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Research Article

Validation of Yoon's Critical Thinking Disposition Instrument

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SUMMARY

Purpose: The lack of reliable and valid evaluation tools targeting Korean nursing students' critical thinking (CT) abilities has been reported as one of the barriers to instructing and evaluating students in undergraduate programs. Yoon's Critical Thinking Disposition (YCTD) instrument was developed for Korean nursing students, but few studies have assessed its validity. This study aimed to validate the YCTD. Specifically, the YCTD was assessed to identify its cross-sectional and longitudinal measurement invariance.

Methods: This was a validation study in which a cross-sectional and longitudinal (prenursing and postnursing practicum) survey was used to validate the YCTD using 345 nursing students at three universities in Seoul, Korea. The participants' CT abilities were assessed using the YCTD before and after completing an established pediatric nursing practicum. The validity of the YCTD was estimated and then group invariance test using multigroup confirmatory factor analysis was performed to confirm the measurement compatibility of multigroups.

Results: A test of the seven-factor model showed that the YCTD demonstrated good construct validity. Multigroup confirmatory factor analysis findings for the measurement invariance suggested that this model structure demonstrated strong invariance between groups (i.e., configural, factor loading, and intercept combined) but weak invariance within a group (i.e., configural and factor loading combined).

Conclusions: In general, traditional methods for assessing instrument validity have been less than thorough. In this study, multigroup confirmatory factor analysis using cross-sectional and longitudinal measurement data allowed validation of the YCTD. This study concluded that the YCTD can be used for evaluating Korean nursing students' CT abilities.

Introduction

Critical thinking (CT) has been identified as a vital outcome for nursing education [1,2]. However, the lack of a valid instrument to measure nursing students' CT abilities has resulted in limited assessment of students' achievement in Korean academic programs, leading to ineffective academic mentoring [3].

Peter Facione [4] considered CT to have two dimensions, including "a frame of mind or a quest for thinking (disposition) and a set of operational cognitive skills." Facione defined CT as "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation and inference, as well as an explanation of the evidential and conceptual, methodological, criteriological, or contextual considerations upon which judgment is based" [4]. The American Philosophical Association's consensus definition of CT led by Facione [4] includes the core cognitive skills and the disposition of CT. Therefore, current instruments measuring CT abilities generally assess either core cognitive skills or CT disposition. For example, the California Critical Thinking Skills Test (CCTST) [5] and Health Sciences Reasoning Test [6] measure core cognitive skills. On the other hand, the California Critical Thinking Disposition Inventory (CCTDI) [7] and Yoon's Critical Thinking Disposition (YCTD) instrument [8] measure CT disposition. Previous studies on CT have found that most measurement instruments were not effective for use with nursing students because of either lack of instrument soundness or the problematic process of validation [9,10]. Considering that the CCTST was used as a nonspecific test for changes in CT, the CCTDI is recommended as a more reliable tool for measuring CT in nursing students in the assessment and planning of specific

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curriculum development activities and in counseling individual students [9,11]. Tools developed from other countries are limited in sensitively capturing the cognitive tendency associated with Korean students' perception of every item [12]. With the increasing attention to CT in nursing education, the lack of reliable and valid evaluation tools targeting Korean nursing students' CT abilities has been identified as one of the barriers to instructing and evaluating students in undergraduate programs [13].

Yoon [8] originally developed the YCTD based on the CCTDI for Korean nursing students. The subcategories of the YCTD are similar to those of the CCTDI, which was developed based on the American Philosophical Association definition of CT disposition. The seven subscales of the YCTD include objectivity, prudence, systematicity, intellectual eagerness/curiosity, intellectual fairness, healthy skepticism, and CT self-confidence [8]. Objectivity in CT is a tendency of eliminating personal biases, and prudence is the habit of seeing the complexity of issues. In addition, systematicity is the tendency of striving to approach problems in a systematic way and intellectual eagerness/curiosity is the tendency to want to know things. Intellectual fairness is the tendency of thinking with the viewpoints of others, while healthy skepticism is the habit of always seeking the best possible understanding of any given situation. Lastly, CT self-confidence is the tendency to trust reflective thinking to solve problems and to make decisions. The YCTD was developed in the form of self-assessment for Korean nursing students, and it has been identified as one reliable instrument that can be used to assess Korean nursing students' CT abilities [14]. Based on an intensive review of studies of all the currently available CT instruments, Nair and Stamler [9] have reported an urgent need for examination of the instruments' construct validity. In addition, Gregorich [15] addressed that self-report instruments should be evaluated to have the measurement invariance for meaningful comparisons across groups. Measurement instruments must be designed to yield replicable findings both cross-sectionally and longitudinally. A valid comparison of self-report instruments such as the YCTD requires that the constructs have a similar meaning across groups and time. Structural equivalence, which calls for an identical meaning of each item across groups or measurements, is difficult to evaluate [16]. Furthermore, Barbosa-Leiker et al [17] suggested that verification of longitudinal invariance should be precedent before assessing whether observed change in certain measurement values with an intervention reflects true change or changes in evaluation or the construct structure over time.

