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Category Response Analysis of the Revised Caregiver Self-efficacy Scale for Transfers

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Note: This document describes a Capstone Dissemination project reflecting an individually planned experience conducted under faculty and site mentorship. The goal of the Capstone Experience is to provide occupational therapy doctoral students with unique experiences whereby they can demonstrate leadership and autonomous decision-making in preparation for enhanced future practice as occupational therapists. As such, the Capstone Dissemination is not formal research.
Abstract

Objectives: The purpose of this study was to evaluate the psychometric properties of the revised rating scale used with the Caregiver Self Efficacy Scale for Transfers (CSEST).

Method: The participants were caregivers of non-ambulatory children. Each caregiver received a packet containing an introduction letter, a demographics sheet, and a copy of the CSEST. This study used the Rasch Measurement Model for rating scale analysis and Linacre’s guidelines for rating scale evaluation to analyze if the five point scale was the most effective in producing a valid assessment.

Results: Caregivers returned 175 usable surveys. Results supported that these caregivers used the five-point rating scale as intended. Each response category was perceived uniquely, response categories reached thresholds and advanced monotonically. The vast majority of means squares fit and step difficulties advanced appropriately. However, we lack some ability to make inferences at the lower end of the scale because this sample of caregivers tended to be more confident in transfer abilities.

Conclusion: Overall, the data from this study with another sample of caregivers was analyzed and confirmed that the collapsed five-point rating scale was the most optimal scale. Occupational therapists can use the CSEST to evaluate the confidence caregivers feel in their transferring skills and then plan an intervention strategy to increase the use of proper body mechanics, energy conservation, and safety techniques for both caregiver and child. Future research is needed to further assess the effectiveness of the five-point scale.
Category Response Analysis of the Revised Caregiver Self-efficacy Scale for Transfers

The role of caregiver is becoming more common. Parents and caregivers of nonambulatory children have a particular challenge in that the children will continue to grow throughout the years and the caregiver will need to adapt to the child’s new weight and height. As children grow, caregivers’ confidence in their abilities to transfer their children safely without injury to the children or to themselves can diminish. Self-efficacy is a concept that occupational therapists can use to help caregivers learn how to perform transfers in a safe and effective manner once transfer issues are assessed. Occupational therapists can educate caregivers’ in preventive strategies to avoid back injury and pain and enhance caregivers’ self-efficacy.

The current study is one of a series of studies that have created and refined the Caregiver Self-Efficacy Scale for Transfers (CSEST) and have evaluated its psychometric properties and rating scale. The CSEST focuses on identifying the perceived self-efficacy of caregivers to perform specific physical transfers with their children that they encounter in their normal occupations of daily living (Thomas, Shuford, Duke, & Cipriani, 2007). The current study was conducted in collaboration with Kubec (2008) who evaluated the psychometric properties of the CSEST as a whole. This purpose of this study was to evaluate the psychometric properties of the revised rating scale used with the CSEST.

Prior to describing this study, relevant literature will be presented. First, the potential of caregiver injury will be described. Secondly, self-efficacy will be defined with a focus towards the caregiver and the need for the CSEST will be established. Thirdly, the role of occupational therapy and the caregiver will be examined. Lastly, the analysis of the CSEST response scale will be explained and Rasch analysis, used to evaluate the psychometric properties of the CSEST in previous studies will be described.
Back Pain and Injury

Caregivers are more susceptible to back pain and injury than those in the general population. In the United States, 0.2% of children between the ages of 6 and 14 use a wheelchair (U.S. Census Bureau, 1997). Some caregivers do not understand correct body mechanics or do not have the confidence in themselves to perform transfers that are safe for their children and themselves. Sales and Uttig (2002), both nurses, were particularly concerned with the strain placed on nurses’ backs while performing manual handling of children and young people in a hospital and at home. Manual handling is described as “lifting, lowering, pushing, pulling, carrying, and supporting of loads including patients” (p. 36). They found that loads are most efficiently supported when applied to a vertical spine. When a load is applied to a twisted spine, the vertebrae and muscles are lined up incorrectly and cannot fully support the load. Sales and Uttig (2002) identified the risk factors for back injury as:

1. Excess loads or distance or both.
2. Holding loads away from the area of the trunk (loads at arm’s length or too high or low).
3. Twisting (especially with a load).
4. Those movements which involve poor posture such as bending and stooping.
5. Repetitive movements.
6. Insufficient rest between maneuvers (p. 37).

Many of these risk factors are present when transferring a child or the child’s equipment. Sales and Uttig recommend three ways to move loads safely by using “basic principles of movement, including: maintaining good posture and positioning, being aware of the body’s center of gravity, and being aware of the mechanics of movement including momentum and friction (p. 39).
Griffin and Price (2000) focused on the methods that mothers choose to physically care for their children that may subject the mothers to back strain or injury. They found that mothers typically would choose lifting and transfer methods that are based on the needs of the child, and would often disregard themselves and their own needs. Griffin and Price (2000) found that when mothers lifted their child from the ground they would often choose “the stooped position involving lifting a load from the floor with straight knees and a bent back” (p. 2) and that when they lifted their child using this method, “the soft non-muscular tissue of the back that supports the load during this type of lift is often strained” (p. 2). Using the correct body mechanics to lift a child can be difficult because of the child’s weight and because children are constantly moving.

Griffin and Price (2000) conducted ten semi-structured interviews with mothers who had children between birth and three years old and had no history of back pain prior to the birth of their children. They found that all mothers put their children’s needs before their own. It was also shown that mothers preferred ways that saved them time, effort, and caused least amount of worry. When the mothers were tired they really did not care about how they lifted, and that they would use the method that took the least amount of time. Griffin and Price (2000) state that, “the mother needs to be aware that if a major injury were to occur to her back, her mothering role would be affected” (p. 15). Caregivers’ need to recognize that if they do not use the proper techniques they can injure themselves to a point that they might not be able to care for their child at all.

Nicholson (1999) conducted a survey of parents caring for children with restricted mobility. She investigated the incidence of musculoskeletal problems and the ways that the parents managed to care for themselves and what strategies they used to perform tasks involving lifting and supporting their children. Her results revealed a high incidence of caregiver problems,
particularly back pain. The parents indicated a lack of knowledge on proper body mechanics and used whatever was most appropriate for their children.

