



# Coping measurement: Creating short form of Coping and Adaptation Processing Scale using item response theory and patients dealing with chronic and acute health conditions



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## ABSTRACT

**Purpose:** The purpose of this study was to enhance the CAPS tool by clarifying the concept of coping, using item response theory (IRT) to shorten and assess the metric equivalence of the scale, and testing the preliminary validity of the resulting shortened scale.

**Methods:** A descriptive design of participants from different ethnic backgrounds was employed (USA  $n = 347$  and Panama  $n = 327$ ). To select items for the shortened CAPS, a well-established multi-step process grounded in IRT was used. Further, a coping ladder was created to approximate the a priori perceived location/difficulty of each item along the coping trait scale. Items for the shortened scale were selected based on considerations central to the middle range theory of coping and adaptation processing and the results of the item calibration and model testing.

**Results:** A total of 15 items were selected. The selected items were well distributed on the coping ladder and all basic subconcepts of the middle range theory were included. Further the sum of the DIF size for the selected short form items is  $-0.01$ , so the overall bias of the total score is minimal. Finally, concurrent and divergent validity of the new scale was demonstrated in two separate correlational studies.

**Conclusion:** The 15-item Coping and Adaptation Processing Scale (CAPS)-Short-Form can be a practical tool to effectively and efficiently measure coping and adaptation in both practice and research for people dealing with both chronic and acute health conditions.

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Coping has long been recognized as a crucial variable in understanding individuals' responses to changing situations of health and illness. The 47-item Coping and Adaptation Processing Scale (CAPS) was developed to address some of the unresolved issues in understanding and measuring the complex construct of coping as an important variable for establishing research-based nursing practice. The scale has been used by numerous investigators in multiple countries and translated into six languages (Catal, 2012; Chayaput, 2004; Gutiérrez Lopez et al., 2007; Song, 2014; Toriya & Tshako, 2008). It has successfully identified changes in coping following nursing interventions based on the theoretical structure from which it was derived (Gonzalez Williams, 2008; McCurry & Roy, 2005). In particular, patients were able to better cope with short term surgical events and with cardiac disease following nursing interventions focused on coping than patients who did not receive these interventions.

Extensive use of the scale in several languages offers promise for its utility yet some challenges remained. Specifically, as data have accumulated it is possible to better target the meaning of coping as a unidimensional concept. Such a focus would also have the advantage of shortening the scale to increase its utility in research and demanding clinical settings. Further, assessing and retaining items on the CAPS that demonstrate metric equivalence across different samples can improve the cross-cultural utility of the scale. The purpose of this study was to enhance the CAPS tool by clarifying the concept of coping, using item response theory (IRT) to shorten and assess the metric equivalence of the scale, and testing the preliminary validity of the resulting shortened scale. As background for the study, the authors summarize the development of the original scale and offer a rationale for using item response theory (IRT) along with an explanation of the basic principles that are useful for the study.

## 1. Background

### 1.1. Theoretical and conceptual basis of coping and the 47-item CAPS

Coping as a construct has a long history in studying people and their health. Initially studies focused on psychopathology. Later researchers

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shifted toward positive behavior and the role of emotions. Significant issues were identified in clarifying the concept and matching it with measurement (Schwarzer & Schwarzer, 1996). After updating a review of the rapidly widening literature on stress and coping, Aldwin (2007) noted that dealing with measurement was still the most controversial issue in the field. One way researchers addressed this problem was to develop coping scales specialized by situations, for example, coping with asthma in everyday life. While scales multiplied in number, clarity of the concept of coping in people related to their health did not advance.

Nursing research has relied heavily on the conceptualization and measurement of coping based on the work of Lazarus and colleagues (Lazarus & Folkman, 1984). For example, Jalowiec (1993) noted that in the decade of stress and coping research in nursing that she reviewed, 70 percent of nursing studies used Lazarus' model. Continued use of Lazarus' conceptualization and instrument is reflected in another review of the Cumulative Index to Nursing and Allied Health Literature (CINAHL) data bases from 1998 to 2004 that showed 151 studies reported use of the questionnaire (Johnson, 2006).

Although Lazarus has sometimes been referred to as the standard in the field, a number of authors, as reported by Aldwin (2007) noted that the construct validity of the instrument was not strong, given an unstable factor structure. In some clinical samples, nurse researchers reported that only 35 out of 66 items loaded satisfactorily (Smyth & Yarandi, 1996). Jalowiec (1993) questioned whether or not nurse researchers were losing discrimination in measurement by relying on the distinction between problem-solving or emotional coping and not tapping into the rich cognitive and behavioral domains of coping. Lazarus' concepts have been used in research by nurses since 1972 without much evidence of a developing body of knowledge.

