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CNS 736 Appraisals

Assignment 6.1 Research Assignment: MMSE

Abstract

The mini-mental status examination (MMSE) is a brief mental status exam, designed to be administered in as little as ten minutes. Scoring is simple, and the results indicate the likelihood of cognitive impairment in the client. The test is a valid and reliable screening tool, and one of the most popular mental status exams available, however, it is not without its flaws. It is important that users of the MMSE understand the circumstances in which the MMSE may not provide accurate estimations of the client's cognitive abilities such as low educational level, decreased sensory abilities, and advanced age. In these situations, the MMSE results may indicate cognitive impairment where there is none.

Research Assignment 6.1: MMSE

The mini-mental state examination (MMSE) is one of the most commonly used assessment tools for quickly evaluating an individual's level of cognitive functioning. Developed in 1975, the MMSE contains questions related to 11 categories: 1) Orientation to Time, 2) Orientation to Place, 3) Registration, 4) Attention and Calculation, 5) Recall, 6) Naming, 7) Repetition, 8) Comprehension, 9) Reading, 10) Writing, and 11) Drawing (Albanese & Ward, 2003). The MMSE has gained popularity because it takes very little time to administer (as little as five or ten minutes), is simple to score, and provides a valid, reliable, and sensitive screening tool for most clients and clinicians.

The purpose of a mental status examination is to assess the behavioral and cognitive functioning of the client (Hays, 2017; Martin, 1990). The MSE is a thorough assessment that includes descriptions of the client's appearance, mood, affect, level of attentiveness, speech, attitude, insight, and abstract reasoning (Martin, 1990; Hays, 2017). Mental status exams (MSEs) are usually conducted during the initial intake session or when the counselor feels that the client seems "disoriented, confused, or out of touch with reality" (Hays, 2017). A thorough MSE can be quite time consuming and provide a lot of information to the counselor.

The MMSE was originally developed as a brief screening tool for use with older adults to evaluate cognitive impairment (Folstein, Folstein, & McHugh, 1975). This type of assessment requires the cooperation of the client; however, some clients may feel threatened by such an assessment, especially those beginning to suffer from delirium or dementia. The MMSE was created to be completed quickly in order to capitalize on the shorter time frame of cooperation typical of a cognitively impaired patient (Martin, 1990; Folstein, Folstein, & McHugh, 1975).

The first portion of the MMSE is verbal in which the client is asked to respond verbally to questions covering “orientation, memory, and attention” (Folstein, Folstein, and McHugh, 1975). The assessment begins by asking the individual to state the date and time, as well as the location where the assessment is occurring. After that, memory is assessed by having the test administrator name three objects and then ask the individual to repeat them back. Attention and calculation are assessed next with the “Serial 7s” task in which the subject is asked to subtract 7 from 100, and then subtract 7 from that number, and so on until asked to stop (Folstein, Folstein, & McHugh, 1975). For individuals with lower educational level, they may instead be asked to spell the word “WORLD” backwards.

Next, the subject is asked to recall again the previously listed three objects. The individual is then assessed for their language ability. The first language assessment involves the test administrator pointing to an object and asking the individual to name the object (usually a watch and a pencil). This is followed by asking the individual to repeat a sentence, and then to follow a three-stage command such as “Take a paper in your right hand, fold it in half, and put it on the floor” (Folstein, Folstein, and McHugh, 1975, p. 197).

The remaining portion of the assessment involves the individual performing various actions. The first is a reading assessment in which the sentence “Close your eyes” is printed (large enough to read) and the individual is asked to read it out loud and follow the instructions (Folstein, Folstein, & McHugh, 1975). The individual is then provided with a paper and a writing utensil and asked to write a sentence. The sentence is evaluated based on whether it contains a subject, a verb, and makes sense. Finally, the individual is asked to copy a complex shape, often intersecting pentagons. Each item is worth between one and five points and is

scored as the assessment progresses. Raw scores below 20 indicate impaired cognitive ability (Folstein, Folstein, & McHugh, 1975).

The MMSE was found to be reliable on retest at both 24 hours and at 28 days with a Pearson r coefficient of 0.887 and 0.827, respectively (Folstein, Folstein, & McHugh, 1975). Validity of the MMSE was determined by correlating the scores with the Wechsler Adult Intelligence Scale, Verbal and Performance scores. The Pearson r was 0.776 and 0.660, respectively. The standardization sample used was made up of 206 individuals, 69 of which had a known clinical condition, 63 of which were “normal, elderly persons similar in age to the patients” (Folstein, Folstein, & McHugh, 1975).

