thead>
<tr>
<th>Test</th>
<th>PWB20 r-value</th>
<th>PWB30 r-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstairs</td>
<td>-.78</td>
<td>.69</td>
</tr>
<tr>
<td>Downstairs</td>
<td>-.80</td>
<td>.64</td>
</tr>
<tr>
<td>Hop</td>
<td>.47</td>
<td>.43</td>
</tr>
<tr>
<td>Walk (kph)</td>
<td>-.71</td>
<td>.59</td>
</tr>
</tbody>
</table>

PWB20 = partial weight bearing 20 second test  
PWB30 = partial weight bearing 30 repetition test

Linear Regression

A simple linear regression was found to evaluate the PWB squat tests’ ability to predict estimated changes in other functional activities. All coefficients were found to be statistically significant. The slope of the regression model was examined with statistical significance set at a p-value < .05.

Table 5. Linear regression coefficients for the predictive nature of the PWB tests and the functional tests (significant coefficients at p < .05).

<table>
<thead>
<tr>
<th>Test</th>
<th>TG20 coefficient</th>
<th>TG30 coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstairs</td>
<td>-.71</td>
<td>.16</td>
</tr>
<tr>
<td>Downstairs</td>
<td>-.78</td>
<td>.18</td>
</tr>
<tr>
<td>Hop</td>
<td>2.95</td>
<td>-2.12</td>
</tr>
<tr>
<td>Walk (kph)</td>
<td>.32</td>
<td>-.17</td>
</tr>
</tbody>
</table>


**Discussion**

As discussed previously in the literature review, the weight bearing functional performance tests like hop, stair climbing, and gait are essential to assess a patient’s ability to return to activities of daily living or sporting activities. Weight bearing tests are relevant because they resemble the functional activities that lower extremities undergo on a daily basis. There are not many daily activities that the lower extremity does under an open kinetic chain or non weight-bearing situation. Weight bearing activities differs because it requires movement at multiple joints in the lower extremity, which includes the ankle/foot, the knee, and the hip. Usually, this occurs when the most distal segment is under resistance or is fixed in space. Open kinetic chain or non weight bearing no segments that are fixed and movement occurs at a specific joint. Although the weight bearing test are more reflective of the type of activities that the lower extremities endure, nearly full weight bearing capabilities are needed in order to perform them. Therefore, weight-bearing tests would be performed later in the injured patients’ rehabilitation process. To test prior to the level of full weight bearing capabilities, some open kinetic chain activities have been used. Yet evidence has demonstrated that these are not accurate measurements of the patient’s functional ability compared to the weight bearing tests.

The goal of the current study was to expand on the study provided by Munich et al by attempting to find evidence of the PWB squat tests ability to produce valid measurements. Evidence was found by using a multivariate correlation study comparing the PWB squat tests to the other established weight bearing lower extremity functional performance test. Specifically, these established lower extremity performance tests were stair climbing/descention, walking and hop test. It was found that the PWB squat tests have a relationship to all three lower extremity
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functional performance tests. This is evident because the correlational values between the PWB squat tests and the other functional performance test were statistically significant. Such results provide evidence in the validity of the PWB tests. Although all test correlated with the PWB squat tests it is important to discuss that it is only the unhealthy lower extremities of the stair climbing and walking test that were correlated with the PWB squat tests. This is because unlike the hop test, both the healthy and unhealthy lower extremity could not be tested separately. Yet the unhealthy lower extremity affected performance in these specific activities of walking and stair climbing. By using this method of analysis, the information found can demonstrate that the outcome of the unhealthy lower extremity performance in the PWB squat tests would produce a similar outcome in the stair climbing and walking test.

Linear regression was also assessed and found that the PWB tests are able to predict the outcomes of the other functional tests. The linear regression coefficients found in this study was found to be statistically significant. Consequently, the significance of this data implies the use of the PWB squat tests coefficients listed in Table 5 put into the linear regression formula. Once entered into the linear regression formula it could predict the measurement of how the individual would perform in the functional performance tests. For example, the regression coefficient for the PWB 30 repetition test and stair climbing upstairs was 0.16. This indicates that for every second faster that a person can complete 30 repetitions on the PWB test, this individual will likely be able to climb stairs .16 seconds faster. Improvements in walking speed in particular can be predicted, based on improvements on the PWB tests. For each additional repetition that a person can complete on the PWB test (PWB 20 second test), the predicted walking speed will increase by 0.32 kph.
There may be some possible explanations for the PWB squat tests correlations to the other lower extremity functional performance tests of the hop, walking, and stair climbing. One reason for the correlation is because all activities were done in closed kinetic chain and were observed to be using similar motion at the lower extremities. As with most closed kinetic chain activities motion at one joint in the lower extremity causes similar motion at the remainder of the joints in the lower extremity chain as discussed previously. The observed similarities in the weight bearing activities involved two phases of motion for each lower extremity. One phase incorporated dorsiflexion of the ankle, and flexion of the knee and hip. The second phase of motion observed was knee and hip extension. Because these activities were observed to produce similar movements it can be proposed that similar muscle activity was also being used to carry out the activities.

