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Confirmatory Factor Analysis of the Debriefing for Meaningful Learning Inventory[©]

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KEYWORDS

debriefing;
debriefing training;
assessment of
debriefing;
debriefing application;
measurement;
factor analysis

Abstract

Background: Despite recommendations for formal debriefing training, it is unknown how training improves the application of a debriefing method. To assess the application of Debriefing for Meaningful Learning (DML), the previously tested 31-item DML Evaluation Scale[®] was modified into the 57-item DML Inventory[®] (DMLI).

Methods: The DMLI was completed by 234 participants. Data from the 52 application DMLI items were used to conduct a factor analysis confirming the DMLI as a valid measure of DML.

Results: Confirmatory factor analysis demonstrated a good fit for the DMLI data, supporting a six-class DFactor model classified as the six Es of DML.

Conclusions: The 52 DMLI application items are a valid measure of DML. Assessment of how debriefing methods are applied after training is needed to advance the science of debriefing practice.

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Background

Debriefing is a collaborative conversation between a debriefer and learners that follows a learning experience (Neill & Wotton, 2011). During this conversation, a debriefer guides learners to explore the thinking and actions that occurred during the encounter (Dreifuerst, 2009). Because of the significance of the learning that happens in debriefing (Shinnick, Woo, Horwich, & Steadman, 2011), training in a theory-based debriefing method has been recommended by the National Council of State Boards of Nursing (Alexander et al., 2015) and the International Nursing Association for Clinical Simulation and Learning (INACSL Standards

Committee, 2016). However, because of the lack of valid instruments that specifically measure how a debriefing method is applied with students, it remains unknown how training in a method improves debriefing.

Debriefing for Meaningful Learning[®] (DML) is a theory-based debriefing method that has been adopted by more than 300 nursing programs in the United States, and nine other countries (K.T. Dreifuerst, personal communication, November 6, 2016). DML engages learners in reflective thinking through Socratic questioning to understand the thinking, actions, and decisions impacting clinical experiences (Dreifuerst, 2012). Concepts foundational to this method are reflection in action, reflection on action, reflection beyond action, challenging taken for granted assumptions, and thinking like a nurse. These central concepts are embedded throughout the six Es of DML: *engage*, *explore*, *explain*, *elaborate*, *evaluate*, and *extend*. The first

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five Es were adapted from the Biological Sciences Curriculum Study E5 Instructional Model (Bybee, 1989; Bybee et al., 2006). The sixth E, *extend*, was added by Dreifuerst (2010) to foster anticipatory thinking associated with reflection.

Key Points

- There is limited ability to assess a trained debriefer's application of a specific debriefing method with students.
- The Debriefing for Meaningful Learning Inventory[®] (DMLI) was developed to measure DML understanding and application.
- Confirmatory factor analysis demonstrated that the DMLI application items are a valid measure of DML.

Although debriefers have reportedly been receiving training in DML since its adoption, it is unknown how that training has impacted the understanding and application of the method. Positive learning outcomes have been demonstrated through testing of this method; these outcomes were achieved when DML was applied with students in its original design. The outcomes demonstrated through testing of DML among prelicensure nursing students include improvements in clinical reasoning skills (Dreifuerst, 2012; Forneris et al., 2015) and clinical judgment skills (Mariani,

Cantrell, Meakim, Prieto, & Dreifuerst, 2013). In addition, DML was chosen as the debriefing method for the longitudinal, multisite National Council of State Boards of Nursing National Simulation Study that tested the substitution of traditional clinical hours with 25% and 50% simulation hours. Hayden et al. (2014) found that up to 50% simulation hours could be effectively substituted for clinical hours when the Nursing National Simulation Study conditions were fully replicated; one of these conditions was the use of DML during debriefing by trained debriefers. However, if DML is not applied in its original design by trained debriefers, it is unknown if similar learning outcomes can be achieved.

Therefore, it is important to know if debriefers who are formally trained to use DML apply it in the way it was designed. One instrument that has been developed and tested to measure the application of DML by debriefers is the Debriefing for Meaningful Learning Evaluation Scale[®] (DMLES). The DMLES is an evaluative rating scale behaviorally anchored in DML that has demonstrated internal consistency (Cronbach's $\alpha = 0.88$), interrater reliability (0.86, total scale intraclass correlation [$p < .01$]), content validity (scale-level CVI = 0.92), and face validity (Bradley & Dreifuerst, 2016). The DMLES was modified into the Debriefing for Meaningful Learning Inventory[®] (DMLI) as a self-report measure of how a debriefer understands the central concepts that underpin DML and how a debriefer applies DML in debriefing. Although data derived from self-report can have challenges related to validity and reliability because of emotion, bias, and interpretation (Paulhus & Vazire, 2007), this method is prevalent in simulation literature as an initial method of assessing a new concept of

interest (Berndt et al., 2015; Richardson, Goldsamt, Simmons, Gilmartin, & Jeffries, 2014). Rather than assuming that a debriefer understands the central concepts of DML because of objective observation of debriefing behaviors, the self-report nature allows a debriefer to describe their actual understanding and application. This follows the inherent premise of DML as a teaching and learning method that uncovers the relationship between thinking and actions.

To develop the DMLI, the 31 DMLES items were expanded into 57 items to comprehensively explore how a debriefer understands and enacts DML. Items that could be challenging to self-evaluate in a single statement were expanded into more than one DMLI item, requiring participants to identify and reflect on their typical debriefing behaviors (Appendix A). Because the content was unchanged from the original 31 DMLES items, content validity of the DMLES was applied to the DMLI (Bradley & Dreifuerst, 2016). Face validity of the DMLI was determined by three experts in DML debriefing prior to initial testing and use. The first 52 DMLI items describe DML behaviors that should consistently be applied during a DML debriefing and are scored with ordinal frequency options: *always*, *sometimes*, and *never*. Items 53 through 57 assess understanding of the DML central concepts, and are scored with the binary options of *yes* or *no*. These final five items were not included in the factor analysis because they assess understanding of the concepts embedded within each of the six Es of DML.

A confirmatory factor analysis (CFA) of the 52 application items of the DMLI was conducted to determine if they are a valid measure of DML. The guiding research question of the CFA was: *Is the DMLI a valid measure of DML application?* Findings of the CFA are reported in this article.

Methods

Factor analysis is a statistical method used to reduce a large number of measurable variables into a lesser number of underlying constructs that are not possible to measure independently (Tabachnick & Fidell, 2013). Factor analysis is used to determine which measurable variables have similar patterns of responses, thus correlating with a latent construct. A latent construct is an underlying abstraction that may be difficult to express or measure. Latent constructs, which are called factors, cannot be directly measured, therefore must be inferred through a mathematical model from the variables that can be measured. This is achieved through examining the amount of variance between these measured variables. The variance in each variable is explained by the factor, which is called the factor loading. The factor loadings are specified by estimating the relationships from the factor to the variables.

One type of factor analysis is CFA, which is a multivariate statistical method used to confirm or reject a measurement theory (Bollen, 1989). Whereas exploratory factor analysis seeks to discover patterns between observed

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