The authors of the MMSE never intended for the MMSE to be used as a diagnostic tool and indicate that low scores indicate that cognitive impairment is likely, and a more thorough mental status assessment should be conducted (Folstein, Folstein, and McHugh, 1975). It is likely the authors also probably did not expect it to become nearly as popular and ubiquitous as it has. While it is an extremely common assessment, it is not without its flaws. Devenney and Hodges (2017) point out some of the so-called “pit-falls” of the MMSE: it fails to differentiate between distinct types of dementia, the test is confounded by language issues, literacy issues, and lower levels of education, and the MMSE is not reliable in detecting early stages of dementia or cognitive decline. Research supports such criticisms of the MMSE (Pernecky et al., 2006; Nys et al., 2005; Mitchell, 2009; Monroe & Carter, 2012).

Several studies have demonstrated the MMSE’s lack of sensitivity and its failure to accurately or reliably detect mild cognitive impairment (Pernecky et al, 2006; Monroe & Carter, 2012; Nys et al., 2005). While Pernecky and colleagues (2006) found that the MMSE was not sensitive enough to identify mild impairment, their findings did show that that for increased

levels of impairment, the MMSE was comparable with results from the clinical dementia rating (CDR) and could be used not only as a screening and tracking tool, but also as a staging tool in determining level of impairment from moderate to very severe.

The MMSE is sometimes used by neurologists to assess cognitive function in stroke patients even though this goes beyond its intended usage. However, research suggests that this practice should be avoided as the MMSE is not valid means of discriminating “between cognitively intact and impaired patients with acute stroke (Nys et al., 2005). Their findings demonstrated the MMSE was about as accurate as chance in detecting impairment in this patient population (Nys et al., 2005).

When establishing population-based norms for the MMSE, Crum, Anthony, Bassett, and Folstein (1993) determined that years of schooling were correlated with scores on the MMSE; those with no education scored the lowest, while those with the highest levels of education scored better on the MMSE. If education level is not known at the time of assessment, the results may indicate worse cognitive decline than is present. In addition to years of school, neighborhood and level of acculturation also impact MMSE scores (Matallana et al., 2010). In a study of older Mexican Americans, lower levels of education were highly associated with lower levels of acculturation and assimilation, as well as living in low-income neighborhoods, called *barrios* (Matallana et al., 2010). All three of those factors were also linked with lower MMSE scores compared to older Mexican Americans who were better educated, lived in better neighborhoods, and who spoke better English due to their increased levels of acculturation and assimilation.

The creators of the MMSE make three assumptions: 1) subjects can read and write in the language of the assessment; 2) subjects are fluent in the language of the assessment, and 3)

subjects can see, hear, and talk (Monroe & Carter, 2012). When these assumptions are not accounted for, subjects may receive lower scores on the MMSE and appear to suffer from cognitive impairment where there is none. For clients who speak English as a second-language, suffer from perception-based disabilities, have less than eight years of education, or are older than 75, scores from the MMSE must carefully interpreted. It is recommended that test administrators use the following adjustment formula with these types of clients: $MMSE_{adj} = \text{Raw MMSE} - (0.471 \times [\text{education} - 12]) + (0.131 \times [\text{age} - 70])$ (Mungas et al. 1996; as cited by Monroe & Carter, 2012). It was found that much of the research literature does not screen for or does not “clearly report sensory status, educational level, and language fluency of participants” (Monroe & Carter, 2012, p.271).

Cut-off scores are “the specific scores on the instrument where the researcher or clinician determines mild, moderate, or severe cognitive impairment” (Monroe & Carter, 2012, p.267). There have been many different cut-off scores suggested in the research, however there is little consistency across the research as to what the specific cut-offs should be, or what they mean (Monroe & Carter, 2012). It is generally agreed that scores below 17 indicate severe cognitive impairment, but there also exists significant differences in the cognitive abilities of individuals scoring in this range.

In addition to these, there are also cultural concerns when considering cut-off scores. For example, Wood, Giuliano, Bignell, and Pritham (2006) found that black women scored lower than white women on the MMSE, even after age and education were controlled for. This information raises the concern that the use of such cutoff scores as inclusion criteria to determine who participates in research studies or interventions, those with lower education levels, minority status, or over age 75 may be excluded because of lower MMSE scores, even while those scores

may not accurately reflect their actual cognitive abilities. The MMSE also struggles with specificity issues in that it falsely identifies some individuals as having dementia when they do not, specifically in older minorities with lower educational levels (Wood et al., 2006).