The specific muscles involved in the weight bearing activities are gluteus maximus, iliopsoas, hamstrings, quadriceps, and gastrocnemius activity. These muscles have different functions as the lower extremity undergoes flexion and extension phases. In the flexion phase of weight bearing activity it includes iliopsoas for hip/trunk flexion which, assist in decreasing flexion at the knee. Therefore, increased trunk flexion decreases quadriceps activity as reported in a study by Wilk et al. Cocontraction of both the hamstrings and quadriceps have an important role in lower extremity function in that it creates knee stability while its flexed in closed kinetic chain activity. The gastrocnemius also is a knee stabilizer during the flexion phase of closed kinetic chain activity. In a study by Kivst et al, which involved subjects with ACL deficient knees, the gastrocnemius was found to act with the quadriceps in order to be a stabilizer of knee flexion. Furthermore, the study explains activity of the gastrocnemius and quadriceps occurs to move the tibia forward during flexion of the knee and antagonizes the
action of the hamstrings. The extension phase of weight bearing activity can be described using the squat as an example. In the squat during the extension phase the rectus femoris acts eccentrically and the hamstrings act concentrically to extend the hip. Knee extension occurs because of the concentric activity of the rectus femoris and the eccentric activity of the hamstrings. This type of muscle activity is known as concurrent shift contraction. It is this type of contraction that has been discussed as necessary for weight bearing activities.

Proprioceptive activity may also play a role in the relationship of the hop, walking, and stair climbing activities to the PWB tests. As closed kinetic chain activities these activities produce movement and loading of the ankle, knee and hip joint. Furthermore, as discussed previously the weight bearing activities performed in this study were observed to produce similar movements, which may also load the joints in a similar manner. By loading the joints they are activating proprioceptors that are responsible for awareness of joint position, joint motion and has a role in muscle activation. Hence, it is postulated that the weight bearing activities produce similar proprioceptive feedback which may contribute to similar muscle activity being used in the weight bearing activities.

The results of this study demonstrate significant relevance to the clinical setting. This study provides evidence that PWB squat tests provide valid measurements of a person with a lower extremity dysfunction ability to participate in weight bearing activities. By using the PWB squat tests clinicians are not required to delay weight bearing testing until the patient is able to fully weight bear, or has full stability in the lower extremity. The least weight bearing restriction to perform this activity would be partial weight bearing or 50 % of their body weight. Tests like the hop test, which is widely studied, as a lower extremity functional performance test is an aggressive activity. Individuals that perform the test must have a certain amount of lower
extremity stability to perform a hop. Therefore, it may not be an appropriate test for individuals that are older and do not have stability. Many subjects in this study were older and had difficulty performing the hop test. The PWB squat tests also are an alternative to the non-weight bearing procedures of testing that are not functional. In the PWB squat tests weight bearing is similar to the functional weight bearing activities but under a condition where the amount of weight bearing can be controlled. Decreasing the angle at which the squats are performed and adjustment of how far the patient can bend the knee achieves this. Additionally, by finding the linear regression coefficients a clinician could use the PWB squat tests to predict how the patient would perform on other weight bearing activities like stair climbing and walking. Based on these many advantages of using the PWB squat tests, it is suggested that these tests can be used to assist the clinician in making the appropriate clinical decisions. Clinical decisions may include the patient’s appropriateness for weight bearing activities, assessment of patient progression, and as an initial evaluation tool.

The goal of the current study to research possible correlation between the PWB squat tests and other functional performance tests was obtained. However, there were aspects of the study, which could be improved. A limitation to the study involved the subject population, which was closely homogeneous in age. The average age of the subjects was 49.4 years old. Hence, it is questioned whether there would be a significant correlation between the PWB tests and the other three functional weight bearing test if young athletes with lower extremity injuries were used. Such results would have significance because it could provide evidence of training effects on the correlation results. Furthermore, these individuals may have trained muscle activity that will allow more stability than the subjects that were used in the current study. The purpose of this study was to assess the PWB squat tests ability to assess weight-bearing ability, which in turn
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will predict a person’s ability to return to activities of daily living (ADLs) and sporting activities. Many of the subjects that were used in this study were not athletes. The implications of a study using young athletes could provide evidence of the PWB squat test’s ability to supply valid results which could predict a subject’s ability to return to sport-related activity. This is especially a concern because sport-related activity might be more challenging than ADL activity. The possibilities of the PWB squat tests to predict return to more challenging activities would be instrumental in evaluating the athletic individual.

In the current study, the relationship between the weight-bearing tests and the PWB squat tests was postulated to produce similar muscle activity and proprioceptive feedback. However, further exploration of these possible causes could expand on the evidence in using the PWB tests as tests for lower extremity functional performance. Specifically, an electromyographical (EMG) study, which involved the weight-bearing tests, could be a possible way to assess the similarity in muscle action. Testing for muscle activity would provide an understanding of the relationship of the PWB squat tests to the other tests. Findings from such studies could be useful in the rehabilitation of a subject with a lower extremity dysfunction, in that an EMG would give an analytical perspective of which muscles are needed in order to perform these weight-bearing activities.

Conclusion

As it has been discussed, the results of this study are significant because it provides evidence of when compared to other established lower extremity functional performance tests; it produces valid measurements of lower extremity function. This study introduces a new tool for lower extremity performance testing in the physical therapy setting. Furthermore, it will offer an effective way to evaluate patients with limited weight-bearing capabilities early in the
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rehabilitation process. Thus, it will help clinicians make the appropriate decisions regarding their patients’ care and efficiently return these individuals to their level of activity prior to the lower extremity injury.
Bibliography