This concern was the stimulus for developing an alternative conceptualization and measurement tool. The program of work included a qualitative phase followed by development of a middle range theory (MRT) that integrated the four adaptive modes of the Roy adaptation model with a model of information processing (See Fig. 1). Roy (2009) has described adaptive behavior as being assessed in four ways or modes, including physiologic, self concept, role function and interdependence. Further, her model of cognitive processing (Roy, 2001) describes two types of input processes—arousal and attention; four kinds of central processes—coding, concept formation, memory and language; and three processes for output—planning, motor response and regulating. The middle range theory depicts coping with stress as both a process and an outcome that includes the concept of adaptation. The effort was to comprehend coping as one concept but to expand the understanding by using inductive and deductive theoretical strategies that led to the development of a 47-item Coping and Adaptation Processing

Scale (CAPS) with Likert response choices ranging from 4 (*always*) to 1 (*never*).

The development and validation of the original scale is described elsewhere (Roy, 2011). A brief summary of its cumulative psychometric properties is provided here. In publications by 6 investigators in 4 countries (US, Thailand, Colombia and Turkey) the Cronbach alpha coefficients for the total CAPS were described as ranging from .94 to .81. The same investigators noted that the Cronbach alpha coefficients for subscale factors ranged from .96 to .65 with one outlier reported at .31 (Alkrisat & Dee, 2014; Catal & Dicle, in review; Chayaput, 2004; Gutiérrez Lopez et al., 2007; Roy, 2011; Zhan, 2000). The content, construct, predictive, and concurrent validity of the CAPS was also supported by the investigators in a number of ways. For example, predictive validity was supported in a descriptive correlational study by Zhan (2000) who found that coping, as measured by the CAPS, explained 42% of the variance in self-consistency, a component of self-concept, among elders dealing with hearing impairment and living in the community. In addition, Alkrisat and Dee (2014) conducted a confirmatory factor analysis to support construct validity of CAPS using a sample of nurses working in acute health care facilities, which demonstrated good fit.

Improving the CAPS became an issue as the scale was used with older populations and varying cultures globally. With the data accumulating on this particular approach to coping it seemed possible that the concept could be clarified. Further, it became a priority to create a shortened scale that was metrically equivalent across different samples, while maximizing precision and ensuring adequate content coverage across the domains of the middle range theory underlying the scale. Several attempts to shorten the CAPS (Chayaput and Roy, 2007; Zhan, 2000) and assess its cross-cultural equivalence (Catal, 2012; Chayaput, 2004; Sarmiento González, Botero Giraldo, & Carvajal Carrascal, 2013) have been made.

## 1.2. Rationale for use and description of item response theory

The earlier approaches to shorten and improve the scale were all grounded in classical test theory (CTT). While CTT approaches are valuable, there are several important limitations that are important to note (Embretson, 1996; Hambleton & Jones, 1993). First, under CTT, reliability is assumed to be constant across all scores (e.g., Chronbach's  $\alpha$  used as a measure of reliability for the total scale). However, in reality this assumption often does not hold. Second, scale properties are considered sample dependent. Therefore, re-validation is needed when scales are used in different populations. Third, raw scores are assumed to have "interval" level scale properties. However, it is hard to evaluate if the difference between an observed score of [5 and 6] verses [6 and 7] on a 10

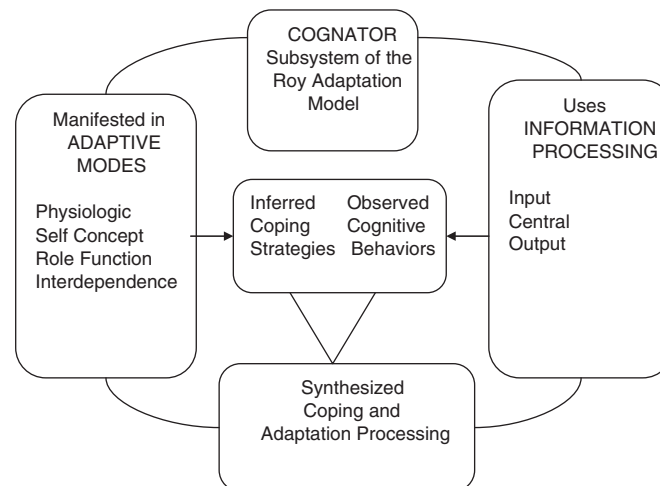


Fig. 1. Middle range theory of coping and adaptation processing. (from Roy (2011). Research based on the Roy Adaptation Model: Last 25 years. *Nursing Science Quarterly* 24(4) 312–320. <http://www.sagepub.com/content/24/4/312.refs.html>.

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