Considering that the structural validity and group invariance of the YCTD have not yet been established, this study aimed (a) to validate a proposed seven-factor model of the YCTD, a CT disposition measurement instrument currently used in Korean nursing research and education, and (b) to examine the multigroup measurement invariance of the YCTD across different groups and time periods using cross-sectional and longitudinal data in order to compare the structure of responses to CT instrument across these different student groups.

Methods

Study design

The study was a validation study of the YCTD using cross-sectional and longitudinal data from a multisite, pretest, posttest study on the effect of nursing education.

Participants

According to a power analysis for confirmatory factor analysis (CFA), a sample size of 345 participants was adequate for the study [18]. A total of 350 baccalaureate nursing students were recruited at three universities in Seoul, Korea. Students enrolled in a pediatric nursing practicum between February and December in 2012 and 2013 were included as study participants. Specifically, data from three universities with 248 participants (100 at school A, 75 at school B, and 73 at school C) were used for cross-sectional analysis, multi-group measurement invariance test between groups, and data from one university with 168 senior participants (95 in 2012 and 73 in 2013) were used for longitudinal analysis by using pre-practicum and postpracticum, premeasurement and post-measurement invariance test within a group. Most students (95.0%) were female.

Data collection

At each university, student participants were introduced to the study and were asked to use the YCTD to evaluate their CT before and after a clinical pediatric nursing practicum which included an integrated simulation curriculum. The simulation curriculum in this practicum was developed to enhance participants' CT [19,20]. All 350 nursing students undergoing the practicum were asked to participate in the study, among them 345 students completed both the YCTD pretest and posttest.

Instruments

The YCTD [8,12] was used to measure the participants' levels of CT in the pretest and posttest. The instrument consists of 27 items and uses a 5-point Likert scale ranging from 1 (*strong disagreement*) to 5 (*strong agreement*). The instrument's seven subscales include objectivity, prudence, systematicity, intellectual eagerness/curiosity, intellectual fairness, healthy skepticism, and CT self-confidence. Yoon's original study [8] reported the instrument' construct validity and reliability for Korean nursing students; the explained variance for the factor analysis was 52.0%, and the instrument reliability using Cronbach α coefficient was .84. The YCTD was found to have strong reliability in several previous studies [14,21–23], and the Cronbach α coefficient score in the present study was .84.

Statistical analysis

CFA was used to validate the seven-factor model proposed by Yoon's original study. We employed the structural equation model in STATA version 13.0 to estimate the first-order CFA [18]. Considering that the YCTD was developed based on the CCTDI, a theory-driven instrument, CFA was used to test the YCTD's construct validity. The overall model fits were estimated by the following statistics: the chi-square statistic and associated probability (p), the root mean square error of approximation (RMSEA) index, the standardized root mean squared residual (SRMR), the comparative fit index (CFI), the coefficient of determination, Akaike's information criterion (AIC), and the Bayesian information criterion (BIC). We have adapted Bentler and Bonett's [24] criterion of CFI > .90 as indicative of acceptable model fit, and Browne and Cudeck's [25] criterion of RMSEA < .05 as “close fits”, between .05 and .08 as “reasonably close fit”, and > .10 as “an unacceptable model”. SRMR indicates the average standardized absolute value of the difference between the observed covariance matrix elements and the covariance matrix elements implied by the given model, with smaller values reflecting better fit. Use of the AIC and BIC is recommended when models are compared and when the model with the smaller AIC and BIC values is preferred. We used a second-order CFA to identify any latent general factor named “critical thinking”