

# Functional Capacity Evaluation:

## Current Evidence Based Practice

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# Introduction

- Fifth FCE
- Online Assessment Application
- Train PT's and OT's around the country
- 4 reliability research projects
- 1 large validity research project



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# Course Objectives

- Daubert Standard and FCE's
- Validity and Reliability in FCE's
- Consistency of Effort
- Reliability of Pain
- Evidence Based Research
  - Consistency of Effort
  - Reliability of Pain
- Introduce a Functional Pain Scale



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# Daubert Standard



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# What the heck is Daubert?

For an FCE to be admitted as evidence

- Reliability
- Validity
- Relevant
- “The Supreme Court held in the Daubert case that this ruled required the judge to consider whether the expert's underlying methodology or technique had been or could be tested; whether it had been subjected to peer review; whether it had a known or potential rate of error; and whether and to what degree the methodology or technique had been accepted within the relevant scientific community” (3)



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# FCE credibility and Daubert

- Do not rely on the FCE testing methodology!
  - No FCE had average to good Validity
- You need to analyze and interpret the data correctly based on evidence based practice
- FCE's should only be performed by health care providers who have the legal authority to perform them
- A kinesio-physical vs. a biophysical vs. a psychophysical approach
- Make sure you know the legal question as well
- Be careful how you report consistency of effort and reliability of pain
- “In the end, it is a well written, rational opinion that tips the credibility scale” (3)



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## Guidelines for FCE of People with Medical Conditions

- Hart, Isernhagen, Matheson
  - Safety
  - Reliability
  - Validity
  - Practicality
  - Utility



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## FCE Validity



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## Types of Validity

- Face Validity
  - This occurs when an FCE appears to measure what it intends to measure and is a plausible method to do so
- Content Validity
  - This occurs when the individual test items in an FCE accurately represents the overall performance domain the test is intended to measure.
- Criterion Related Validity
  - Does your FCE testing meet the level of a “gold standard” (no gold standard in FCE’s)
  - Concurrent Validity
    - Looks at the FCE’s ability to determine current abilities
    - To establish this the FCE must compare the results to the client’s current work status
  - Predictive Validity
    - Refers to your FCE’s ability to determine future abilities
    - To establish this you must follow your patient for a period of time
- Construct Validity
  - Measures whether your FCE can be shown to measure a hypothetical construct



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## Validity Examples

- Face and Content Validity
  - Is your FCE assessment relevant to the needs of the client, therapist, employer, insurer and physician
- Criterion-Related Validity
  - Does your FCE predict successful return to work?
  - Does your FCE predict continued/sustained successful return to work
- Construct Validity
  - Does your FCE discriminate between different groups such as those with and without back pain or can or cannot work.



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## Are FCE’s Valid?

- Out of all the commercially based FCE’s “validity ranged from poor to good”<sup>(1)</sup>
- Out of all the commercially based FCE’s only partial aspects of them had moderate to good validity
  - BTE, EPIC Lift Capacity, ERGOS Work Simulator, Ergo Science, Spinal Function Sort, and Valpar
- There was no commercially based FCE system “that demonstrated moderate to good validity in all areas” (1)
- Why are FCE’s not valid?



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## FCE reports and validity?????

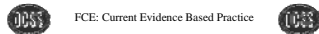
- Validity Criteria
- Valid or Invalid FCE
- Sincerity of Effort and Validity
- Consistency of Effort and Validity
- In your FCE documentation you should never say anything as to whether the patient or FCE was valid.
- Validity is a statistical measurement



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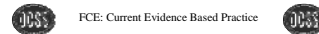


## FCE Reliability



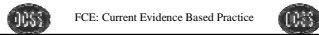
## Two types of Reliability

- Intra-rater reliability
  - Looks at the stability of data recorded by one person across two or more FCE's
- Inter-rater reliability
  - Determines the variability between two or more persons who are testing the same patient.