Sanders and Morse (2005) identified the frequency, type, and severity of musculoskeletal symptoms in parents of children who were less than four years old. The results showed the parts of the body most affected were the lower back (48%), neck (17%), upper back (16%), and shoulders (11.5%). These findings indicated musculoskeletal symptoms were associated with performing child-care tasks defined as having high biomechanical risks (p=.001). The findings also indicated that mothers perceive that caring for children is highly demanding (p=.003). The study suggests the need for occupational therapy wellness programs that have a focus on preventing the musculoskeletal pain and discomfort associated with parenting and the need for providing support for the role of parental caregiver. Each caregiver has a different level of confidence when transferring his or her child. The level of confidence each has can be described using the term self-efficacy.

Self-efficacy

Self-efficacy was first described by Bandura in the context of his Social Cognitive Theory (1986). According to this theory, people are motivated to engage in a behavior based on the belief that:

(a) the behavior will result in a favorable outcome (outcome expectation), and

(b) the individual is capable of executing the behavior (efficacy expectation).

According to Bandura, efficacy expectations are related to behavior in three ways; the conviction that one has the ability to initiate an activity, maintain an activity, and persist in performing an activity in the face of obstacles (Horan, Kim, Gendler, Froman, and Patel, 1998, p. 396).
Self-efficacy is a person’s belief in her own capabilities to achieve certain goals or objectives. Maddux (1995) states, “the crux of self-efficacy theory is that the initiation of and persistence at behaviors and courses of action are determined primarily by judgments and expectations concerning behavioral skills and capabilities and the likelihood of being able to successfully cope with environmental demands and challenges” (p. 4). Caregivers will be faced with several environmental demands, such as rain, snow, and ice especially during transfers of the child and equipment into and out of the car. It is important that caregivers have a sense of confidence that is reflective of skills to safely perform needed transfers without injury to themselves or their children. Once caregivers feel confident in their ability to successfully complete transfers, random failures or problems should have little effect on their confidence or their efficacy (Bandura, 1986). Once caregivers of children learn safe transfer techniques and develop confidence in their skills for proper transfer techniques to effectively avoid back pain they will subconsciously use the proper body mechanics in caring for their child. An occupational therapist can help develop the skills for safe transfer techniques.

Role of Occupational Therapy with Caregivers

Using the CSEST, occupational therapists can evaluate the confidence caregivers feel in their transferring skills and then plan an intervention strategy to increase the use of proper body mechanics, energy conservation, and safety techniques for both caregiver and child. By finding what motivates mothers to perform their transfers in a specific way, healthcare professions will be able to design effective intervention strategies to decrease pain (Griffin and Price, 2000). Knowing that their children will be safe, the mothers may be more apt to focus on an intervention that would decrease back pain. Esdaile (1994) reviewed occupational therapy perspectives of parents of children with special needs. She explains the need for family members
to also be able to help the caregiver and states that “it is well documented that many occupational therapists are concerned with families who have children with special needs” (p. 6).

Occupational therapists can help family members and caregivers recognize transfer hazards and learn safe techniques that minimize back pain. The CSEST can contribute to the therapy process by highlighting the key areas where a caregiver is lacking confidence. The occupational therapist can then design an intervention aimed to improve these specific target areas. The usefulness of the CSEST is dependent on its psychometric strengths. The performance of the CSEST rating scale is one aspect of its validity. The Rasch Measurement Model is used to determine attributes of validity. The next section describes Rasch Measurement Model analysis and its application to the CSEST.

Rating Scale Analysis

The Rasch Model (RM) is commonly used to evaluate the psychometric properties of measures and rating scales (Fisher, 1993, Kornetti, Fritz, Chiu, Light, & Velozo, 2004, Dominger, Bode, Heinemann, & Ambrose 2000). The RM is used to evaluate the reliability and validity of interval scaled measures (Dominger et al., 2000). Fisher (1993) used a multifaceted RM to develop the Assessment of Motor and Process Skills (AMPS). She discusses the significance of using Rasch analysis to determine how well the items on the scale fit the unidimensional ruler, which is reflected in the goodness-of-fit statistics. Rasch analyses generate goodness-of-fit statistics that can be used to confirm construct validity analyses of the constructed scales. Rasch analysis does this based on possible expectations of the group of test takers and then confirming that the test items fit into the model (Fisher, 1993). The RM is able to identify whether a hierarchy of difficulty of items exists which is reflected in the measures and standard errors of items. The easier the transfer described in an item the more likely that any
person will express confidence in his/her skill and the more skilled person will be more likely to express confidence in harder transfer items. Scales such as the CSEST use RM to evaluate measures. The RM also converts ordinal scale data to interval scale data for statistical purposes (Darr, 2006). An additional application of the RM is to evaluate the usefulness of rating scale categories, which are common in measures such as self-efficacy measures.

In Bandura’s social cognitive theory he establishes guidelines for expressing self-efficacy by asking participants to estimate their confidence in their abilities by using a scale ranging from 0 to 100 in 10-point increments (Smith, Wakely, Krief, & Swartz, 2003). The problem with using such a large scale is the participant’s inability to differentiate between response categories. Using the RM allows researchers to optimize the number of response categories on the rating scale without having to administer several different versions of a scale to the same participants resulting in unidimensionality (Smith et. al., 2003). Fisher (1993) states that response categories frequently appear as if they represent equal intervals, however little research is available to support the assumption that response categories progress in equal intervals. Linacre (2002) encourages the five-point rating scale, and believes that using fewer response categories has a psychometric advantage in comparison to a scale with more response categories. Linacre (2002) demonstrated that using RM to evaluate a rating scale can provide an effective framework that verifies and improves the functioning of the rating scale.

For example, Smith et al. (2003) conducted a study of 330 students administering the Index for Self-efficacy and Writing. The 36-item test consisted of a 10-point rating scale. Upon data analysis disordering was found in the response categories. The researchers then collapsed the disordered response categories and created a 4-point rating scale. The test was then readministered giving person reliability of .87 and item reliability of .99. All mean square infit
and outfit statistics were within the required range and the item hierarchy was stable throughout
the test. The results indicate the generalizability of the findings and the utility of the scale for use
with samples of respondents lending support to the use of four response categories points on a
rating scale (Smith et al., 2003).

Miller (1956) studied the limits on human’s capacity for processing information. Miller
showed that the limit of human’s short-term memory is seven categories plus or minus two. His
theory was tested with listening to the pitch of tones, taste intensities of a solution, the position
of a point on a line, and the size of a square. Miller (1956) states that “there seems to be some
limitation built into us either by learning or by the design of our nervous systems, a limit that
keeps our channel capacities in this general range” (p.86), (seven plus or minus two). Miller’s
study has been cited in several studies (Smith et al., 2003 and Streiner & Norman, 1995), and
because of his groundbreaking research seven is used as a common number for categorizing,
(e.g. seven digit telephone numbers, seven primary colors, seven musical notes on a scale).
Streiner & Norman (1995) confirmed Miller’s theory by conducting empirical investigations into
the optimal number of rating points and found that there are minimal gains in reliability as one
goes beyond five to seven points.