Overall, the MMSE is an effective screening tool when it is used as it was intended. Clinicians or researchers intending to use the MMSE to evaluate levels of cognitive functioning must also collect information regarding their client's level of education, native language, ethnicity/culture, advanced age, and sensory abilities. This information must be properly accounted for and taken into consideration and used when interpreting the results of the MMSE. Low scores on the MMSE indicate *likely* cognitive impairment and clinicians should follow these scores up by conducting additional testing and a more thorough examination before reaching a conclusion regarding a diagnosis.

Administering the MMSE is easy as the instructions are clear and simply, and scoring the assessment does not require any fancy math or equipment, making the MMSE a popular choice for a brief assessment of cognitive functioning. For patients already diagnosed with dementia, the MMSE can be effectively used as a tracking tool, monitoring patient progression in terms changes in cognitive impairment. While the MMSE is not great at determining mild impairment, it does to perform well in differentiating between more severe levels of impairment, making the MMSE a useful assessment for those working with these populations.

References

- Albanese, M., & Ward, S. (2003). Test review of the MMSE. In Plake, B., Impara, J., & Spies, R. (Eds.), *The fifteenth mental measurements yearbook* [electronic version]. Retrieved from the Burros Institute's Mental Measurements Yearbook online database
- Crum, R., Anthony, J., Bassett, S., & Folstein, M. (1993). Population-based norms for the mini-mental state examination by age and education level. *JAMA*, *269*(18), 2386-2391.
<http://dx.doi.org/10.1001/jama.1993.03500180078038> .
- Devenney, E. & Hodges, J. (2017). The mini-mental state examination: Pitfalls and limitations. *Practical Neurology*, *17*(1), 79-80. <http://dx.doi.org/10.1136/practneurol-2016-001520>
- Folstein, M., Folstein, S. & McHugh, P. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, *12*(3), 189-198. [http://dx.doi.org/10.1016/0022-3956\(75\)90026-6](http://dx.doi.org/10.1016/0022-3956(75)90026-6)
- Hays, D. (2017). *Assessment in counseling procedures and practices* (6th ed.). Alexandria, VA: American Counseling Association
- Martin DC. (1990). Chapter 207: The Mental Status Examination. In: Walker HK, Hall WD, Hurst JW, editors. *Clinical Methods: The History, Physical, and Laboratory Examinations*. (3rd ed.), Boston: Butterworths;. Retrieved from:
<https://www.ncbi.nlm.nih.gov/books/NBK320/>
- Matallana, D., de Santacruz, C., Cano, C., Reyes, P., Samper-Ternent, R., Markides, k., Ottenbacher, K., & Reyes-Ortiz, C. (2010). The relationship between education level and mini-mental state examination domains among older Mexican Americans. *Journal of Geriatric Psychiatry and Neurology*, *24*(1),9 – 18,
<http://dx.doi.org/10.1177/0891988710373597>.

- Mitchell, A. (2009). A meta-analysis of the accuracy of the mini-mental state examination in the detection of dementia and mild cognitive impairment. *Journal of Psychiatric Research*, 43(4), 411-431. <http://dx.doi.org/10.1016/j.jpsychires.2008.04.014>
- Monroe, T., & Carter, M. (2012). Using the Folstein mini mental state examination (MMSE) to explore methodological issues in cognitive aging research. *European Journal of Aging*, 9(3), 265-274, <http://dx.doi.org/10.1007/s10433-012-0234-8>
- Nys, G., van Zandvoort, M., de Kort, P., Jansen, B., Kappelle, L., & de Haan, E. (2005). Restrictions of the mini-mental state examination in acute stroke. *Archives of Clinical Neuropsychology*, 20,(5), 623-629, <https://doi.org/10.1016/j.acn.2005.04.001>
- Pernecky, R., Wagenpfeil, S., Komossa, K., Grimmer, T., Diehl, J., & Kurz, A. (2006). Mapping scores onto stages: Mini-mental state examination and clinical dementia rating. *The American Journal of Geriatric Psychiatry*, 14,(2), 139-144, <https://doi.org/10.1097/01.JGP.0000192478.82189.a8>.
- Wood, R. Y., Giuliano, K. K., Bignell, C. U., & Pritham, W. W. (2006). Assessing cognitive ability in research: Use of MMSE with minority populations and elderly adults with low education levels. *Journal of Gerontological Nursing*, 32(4), 45.