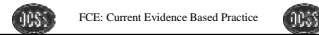
## Commercially based FCE Reliability

- ARCON, BTE, Cal-FCP, Epic Lift Capacity, ERGOS Work Simulator, Lifting portion of the Isernhagen FCE, Lido Work Set, Spinal Function Sort, PILE, Ergo Science, WEST. (2)

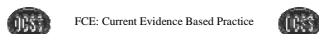


## In house FCE Reliability

- How do establish reliability

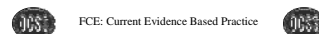


## Consistency of Effort

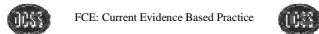


## What is it

- Sincerity of Effort
- Symptom Magnification Syndrome
- Invalid Effort
- Testing a clients overall biomechanical consistencies and inconsistencies based on evidence based medicine.
- "If we avoid addressing consistency of effort, we are underreporting what I believe is an important bit of information. 'Consistency' does not mean 'sincerity'. To say someone is consistent is to report an observation. To say someone is sincere is to judge that person, using our own personal value system." (11)

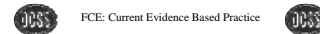


## Evidence Based Research



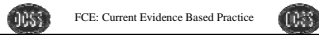
## Definition

- *"Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients."* (4)



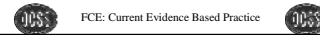
## Consistency of Effort-Musculoskeletal Testing

- What's the general thought
  - Musculoskeletal testing correlates with a persons function during FCE testing
  - If someone demonstrates inconsistencies during ROM/MMT compared to functional testing they should be labeled inconsistent.
- Musculoskeletal testing is always performed for disability/impairment ratings
- "Research, however, suggests that impairment is not directly (i.e., linearly) correlated with function" (5)



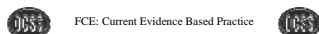
## Evidence

- ROM correlates moderately with measures of function (5)
- Muscle force is not correlated to function (5)
- Low correlation between lower extremity ROM and muscle strength and function at work (5)
- "There are no studies confirming a direct relationship between musculoskeletal impairment and function" (5)



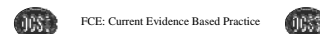
## Evidence

- There is no evidence based research that backs up the common practice of inconsistencies between
  - ROM and inconsistencies during functional testing
    - ROM is reliable however not valid in regards to function and FCE testing
    - Requires common sense (RATIONAL OPINION)
  - MMT and inconsistencies during functional testing
    - MMT is less reliable than ROM and not valid in regards to function and FCE testing
    - Requires common sense (RATIONAL OPINION)



## Practicality and Documentation

- Practicality however would tell us if there is a difference between ROM and functional performance or MMT and functional performance that from an objective and practicality standpoint we need to document this



## Consistency of Effort- Upper Extremity Testing

- What is the general thought
  - Grip and Pinch testing
  - Coefficient of Variation
  - 5 span grip strength testing
  - Rapid Grip exchange
  - “Grip strength is a reliable and valid measurement only when an individual is exerting maximal voluntary effort, and detecting if a person exerts maximal effort is a difficult problem” (6)



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## Coefficient of Variation

- Coefficient of variation is used in FCE testing to determine consistency of effort
- A cutoff value is established
- In the literature this cutoff value ranges from 7% to 20%
- The most common cutoff value is 11% or 15%



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## Evidence

- 3 studies in literature suggest there were no significant differences between the CV of maximal and sub-maximal efforts
- 9 studies in literature suggest there was a significantly greater CV for sub-maximal effort as compared to maximal effort
  - 3 of these showed low stability
  - 3 of these showed large error rates
- 9 of the above 12 studies showed that if the CV was to be used at all that it should not be the only predictor of consistency of effort



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## Evidence

- 2 studies demonstrate that people with weak grip strength, such as when they have an upper extremity disorder, are more likely to be incorrectly classified as exerting insincere effort.
  - This was due to a study that found that the CV of injured subjects was significantly greater than uninjured subjects
- One author, Orit Shechtman, PhD, OTR/L based on her research of the CV stated, “Clinicians and designers of work assessment systems are urged to stop using the CV to indicate whether a grip strength is sincere.”
- CONSISTENT?????