Linacre (2002) describes using RM to analyze rating scales to understand and develop
them more than if there simply was only a right or wrong answer. Rating scales have three main
purposes: they allow the researcher to focus on the topic of research being done, they provide a
number of possible responses to each question, and they require all test takers to have the same
choices of responses when responding (Smith et al., 2003). For instance, the response scale on
the original CSEST was an 11-point scale (i.e., 11 independent responses for each question),
from zero, not at all confident, to five, moderately confident, to 10, extremely confident.
Linacre (2002) developed guidelines to evaluate the effectiveness of rating scales. Table 1 summarizes his guidelines. Guidelines two, three, four, five, seven, and eight are reviewed as they are most applicable to the current study. Guideline #2: One should observe regular distribution amongst the probability curves of the response categories. Response categories should be perceived uniquely. Irregularity in observation categories may show a deviation from what is expected. Each response category needs to have its own probability curve peak without any other response category options overlapping that peak.

Guideline #3: The average measure should advance monotonically with each response category. For numbers to advance monotonically they must reach a threshold. Ordered thresholds show that as one moves up the self-efficacy continuum, the next higher category will become the most likely response showing that respondents can differentiate between categories (Smith, et al., 2003). “To improve the rating scale, response categories are often collapsed or combined when options on the rating scale are not well represented or used by respondents” (Darr, 2006, pg. 9). However, researchers do not want to collapse two divergent categories. They must also carefully consider the specific response categories that will be collapsed.

Guideline #4: The outfit mean-squares should be less than 2.0 logits. “The Rasch Model specifies that a reasonably uniform level of randomness must exist throughout the response category data” (Darr, 2006, pg. 10). Linacre (2002) explains that values greater than 2.0 standardized units for the outfit statistics suggest there is more unexplained randomness, or “noise,” thus indicating more incorrect information than systematic variation in the observations.

Guideline #5: The step calibrations should advance with each successive response category. There are three reasons why disordering could occur, 1) when intermediate response category points are not labeled undecided or neutral, 2) when intermediate response category
points are not labeled at all, or 3) when too many response category options have been presented (Smith, et al., 2003).

Guideline #7: The step difficulties must advance by at least 1.4 logits. If the response category steps advance by less than 1.4 logits, the categories may have too close of a meaning with excessive overlap of probability distributions from adjacent categories. This guideline should result in more distinct response categories on the response scale.

Guideline #8: The step difficulties must advance by less than 5.0 logits. When step difficulties advance by more than 5.0 logits it creates response categories that are too far apart from adjacent categories, resulting in a gap in measurement ability on the rating scale.

*Development of the Caregiver Self-Efficacy Scale for Transfers (CSEST)*

Shuford (2000) developed the initial Caregiver Self-Efficacy Scale (CSES). The CSES was “designed to assess caregivers’ perceived self-efficacy for completing physical transfers required in the care of their children” (p. 7) and also to, “assess reliability for the CSES through internal consistency” (p. 1). It originally consisted of a 17 item survey, with an 11 point rating scale. The CSES was developed to assess perceived self-efficacy to use proper body mechanics in occupations such as vehicle transfers, toilet transfers, and bed transfers among others. The CSES also evaluated completing these occupations in different conditions: adverse (such as being in a hurry, running late and different bad weather conditions) or optimal (feeling calm, no time constraints, and good weather). Shuford had 14 expert occupational and physical therapists evaluate the items for clarity, conciseness, and importance. Twelve therapists returned the surveys. Shuford revised the items based on the suggestions from the 12 experts.

After the first revision, sixteen items remained and Shuford added one item of the caregivers’ choice with unspecified conditions involving a transfer of the child in a public place.
The original 11 point rating scale incorporated into the CSES anchors zero with “not at all confident” and ten as “extremely confident” (2000).

The CSES was given to a sample of parents or caregivers’ of non-ambulatory children through several agencies and schools. Thomas et al (2007) used the Rasch Measurement Model to evaluate the psychometric properties of the CSES. There were two phases in this study. The first phase was the development and evaluation of the initial CSES, then renamed Caregiver Self Efficacy Scale for Transfers (CSEST). This phase used the RM and tested the person and item reliability, item infit statistics, and hierarchical order of the items. A total of 82 scales were used in the data analysis. The RM estimate of person reliability was .96 and for item reliability was .97. The adverse conditions for transfers were perceived as more difficult than the optimal conditions after evaluation of the hierarchical structure of the data. “Several items showed infit statistics in excess of two z-scores (i.e. standardized chi-square fit values), which is considered to be evidence of poor fit to the model” (Thomas et. al., 2007, p. 2). During the second phase the CSEST was shortened to 14 items and given to another sample of caregivers. They found that the CSEST showed sufficient reliability (.96 for respondents, .94 for items). It also showed sufficient item separation of levels of self-efficacy (Separation Index (SI) =4.13), showing that the CSEST items separated into more than four individual levels of difficulty. The sample also showed that the caregivers separated into more than five levels of self-efficacy (SI=5.23). Factor analysis confirmed two insubstantial subscales; the 14 item CSEST as a whole accounted for greater than 85% of the total CSEST variance.

Darr (2006) used RM rating scale analysis to analyze the performance of the 11 point rating scale of the original CSEST. She found that the 11-point rating scale did not meet Linacre’s guidelines for rating scale performance. In order to suggest improvements to the rating
scale structure Darr used RM rating scale analysis to evaluate potential re-combinations of response categories. She determined which rating scale response categories should be collapsed and if combining the response rating scale response categories would improve the performance of the rating scale. To perform the analyses Darr followed Linacre’s (2002) eight guidelines to optimize response category measurement, in this case, self-efficacy. She focused on guidelines two, three, four, five, seven, and eight.