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## CV Practicality

- Research on both sides of the fence
- CV cannot be used on an extremity that is injured
- Could be explained by joint instability, pain, fatigue and/or fear
- CV can be used in FCE's as L. Matheson put it “there is no other statistic that is as fair. The problem comes with its appropriate interpretation.”



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## Documenting CV

- Should be described as a measure of consistency of effort
- Should never be used as a stand alone decision for consistency of effort
- Real time performance ratings should be used
- Must identify whether peak or average forces were used
- Must fully explain the test performed using CV
- Should not be used on an impaired upper extremity
- Must have absolute reproducibility of the standardization of administration
- Must use Consistency of Effort criteria not associated with CV



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## Five Span Grip Strength Testing

- Five Span Grip testing is used in FCE's to determine if someone put forth full and consistent effort
- Stokes in 1983 proposed that the plot generated by a sincere, maximal effort produced a skewed, bell shaped curve, whereas a plot from a client who was faking or had a sub-maximal effort produced a flat curve.



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## Evidence

- 11 studies have been performed since Stokes proposal
- 3 found no difference in the shape of a maximal and faked curve
- 7 found a difference between a maximal and sub-maximal curve
  - 2 of the 7 suggested that the differences did not differ as strongly as Stokes suggested
  - 3 of the 7 found that subjects who were taught to fake were able to produce the same skewed curve as they did when gripping maximally
- Two more recent studies suggested that the shape of the curve is strength dependent and not effort dependent



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## 5 Span Practicality

- The literature still leans toward using the 5 span but is starting to lean the opposite way.
- The big question is whether this is able to be used on upper extremity injuries.
  - Some literature says yes but most says no



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## 5 Span Documentation

- Should be described as a measure of consistency of effort
- Should never be used as a stand alone decision for consistency of effort
- Might not be suitable on an impaired upper extremity
- Be aware of the conflicts with this measurement and the evidence



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## Rapid Grip Exchange

- Rapidly exchanging the hand dynamometer between the clients two hands up to 8 times
- The REG test score greater than or equal to the static test score was a positive REG based on initial research.



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## Evidence

- 6 studies
- First
  - G. Lister (REG developer)
  - No data to support his development
- Second
  - No data or analysis to support REG
- Third
  - Maximum effort showed REG scores were 15% lower than max effort 5 span scores
  - Sub-Maximal effort showed REG scores were "significantly greater than peak 5 span scores"



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## Evidence

- Fourth
  - Sub-maximal effort REG scores were significantly greater than 5 span scores
  - Maximal effort REG scores did not differ from peak 5 span scores
- Fifth
  - Found that peak REG scores were always greater than 3 trial grip scores regardless of maximal or sub-maximal effort
  - Sub-maximal peak REG scores compared to 3 trial was greater than maximal REG scores compared to 3 trial
- Sixth
  - Significantly supports a negative REG compared to 5 span and three trial grip
  - Supported a positive REG only when compared to 5 span grip testing



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## REG Practicality

- Research is all done in a different fashion
- Need to be consistent in what you do
- Based on research you should be comparing your REG scores to your position 2 during 5 span grip testing



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## REG Documentation

- Should be described as a measure of consistency of effort
- Should never be used as a stand alone decision for consistency of effort



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## Consistency of Effort- Material Handling

- How do I know the patient tried his/her best
- How do I know if they were consistent in their effort
- Kinesiophysical vs. biophysical vs. psychophysical



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## Evidence

- Two generally accepted lifting test protocols that have been adapted by many clinicians
  - Progressive Isoinertial Lifting Evaluation
  - WEST Epic Lift Capacity Test
- PILE
  - Lumbar test
  - Cervical test
  - Increase by 5 or 10 pounds and need to complete 4 reps within 20 seconds
  - Psychophysical end point
  - Aerobic End Point (85% of age determined maximum heart rate)
  - Safety End point (55-60% of body weight)