Darr used the data set from the previous study done by Thomas et al (2007), and analyzed the rating scale to find the most optimal rating scale pattern. The ninth trial analyzed collapsed the original 11 response categories into five response categories. This was found to be the most optimal collapsed response category option. Response categories zero and one were collapsed and became category zero, response categories two and three were collapsed and become category one; categories four and five became category two; categories six, seven, and eight became category three; categories nine and 10 became category four. This optimal scale configuration met guidelines two, three, five, seven, eight, and demonstrated substantial improvement in guideline four. Guideline number two was met because there were no overlapping response category probability curves. Meeting guideline number three indicated that all response categories advanced monotonically. Guideline number four demonstrated the five-point rating scale improved the outfit mean-square statistics for all items. However, four of the 14 items still had some response categories where the outfit mean square statistics were greater than 2.0 standardized units. Guideline number five was met with no disordering for the 14 items using the optimal rating scale. Guidelines seven and eight were met with the step difficulties advancing by at least 1.4 logits and less than 5.0 logits demonstrating that the categories are correctly measured and distributed.
Current Study

The purpose of this study was to evaluate the psychometric properties of the revised five-point rating scale of the CSEST. RM was used to determine if the optimal five point rating scale found in the previous study (Darr, 2006) performs in a manner that best measures caregivers’ self-efficacy. This study used RM rating scale analysis and Linacre’s guidelines for rating scale evaluation to answer the following research questions: 1. Does the five-point rating scale demonstrate optimal monotonic advancement of the average measures for each response category? 2. Does the five-point rating scale improve the step calibration for items? 3. Does the five-point rating scale demonstrate improved distribution amongst the probability curves? 4. Does the five-point rating scale demonstrate response categories that have outfit mean-square statistics that are less than 2.0 standardized units? 5. Does the five-point rating scale demonstrate response categories that advance by more than 1.4 logits and by less than 5.0 logits? 6. Depending on the results of analysis of the 5-point scale, is there a further way to collapse the five-point scale to more optimally meet Linacre’s guidelines?

The results of this study will contribute to the validity of the CSEST rating scale. Upon completion of the psychometric properties of the assessment, the CSEST can then provide occupational therapists with an assessment that can guide caregiver education on proper body mechanics designed to develop within caregivers the confidence to perform transfers safely and effectively.

Method

Participants

The participants of this study were caregivers of non-ambulatory children. The caregivers were English speaking/reading adults at least 18 years of age. The caregivers were the primary or
secondary caregiver of the child. The participants were gathered from several data collection sites including area school systems, outpatient pediatric rehabilitation clinics, a therapeutic riding facility, and caregiver support groups. The caregiver’s child had to be under the age of 22 and require assistance with transfers on a daily basis for the caregiver to qualify for this study. Participation was voluntary and could be discontinued at any time.

Definitions

The same terms used in Darr’s (2006) study were used in this study. Items refer to the 14 items of the CSEST on which caregivers will rate themselves. An item refers to each individual item (i.e. scenario) within the CSEST. Rating scale refers to the whole scale associated with each item on which caregivers rate their level of confidence for each transfer situation. The new rating scale is a five-point scale with response categories zero to four. The rating scale is used with each of the 14 CSEST items. Response category refers to the individual options on the rating scale. Each of the five points on the rating scale is considered a response category. For example, zero is considered a response category; one is a response category, up to four which is the last number of the rating scale. (See Appendix A for an example of the CSEST and the rating scale).

Instruments

Each data collection packet consisted of a cover letter indicating the purpose of the current study, demographic sheet, the CSEST, and a return self-addressed stamped envelope. The letter stated that the study is confidential and asked if the caregiver is interested in participating in the study. (See Appendix B for the letter). The demographic sheet requested information about caregiver health status, gender, child’s weight, caregiver’s age, child’s diagnosis, caregiver physical ailments, and the child’s age. (See Appendix C for the
demographic sheet). The CSEST consists of 14 items addressing eight different daily occupations dealing with different types of transfers and examines each of them under optimal or adverse conditions. The five-point rating scale consists of response categories, zero being, “not confident at all,” two being, “moderately confident,” and four being, “extremely confident.” (See Appendix A)

*Category Response Scale Analysis*

The Rasch Measurement Model was used to analyze the data using the WINSTEPS computer program (Linacre, 2002). The WINSTEPS program produces probability curves of caregivers’ use of the rating scales for the 14 CSEST items. Each of the 14 items on the CSEST was analyzed to determine if the ability level of the intended caregiver population matched the difficulty level of the CSEST instrument and if the five point rating scale was the most effective in producing a valid assessment.

The rating scale was analyzed to see if it met Linacre’s guidelines (2002). Guideline number one states that there must be at least 10 observations of each category. This assures that each response category is sufficiently estimated (Smith et al., 2003).

The second guideline requires regular observation of distribution. This was analyzed via the probability curves for each item. These curves indicated whether each response category is uniquely perceived by caregivers. This is demonstrated when each response category has its own peak where it has the highest probability of being selected than any other response category.

The third guideline requires that the average measures should advance monotonically with each response category. The numbers for each response category should be ordered from the lowest to the highest indicating that they reach a threshold. This will be reported by WINSTEPS as the observed average.
The fourth guideline requires the outfit mean-square statistics for each response category in each item should be less than 2.0 logits. This shows that there is a reasonable level of randomness that exists within the response category data.

The fifth guideline requires that step calibrations should advance monotonically. The WINSTEPS program will identify this guideline as the structure calibration. The data will indicate the probability that caregivers will rate their abilities accordingly to given response categories on the rating scale.

The sixth guideline is ratings imply measures, and measures imply ratings. Linacre (2002) states that in general, a single observation implies an equivalent underlying measure, therefore from an underlying measure one can infer what behavior is expected. Each question asked on the CSEST can be given a rating on the five-point scale. For example, a question about transfers represents a level of confidence about all types of transfers. Caregivers have varying levels of confidence. This implies that caregivers will rate their own capabilities based on their own varying levels of confidence, signifying that ratings imply measures. This guideline cannot be reported by the WINSTEPS program.

The seventh guideline requires that step difficulties must advance by at least 1.4 logits. If the step difficulties advance by less than 1.4 logits overlapping occurs in the adjacent response categories. Each response category will then not be perceived as unique or distinct from adjacent categories. The WINSTEPS program will report advancements under “structure calibration” from which the step calibrations are calculated.

The eighth guideline requires that step difficulties must advance by less than 5.0 logits from which the step difficulties are calculated. When the step difficulties advance by more than 5.0 logits, gaps in measurement ability occur between adjacent categories. In the case of more
than five logits between categories, it will be perceived as too much distance between response categories. Also, when the distance between response categories is more than 5.0 logits the information between response categories becomes poorly identified and thus poorly measured (Linacre, 2002). The WINSTEPS program will report advancements of logits under “structure calibration.”

The data were evaluated in terms of each guideline. If the data did not meet each guideline, further suggestions will be made for a more optimal rating scale. Implications for collapsing of the current rating scale will be made to find the most ideal reconfiguration of the response categories.

Procedures

The Institutional Review Board at the University of Toledo, Health Science Campus, previously known as the Medical University of Ohio approved this research (IRB# 104501). The Institutional Review Board at San Diego State University classified the study as exempt. We distributed 714 packets (1428 surveys) in hopes of obtaining 125 usable surveys. We contacted caregivers of children who are non-ambulatory and require assistance with transfers. The caregivers were solicited at school districts, outpatient pediatric facilities, support groups, and a therapeutic riding facility in Ohio, Texas, Michigan, and California. Caregivers received the research packet by the investigators or other health care professionals and/or facility staff. Upon agreement to complete the survey, the caregivers had the option to either hand the sealed envelope back to the investigators or mail the surveys back to the University of Toledo using the self addressed stamped envelope provided.
Results

There were 213 surveys received. There were 38 returned surveys that were excluded due to the child’s age being too old or for missing data. In the sample, children’s ages ranged from seven months to 262 months or 21 years 10 months (mean age of nine years one month, s.d. five years four months). Their weight ranged from 18 pounds to 203 pounds (mean 61.92 pounds, s.d. 43.6) and height ranged from 25 inches to 74 inches (mean 47.89, s.d. 11.21). The caregivers’ ages ranged from 20 years to 79 years (mean 43, s.d. 11.6). The most prominent diagnoses among children were cerebral palsy and developmental delays. The majority (66%) of children required maximum assistance with 19% requiring moderate assistance. The majority of children (44%) used manual wheelchairs, 14% used a power chair, and 17% used a stroller, the rest used more than one type of chair. Primary caregiver respondents were mothers, fathers, grandmothers, grandfathers, or other; 68% of primary caregiver respondents were mothers, 18.3% were fathers, 6.9% were grandmothers, 2.9% were grandfathers, and 2.9% were marked as other. The primary gender of the respondents was female, 76%, and the remaining 22% were male. Caregiver respondents were asked to rate their level of health, 34% reported their health as excellent, 49% as good, 12% as average, and 1.7% as poor. Each caregiver respondent was also asked to report if he or she had any ailment due to the role of caregiver; 57.7% marked yes, and 41.1% marked no. The most frequently reported ailment was back pain, followed by herniated disks, and arthritis. Other reported ailments were knee problems, asthma, heart problems, etc.

The Rasch analysis, using WINSTEPS, produced estimates of category structure, calibration structure, fit statistics, and probability curves that graphically display how respondents used each response category for each item. Linacre’s guidelines two, three, four, five, seven, and eight were addressed (2002).
Guideline number two was analyzed via the probability curves for each item. Each item was visually inspected to determine if each response category had its own peak, that is, that each category had an independent probability of being selected. Each response category for each item had its own unique peak. Refer to Figure One for a representative example of the probability curve for Item One. While three items (six, seven, and thirteen) demonstrated unique peaks for each response category, there was a relatively small range of self-efficacy for which caregivers chose response category one. However, even with the restricted range, each response category in every item demonstrated unique peaks. (Refer to Figure Two).

Guideline number three was analyzed to determine if the average measure advanced monotonically with each category. The average measure numbers for each response category should be ordered from the lowest to the highest indicating that they reach a threshold. Each item had observed averages ordered from lowest to highest, fully meeting this guideline. (Refer to Table 2).

Guideline number four states that the outfit mean-squares must be less than 2.0 units for each response category. All but three response categories had results less than 2.0 standardized units: Item One had an outfit mean square value of 3.37 in response category three, Item Five had an outfit mean square value of 3.37 in response category two, Item Thirteen had an outfit means square value of 2.79 in response category zero, and Item Fourteen had an outfit mean square value of 2.32. Refer to Table 3 for an example of response category zero having more than 2.0 standardized units.

Guideline number five states that step calibrations advance monotonically. The WINSTEPS program identifies step calibrations as structure calibration. Each item had a structure calibration in order from the lowest to the highest. The data indicate the probability that
caregivers rated their abilities according to given response categories on the rating scale, fully meeting this guideline. (Refer to Table 2).

Guideline number seven states that step difficulties advance by at least 1.4 logits. Items two, three, four, five, six, seven, nine, ten, and thirteen had step difficulties between response categories one and two that did not advance by at least 1.4 logits. Table 3 demonstrates that between response categories zero and one, the logits did not advance by at least 1.4.

Guideline number eight states that step difficulties advance by less than 5.0 logits. All items fully met this criterion. (Refer to Table 2)

Discussion

The purpose of this study was to evaluate the psychometric properties of the revised rating scale of the CSEST. This study used Rasch Model rating scale analysis and Linacre’s (2002) guidelines for rating scale evaluation to answer the following research questions: 1. Does the five-point rating scale demonstrate optimal monotonic advancement of the average measures for each response category? 2. Does the five-point rating scale improve the step calibration for items? 3. Does the five-point rating scale demonstrate improved distribution amongst the probability curves? 4. Does the five-point rating scale demonstrate response categories that have outfit mean-square statistics that are less than 2.0 standardized units? 5. Does the five-point rating scale demonstrate response categories that advance by more than 1.4 logits and by less than 5.0 logits? 6. Depending on the results of analysis of the 5-point scale, is there a further way to collapse the five-point scale to more optimally meet Linacre’s guidelines? The results demonstrated that the revised rating scale fully met all but two of Linacre’s eight guidelines thus lending psychometric support to the five-point scale.
The results of this study contribute to the validity of the CSEST rating scale. The study demonstrated that the revised CSEST rating scale fully met guidelines number two, three, four, five, seven, and eight.

Guideline one states that there must be at least ten observations of each response category. This guideline was not met by seven items. They are items one, two, three, eight, nine, eleven, and twelve. The response categories with fewer than ten observations were generally the zero or one response categories. This implies that the respondents were relatively more confident in their transfer abilities than other potential samples. Relatively fewer respondents reported poor health (1.1%) which could be related to poorer transfer self-efficacy. Item number nine demonstrated less than ten observations for response category four. Linacre (2002) states that when category frequency is low, then the step calibration cannot be clearly estimated due to the fact that the inclusion of one observation can noticeably change the estimated structure of the scale. Smith et al. (2003) reports that ten observations of each category assures that each response category is sufficiently estimated (Smith et al., 2003). These data may lack some ability to sufficiently estimate response categories at the lower end of the rating scale.