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## Evidence

- WEST Epic
  - Knuckle to Shoulder, Floor to Knuckle, and Floor to Shoulder
  - Frequent testing is 4 lifts
  - Kinesiophysical test that looks at heart rate, posture and body mechanics.
  - Psychophysical responses are collected



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## Evidence

- Duabert Standard suggests we should only use a Kinesiophysical approach
- “It appears that a minimum increase in heart rate of 25% should be expected in response to maximum effort during the ELC test. (7)
- “The best single indicator of valid effort was the experience clinician’s evaluation of evaluatee effort according to observational criteria.” (7)
- The kinesiophysical floor to waist, horizontal, and waist to crown level lifting test was tested and found to have excellent intra-tester and inter-tester reliability.”



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## Practicality and Documentation

- Best to use a kinesiophysical approach to material handling
- Our observations are the best way to determine a consistent effort
- A 25% increase in heart rate would suggest maximum effort



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## Reliability of Pain

- Subjective Pain ratings
- Physiological changes and pain
- Pain Behaviors
- Determining whether or not the pain rating the client is verbalizing is consistent with the pain level they are experiencing
- OccuCare Pain Intensity Scale™



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## Reliability of Pain- Waddell Signs

- 3 of 5 signs positive suggest a positive Waddell sign
  - tenderness, simulation, distraction, regional disturbances, overreaction
- Waddell 1979,
  - “The physical signs described here profile a simple and rapid screen to help identify the few patients who require more detailed evaluation”
  - “Regression analysis of multiple non-organic signs and of a surgeon’s decisions showed that overreaction was the single most important non-organic physical sign. Unfortunately, this is also the sign most influenced by the subjective impressions of the observer”
  - “Even with a proven and treatable physical lesion, multiple non-organic signs help to identify those patients requiring formal psychosocial assessment before surgery for relief of pain.”



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## Evidence related to FCE’s

- A ton of studies out there
- 9 studies looked at Waddell Signs and their correlation with psychological distress
  - 87.8% of these studies suggest no correlation
- 4 studies looked at Waddell Signs and their correlation with an abnormal illness behavior
  - 100% of these suggested their was no correlation
- 10 studies looked at Waddell Signs and whether than can discriminate between organic and non-organic problems
  - Three of the ten suggest that Waddell signs cannot discriminate between organic and non-organic problems
  - Four of the studies suggest that Waddell signs can discriminate an organic problem



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## Evidence related to FCE's

- 7 studies looked at whether Waddell signs are associated with decreased functional performance
  - All of these studies suggested that Waddell signs are associated with decreased functional performance
- 24 studies looked at whether Waddell signs are associated with secondary gain
  - 75% of these studies suggested that Waddell signs are not associated with secondary gain
- 15 studies looked at whether Waddell signs are associated with greater pain perception
  - 100% of these showed a highly consistent evidence of a relationship between Waddell signs and pain
  - 12 of them showed a relationship between greater pain and Waddell signs



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## FCE Evidence summary

- Substantial consistent evidence
  - Waddell signs are associated with decreased function
  - Waddell signs are associated with greater pain levels



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## Waddell Sign Practicality and Documentation

- Do not document Waddell signs as related to Consistency of Effort
- Should only be related to Reliability of Pain and function
  - Needs more research



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## Reliability of Pain – Physiological Responses

- If a client reports increased pain then their should be an accompanying increase in physiological responses
  - Heart Rate
  - Blood Pressure
  - Respiratory Rate



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## Evidence

- Borg reported that in increase in angina pectoris pain showed an increase in heart rate
  - This is very different from musculoskeletal pain
- Coghill showed an increase in heart rate with a painful stimulus but was unsure if the increase in heart rate was from the painful stimulus or the anxiety of the evaluatee anticipating the painful stimuli
- Moltner showed that there was an increase in heart rate by 8bpm within 12-18 seconds
  - He did show however that “the heart rte response is coupled more closely with the perceived stimulus intensity than with the objective properties of the physical stimulus itself.” (8)