The second guideline requires regular distribution observations as illustrated in the probability curves. These curves indicated whether each response category is uniquely perceived by caregivers. This is demonstrated when each response category has its own peak. (Refer to Figure One). The results show that each response category has its own distinct peak for each item. However, for some items, the probability curves demonstrate that respondents may have had some difficulty distinguishing between response categories zero, one, and two. (Refer to Figure Two). Although each of these response categories had its own peak, they were not quite as distinct as in response categories three and four. Hence, the probability of selecting one
response category is very similar to the probability of selecting an adjacent category. Ideally, the probability of selecting a given category should be sufficiently greater than any other category, to assure that the category is perceived as the response that best measures self-efficacy for a given item. Irregularity in observation categories may show a deviation from what is expected, however the five point scale demonstrated unique peaks for each response category. Thus fully meeting this guideline, showing that this sample was able to perceive each of the five response category options as unique from one another.

Guideline three states that the average measure should advance monotonically with each response category. For numbers to advance monotonically they must reach a threshold. Ordered thresholds show that as one moves up the self-efficacy continuum, the next higher category will become the most likely response showing that respondents can differentiate between categories (Smith, et al., 2003). The results indicated that each item verified that the average measures advanced monotonically confirming that respondents could differentiate between each response category (Refer to Table 2). The data demonstrated strong support for guidelines two and three showing that this sample was able to use the five-point CSEST rating scale to estimate their self efficacy along uniquely perceived and monotonically progressing response categories, which meets these guidelines.

Guideline four requires the outfit mean-square statistics for each response category in each item should be less than 2.0 logits. This shows that the there is a reasonable level of randomness that exists within the response category data. Linacre (2002) explains that values greater than 2.0 standardized units for the outfit statistics suggest there is more unexplained randomness, or “noise,” thus indicating more incorrect information than systematic variation in the observations. Rating scales that have higher mean squares indicate that the categories have
been used in unexpected contexts (Linacre, 2002). The results report that the majority of items had outfit mean-squares less than 2.0 logits. Out of 70 possible response categories only three did not meet the guideline. (Refer to Table 3). Due to this being such a small percentage, it appears that the majority of parents were using the CSEST response categories in the appropriate contexts.

Guideline five states that step calibrations advance monotonically. The data will indicate the probability that caregivers will rate their abilities accordingly to given response categories on the rating scale. Failure of the response categories to advance monotonically is referred to as “step disordering” (Linacre, 2002). There are three reasons why dis ordering could occur, 1) when intermediate response category points are not labeled undecided or neutral, 2) when intermediate response category points are not labeled at all, or 3) when too many response category options have been presented (Smith, et al., 2003). The results indicate that all of the CSEST response categories advance monotonically, thus fully meeting this guideline. Caregivers rated their abilities accordingly to the five given response categories on the rating scale and it appears that there were not too many response categories presented for caregiver consideration.

Guideline six states that ratings imply measure, and measures imply ratings. Linacre (2002) states that in general, a single observation implies an equivalent underlying measure, therefore from an underlying measure one can infer what behavior is expected. Each question asked on the CSEST can be given a rating on the five point scale. This implies that caregivers will rate their own transfer capabilities based on their own varying levels of confidence, signifying that ratings imply measures of transfer self-efficacy. Due to the fact that this guideline
cannot be directly measured, it can be neither confirmed or denied that the five point rating scale meets this guideline.

Guidelines seven and eight state that step difficulties need to advance by at least 1.4 logits, but no more than 5.0 logits respectively. (Refer to Table 2). If the step difficulties advance by less than 1.4 logits overlapping occurs in the adjacent response categories. Each response category will then not be perceived as unique or distinct from adjacent categories. When the step difficulties advance by more than 5.0 logits, gaps in measurement ability occur between adjacent categories. Also, when the distance between response categories is more than 5.0 logits the information between response categories becomes poorly identified and thus poorly measured (Linacre, 2002). The results indicate that the response categories for each item do not advance by more than 5.0 logits. However, some but not all response category step difficulties for items two, three, four, five, six, seven, nine, ten, and thirteen did not advance by at least 1.4 logits between response categories zero, one, two, and in one instance, four (Refer to Table 3 for an example of item two). The results indicate that these response categories for the specific items possibly were not perceived as unique, which can also be seen via the probability curves as the respondents might have had difficulty distinguishing between zero, one, and two.

Darr (2006) used computer modeling to re-analyze data from the original CSES 11-point rating scale. She predicted that a five-point scale would greatly improve the scale’s performance. The rating scale she predicted as optimal was described earlier. The results of this study verify that Darr’s reconfigured rating scale performed as predicted.

In summary guidelines two, three, five, and eight were fully met lending strength to the psychometrics of the five-point rating scale. The guidelines that were partially met were guidelines one, four, and seven. Our sample may not have included enough caregivers who were
on the lower end of the continuum of self-efficacy, which resulted in not fully meeting guideline one. However, some narrowing of the step difficulties at the lower end of the scale indicated that caregivers might have had some difficulty distinguishing between the lower self-efficacy response categories. Linacre (2002) states that fully meeting guidelines number four and seven are not essential for making inferences for the next sample of caregivers to use the CSEST. Out of 56 response categories across all items the five-point rating scale had only three categories that had more than 2.0 standardized units and four categories that did not advance by at least 1.4 logits. Overall, the five-point scale performed quite well.

The data in this study from another sample of caregivers showed that Darr’s collapsed five-point rating scale was the most optimal rating scale. This rating scale was confirmed as optimal because it substantially met six of the eight guidelines set forth by Linacre. It is doubtful that further collapsing the number of response categories would result in significantly better performance. Also, future reducing the number of response categories would decrease the sensitivity of the scale for measuring a full range of self-efficacy.

Implications for Occupational Therapy

This study provides support for the use of a five-point rating scale with the CSEST. Occupational therapists can help family members and caregivers recognize transfer hazards and learn safe transferring techniques that minimize back pain. The CSEST can contribute to the therapy process by highlighting the key areas where a caregiver is lacking confidence in his or her transfer skills. With this knowledge the occupational therapist can design an intervention aimed to improve parent’s skills with the specific types of transfers where he or she lacks confidence. The CSEST can be used as an easy, quick, and efficient method to assess a caregiver’s confidence in ability to do transfers in and out of the home without taking up a lot of
time. The occupational therapist can use the CSEST to explain that in order to be safe with his or her child the caregiver needs to be using safe techniques and taking care of his or her own health. The CSEST also provides a way to monitor the progress caregivers have while practicing transfers with the occupational therapist by administering the CSEST as a pre-test before intervention and a post-test after intervention.

Limitations

A study limitation was that sample lacked a balance in numbers between men and women. Because the sample was heavily weighted with women it was also heavily weighted with the primary role of mother. A more balanced data set of male to female and relationships could further generalize the results more confidently to men. The sample of caregivers used in this study appeared to be a more confident sample, because the response categories with less than ten observations were generally the zero or one options. A larger data set might improve the distribution of caregivers across all levels of self-efficacy and response categories.

Future Research

Future research can further confirm the effectiveness of the five-point rating scale by using a larger and different sample of caregivers, possibly with more primary male or secondary caregivers. On several surveys the term “not applicable” was written on different items. On future surveys the option of a comment section could explain why certain caregivers thought items were not applicable to their situations. If a future sample included people who were more confident and less confident then all points on the rating scale could be analyzed to their fullest potential.

Future research could also provide evidence for how well the scale is used in the occupational therapy and physical therapy clinic. Therapists could determine if the scale and the
interventions used could prove effective for the caregiver over time by using the CSEST as a pre- and post-test before intervention and after.

Conclusion

This purpose of this study was to evaluate the psychometric properties of the revised rating scale of the CSEST. This study used Rasch Model rating scale analysis and Linacre’s guidelines for rating scale evaluation to answer the following research questions: 1. Does the five-point rating scale demonstrate optimal monotonic advancement of the average measures for each response category? 2. Does the five-point rating scale improve the step calibration for items? 3. Does the five-point rating scale demonstrate improved distribution amongst the probability curves? 4. Does the five-point rating scale demonstrate response categories that have outfit mean-square statistics that are less than 2.0 standardized units? 5. Does the five-point rating scale demonstrate response categories that advance by more than 1.4 logits and by less than 5.0 logits? 6. Depending on the results of analysis of the 5-point scale, is there a further way to collapse the five-point scale to more optimally meet Linacre’s guidelines? The results indicate that the five-point rating scale was valid, reliable, and effective. The five-point scale has demonstrated clear probability curves, monotonic advancement of categories, advancement of step calibration, and the step difficulties to advance by at least 1.4 logits but by less than 5.0 logits. The five-point scale can by used in an occupational therapy clinic to assess caregiver self-efficacy and identify triggers of back pain. From this information, occupational therapists can create interventions that will enhance transfer self-efficacy resulting in safer transfers for caregivers and children. Future research is needed to further confirm the reliability and effectiveness of the five-point scale.
Acknowledgements

I would like to thank Dr. Thomas for all her guidance and support throughout this process. I also would like to thank my research partner, Gina Kubec, for being such a support for both parts of this research study. I would like to thank Dr. Cipriani for taking the time to perform our data analysis and for taking the time go over details with all of us. I would like to thank the College of Graduate Studies for the research support award. Lastly, I would like to thank the faculty in the occupational therapy department at the University of Toledo Health Science Campus for their ongoing support for the past three years and my peers and family.
References


Appendix A

Caregiver Self-Efficacy Scale for Transfers

After each item, please rate how confident you are that you could do the task without straining your back if you were to find yourself in that situation today. “Straining your back” means having soreness or pain in your back after lifting your child or lifting the child’s equipment. Rate the degree of confidence that you are feeling right now by circling a number from 0 to 4 on the scale after each item.

1. You are home and feeling calm. You are going on an outing that you and your child have enjoyed before. **You have plenty of time, and the weather is pleasant.** How confident are you that you can store the wheelchair or stroller in the car or van without straining your back?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Moderately Confident</th>
<th>Completely Confident</th>
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<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
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2. You are home and feeling calm. You are going on an outing that you and your child have enjoyed before. **You have plenty of time, and the weather is pleasant.** How confident are you that you can move your child from the wheelchair or stroller into the car or van without straining your back?

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<tr>
<th>Not at all</th>
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</table>

3. You are feeling calm. You have arrived for an outing that you and your child have enjoyed before. **You have plenty of time, and the weather is pleasant.** How confident are you that you can get your child from the car or van into the wheelchair or stroller without straining your back?

<table>
<thead>
<tr>
<th>Not at all</th>
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<td>0</td>
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4. You are home. You are feeling hurried, and you are running late. How confident are you that you can move your child from the wheelchair or stroller to the floor and back to the wheelchair without straining your back?

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<th>Not at all</th>
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5. You are home. You are feeling hurried, and you are running late. How confident are you that you can move your child from the wheelchair or stroller to the toilet, to a toileting device, or to where you diaper the child, and back to the wheelchair without straining your back?

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<td>0</td>
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</table>
6. You are home and **feeling hurried**. You are going on an outing that you and your child have enjoyed before. **You are running late. It is raining, cold, and windy.** How confident are you that you can move your child from the wheelchair or stroller into the car or van without straining your back?

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<td>Not at all</td>
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<td>Confident</td>
<td>Confident</td>
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</table>

7. You are **feeling hurried**. You have arrived for an outing that you and your child have enjoyed before. You are **running late. It is raining, cold and windy.** How confident are you that you can get your child from the car or van into the wheelchair or stroller without straining your back?

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<td>Not at all</td>
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Please complete both sides of the page

8. You are **feeling calm**. You have arrived for an outing that you and your child have enjoyed before. **You have plenty of time, and the weather is pleasant.** How confident are you that you can get the wheelchair or stroller out of the car or van without straining your back?

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<td>Confident</td>
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9. You are home. You are **feeling hurried, and you are running late.** How confident are you that you can move your child from the wheelchair or stroller into the bathtub and from the bathtub back to the wheelchair without straining your back?

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<td>Confident</td>
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10. You are home. You are **feeling hurried, and you are running late.** How confident are you that you can move your child from the wheelchair or stroller into bed and from bed back to the wheelchair without straining your back?

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<td>Confident</td>
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</table>

11. You are home and **feeling calm**. You **have plenty of time.** How confident are you that you can move your child from the wheelchair or stroller to the toilet, to a toileting device, or to where you diaper the child, and back to the wheelchair or stroller without straining your back?

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<td>Confident</td>
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</table>
12. You are home and feeling calm. You have plenty of time. How confident are you that you can move your child from the wheelchair or stroller into bed and from bed back to the wheelchair without straining your back?

0 1 2 3 4
Not at all Moderately Completely
Confident Confident Confident

13. You are home and feeling calm. You have plenty of time. How confident are you that you can move your child from the wheelchair or stroller into the bathtub and from the bathtub back to the wheelchair or stroller without straining your back?