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## Evidence

- Kregel showed that heart rate increased during the onset of immersion in a extremely noxious level of cold water
- Peter and Schmidt did show an increase in respiratory rate following a painful stimuli



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## Practicality

- Evidence to date would suggest that heart rate cannot be used to validate self report measures of pain but respiratory rate can.
- Blood pressure needs more research



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## Reliability of Pain – Pain Behaviors

- Pain behaviors should be documented because they tell us whether or not someone has actually had an increase in pain



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## Evidence

- Prkachin reported in his research that faked and spontaneous expressions of pain differ and can be identified by observers
- Craig reported that faked facial expressions of pain represent intensified caricatures of genuine expression.
- A study by Hadjistavropoulos suggested that chronic pain patients can successfully simulate pain
- A study by Poole and Craig suggested that faked facial expressions of pain cannot be identified accurately.
- Lastly another study by Hadjistavropoulos reported that malingered facial expressions can be identified successfully



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## Evidence

- Keefe in 1984 reported “The present study found that the level of pain behavior correlated with patients’ ratings of pain. Patients who rated their pain as more severe showed higher rates of pain behavior...”
- A study in 1993 by Dirks and associates reported that chronic pain patients who were classified as being conscious exaggerators reported more pain than they displayed or displayed more pain than they reported.
- 1989 Jensen and associates reported “Our data supports the validity of the observation method as a pain measurement technique.” “the results of the present study demonstrate the potential utility of the method in measuring pain behavior in non-chronic back pain patients.”



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## Practicality

- Like everything else there are study’s on both sides of the fence
- There is enough evidence to suggest that pain behaviors are associated with increased pain



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## Documentation

- Continue to document the pain behaviors you see or do not see



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## Reliability of Pain – Psychometric Testing

- Different tests used to determine if someone is being forth right in their report of pain symptoms
- Ransford Pain Drawing
- McGill Pain Questionnaire
- Oswestry Neck and Low Back Disability Index



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## Evidence

- “Psychologic tests appear to be more predictive of treatment outcome than somatically oriented diagnostic procedures” (9)
- Ransford reported “the pain drawing may allow the physician to screen out most (93%) of the patients who are likely to have poor psychometrics and allow him to obtain a full psychologic assessment before proceeding with the necessary treatment”
- There has been a positive association between the Ransford pain drawing and Waddell signs in the literature.
- Chan reported “Our results show that the pain drawing is as effective and reliable as many other commonly used clinical routines.”



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## Evidence

- Kaplan and associates stated “Findings from this study support our prediction that psychological factors are related to performance on the FCE.” (10)
- “the results provide evidence for the relationship between subjective disability, depression, anxiety, self-efficacy and patients’ performances on the FCE” (10)
- “patients who did not exert maximal effort on at least one of the three FCE subtests reported more depressive symptomatology, anxiety, and perceived themselves as more disabled.” (10)



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## Practicality

- Psychologic testing is an integral part of making your final decision in regards to whether someone was reliable in regards to their pain ratings.
- If during FCE testing there are a lot of red flags in regards to consistency and reliability of pain psychological testing will really help to back up or debunk your professional judgment in regards to a client you are testing



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## Documentation

- Your objective documentation of how a client performed on these psychometric tests are crucial.



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## Final thoughts

- In house FCE’s vs. Commercially available FCE’s
- Increase the Validity of your FCE by knowing exactly what the physical demands of the job are
- Continually perform in house FCE round table discussions with all testers to maintain a high level of reliability
- Stay up to date on current evidence based research in regards to FCE’s
- “The determination of maximal effort in a functional capacity evaluation is complex. Because of wide-ranging medicolegal and ethical considerations, caution is recommended in the labeling of patients as exerting either maximal or sub-maximal effort” (12)



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## Questions

## Thank you



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