0 1 2 3 4
Not at all Moderately Completely
Confident Confident Confident

14. You are home and feeling hurried. You are going on an outing that you and your child have enjoyed before. You are running late. It is raining, cold, and windy. How confident are you that you can store the wheelchair or stroller in the car or van without straining your back?

0 1 2 3 4
Not at all Moderately Completely
Confident Confident Confident

Thank you for completing this survey!
Appendix B

Dear Parents/ Caregivers of a Child with Special Needs:

    Kids with special needs have caregivers with special needs. If you have a child who are non-ambulatory and need help with transfers, we hope you will help us learn more about what you find physically difficult and physically easy in taking care of your child. We are interested in how caring for your child is affecting your health and in how your needs might be served.

    We are researching a survey for parents/caregivers of children who need help with transfers. If you filled out a survey like this before, please note that this is a revised survey and we would like your participation again. If you have not seen this survey before, we would like your participation too. You can help us by taking 15 minutes of your time to fill out the attached forms.

    The survey will help occupational therapists determine in which situations you feel most at risk for injuring your back when taking care of your child. Whether you fill out the survey or not, services to your child will not be affected.

    If you have any questions or concerns regarding the survey or its contents please phone Julie Jepsen Thomas at (419) 383-5068.

    We are including a stamped, self-addressed envelope for you convenience in mailing the completed survey. We have enclosed 2 surveys in case there are 2 caregivers in the home. We would welcome opinions from both of you.

    Thank you very much for your time, thought, and assistance!

Sincerely,

Gina L.D. Kubec, Occupational Therapy Student

Danielle L. McPeck, Occupational Therapy Student

Julie Jepsen Thomas, Ph.D., O.T.R./L., F.A.O.T.A
Appendix C

Please answer the following questions about yourself and the child you care for.

How old is your child? ______years ______months

What is your child’s primary diagnosis?____________________________________________

What is the approximate weight and height of your child?______pounds _______height

How much physical assistance do you provide when moving your child in and out of the wheelchair or stroller: (Please check one)

- None (child requires no help)
- Moderate (child requires more help than touching or guiding)
- Minimum (child requires no more help than touching or guiding)
- Maximum (child requires complete help to transfer)

What type of wheelchair or stroller does your child use? (Please check one)

- Standard of Manual
- Power or Electric
- Stroller
- Other (describe)___________________

Are you the primary caregiver? (Please check one)

- Yes
- No

What is your relationship to the child?____________________________________________

How would you rate your overall health? (Please check one)

- Excellent (I feel healthy and able to perform my daily routine all of the time)
- Average (I feel healthy and able to perform my daily routine some of the time)
- Good (I feel healthy and able to perform my daily routine most of the time)
- Poor (I rarely feel healthy and able to perform my daily routine)

How old are you?___________

Please list any ailments that you have such as arthritis, back pain, or muscle weakness that make it difficult to care for your child?
Table 1:

*Linacre’s Guidelines for Optimizing Rating Scale Category Effectiveness*

<table>
<thead>
<tr>
<th>Guideline #</th>
<th>Requirement</th>
</tr>
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<tbody>
<tr>
<td>Guideline #1</td>
<td>At least 10 observations of each category.</td>
</tr>
<tr>
<td>Guideline #2</td>
<td>Regular observation distribution.</td>
</tr>
<tr>
<td>Guideline #3</td>
<td>Average measures advance monotonically with category.</td>
</tr>
<tr>
<td>Guideline #4</td>
<td>Outfit mean squares less than 2.0.</td>
</tr>
<tr>
<td>Guideline #5</td>
<td>Step calibrations advance.</td>
</tr>
<tr>
<td>Guideline #6</td>
<td>Ratings imply measures, and measures imply ratings.</td>
</tr>
<tr>
<td>Guideline #7</td>
<td>Step difficulties advance by at least 1.4 logits.</td>
</tr>
<tr>
<td>Guideline #8</td>
<td>Step difficulties advance by less than 5.0 logits.</td>
</tr>
</tbody>
</table>
Table 2:

Rasch Model Analysis for Item One in the Data Set: Self-Efficacy of Getting a Wheel Chair Out of a Car or Van on a Calm Day.

<table>
<thead>
<tr>
<th>Response Category</th>
<th>Observed Average</th>
<th>Structure Calibration</th>
<th>Step Difficulties</th>
<th>Outfit Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>-3.77</td>
<td>NONE</td>
<td></td>
<td>.69</td>
</tr>
<tr>
<td>One</td>
<td>-2.21</td>
<td>-3.03</td>
<td>3.03</td>
<td>.93</td>
</tr>
<tr>
<td>Two</td>
<td>-.32</td>
<td>-1.37</td>
<td>1.66</td>
<td>1.06</td>
</tr>
<tr>
<td>Three</td>
<td>1.14</td>
<td>1.29</td>
<td>2.66</td>
<td>1.42</td>
</tr>
<tr>
<td>Four</td>
<td>2.57</td>
<td>3.11</td>
<td>1.82</td>
<td>1.48</td>
</tr>
</tbody>
</table>

Note: The step difficulties are the difference between the structure calibration of the number above and on the same line. For example: 3.11 – 1.29 = 1.82
Table 3:

*Rasch Model Analysis for Item Two in the Data Set: Self-Efficacy of Transferring Child Into/Out of Bath on a Calm Day*

<table>
<thead>
<tr>
<th>Response Category</th>
<th>Observed Average</th>
<th>Structure Calibration</th>
<th>Step Difficulties</th>
<th>Outfit Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>-1.60</td>
<td>NONE</td>
<td></td>
<td>2.79**</td>
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<tr>
<td>One</td>
<td>-.73</td>
<td>-1.72</td>
<td>1.72</td>
<td>1.00</td>
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<tr>
<td>Two</td>
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<td>.43*</td>
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<td>1.63</td>
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<td>1.58</td>
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<tr>
<td>Four</td>
<td>3.26</td>
<td>2.48</td>
<td>1.94</td>
<td>1.04</td>
</tr>
</tbody>
</table>

*This shows that this step difficulty did not advance by at least 1.4 logits*

**Outfit mean square with more than 2.0 standardized units.*
Figure 1: Probability Response Curve of Item One: Transferring the wheelchair into the car/van under optimal conditions

Note: Each response category has its own unique peak
Figure 2: Probability Response Curve of Item Two: Transferring child into the car/van under optimal conditions

Note: Response category one is not as clearly identified as in Item One.