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To cite this article: Daniel G. Dominguez, David S. Fike, Eric J. MacLaughlin & Joseph A. Zorek (2015) A comparison of the validity of two instruments assessing health professional student perceptions of interprofessional education and practice, Journal of Interprofessional Care, 29:2, 144-149

To link to this article: http://dx.doi.org/10.3109/13561820.2014.947360

Published online: 07 Aug 2014.
A comparison of the validity of two instruments assessing health professional student perceptions of interprofessional education and practice

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Abstract

Health professional education programs increasingly incorporate interprofessional education (IPE) activities into curricula in response to evolving health policy and accreditation requirements in an effort to highlight the benefits of, and prepare students for, interprofessional collaborative practice (IPCP). As such, there is a need for statistically valid instruments designed to assess baseline student perceptions regarding IPE and IPCP. Using confirmatory factor analysis, this study compared the reliability and construct validity of a revised 21-item Attitudes Toward Health Care Teams (ATHCT-R) instrument and a 10-item Student Perceptions of Interprofessional Clinical Education-Revised (SPICE-R) instrument. The instruments were concurrently administered online and completed by a total of 221 first year nursing, optometry, pharmacy, physical therapy, and health administration students. In this study, the SPICE-R exhibited better performance in terms of goodness of fit, construct validity, and reliability compared with the ATHCT-R. The SPICE-R instrument demonstrates promise as a parsimonious, valid, and reliable tool for measuring health professional students’ perceptions of IPE and IPCP.

Keywords

Accreditation, confirmatory factor analysis, interprofessional education, instrument comparison, multi-disciplinary, student perceptions

Introduction

Organizations worldwide have embraced and promoted interprofessional education (IPE) and interprofessional collaborative practice (IPCP) as a mechanism to improve healthcare delivery systems (Canadian Interprofessional Health Collaborative, 2009; European Interprofessional Practice and Education Network, 2013; Institute of Medicine, 1972, 2003, 2008; Interprofessional Education Collaborative (IPEC), 2011; World Health Organization, 2010). In the United States (US), the impact of these influential forces was highlighted by passage of the Affordable Care Act (ACA; House Office of the Legislative Counsel, 2010). In addition to codifying important IPE and IPCP provisions, the ACA authorized implementation of a national coordinating center to build the infrastructure and capacity necessary to optimally advance IPE and IPCP throughout the health professions (National Center for Interprofessional Practice and Education, 2014; University of Minnesota, 2013). This infrastructure will be important to academic administrators who must demonstrate compliance with an ever-growing body of IPE-related accreditation standards (Zorek & Raehl, 2013).

Currently, a number of health professional education accrediting bodies, e.g. nursing, pharmacy, physical therapy, optometry, and health administration, include language mandating student involvement in IPE activities (Accreditation Commission for Education in Nursing, 2013; Accreditation Council for Pharmacy Education, 2011; Accreditation Council on Optometric Education, 2009; Commission on Accreditation of Healthcare Management Education, 2013; Commission on Accreditation of Physical Therapy Education, 2013). As such, students enrolled in these accredited programs are required to engage in IPE activities.

Instruments have been developed and validated that assess the impact of IPE activities (National Center for Interprofessional Practice and Education, 2014). Those intended for use irrespective of professional affiliation, and that are most commonly described in the literature, include the Readiness for Interprofessional Learning Scale (RIPLS) (Parsell & Bligh, 1999), Attitudes Toward Health Care Teams Scale (Heinemann, Schmitt, Farrell, & Brallier, 1999; Hyer, Abraham, Mezey, & Fulmer, 2000), Interdisciplinary Education Perceptions Scale (American College of Clinical Pharmacy, 2009), and Interprofessional Collaboration Scale (Kenaszchuk, Reeves, Nicholas, & Zwarenstein, 2010). Profession-specific instruments intended for use in the medical and pharmacy student populations include the Scale of Attitudes Toward Physician-Pharmacist Collaboration (Van Winkle, Fjortoft, & Hojat, 2011) and the Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education (SPEICE) instrument (Fike, Zorek, MacLaughlin, Samiuddin, Young, & MacLaughlin, 2013; Zorek, MacLaughlin, Fike, Samiuddin, & Young, 2014).

While several instruments are available, it is important to note that all are contextually constrained by specific sub-scales/factors...
and the populations within which they were validated. For example, the Attitudes Toward Health Care Teams (ATHCT) was designed to obtain the perceptions of those with experience working on interprofessional teams (Heinemann et al., 1999) and gathers perceptions regarding the costs and benefits of team-based care as well as the centrality of physicians on interprofessional teams. The SPICE-R instrument was designed for administration to health professional students and provides information regarding perceptions of the appropriateness and benefits of IPE and IPCP but without a focus on any one profession. The use of a strategically selected, psychometrically sound, instrument to generate reliable assessment data is of high value to accreditors and academic administrators alike. As such, it is important to select an instrument that matches the population of interest and is capable of producing the desired assessment data (e.g. demonstrate compliance with an accreditation standard; obtain student feedback regarding perceptions of IPE and IPCP).

Information important to both accreditors and academic program evaluators would be a baseline assessment of perceptions toward IPE and IPCP. Baseline data, especially if obtained when students first enter health professional education programs, would provide a reference for assessment of changes in attitude toward IPE and IPCP as a result of the acculturation process (Garman, Leach, & Spector, 2006). It would also provide a reference to measure the impact of IPE initiatives. Similarly, baseline data would be useful in comparing differences in perceptions toward IPCP teams between health professions (e.g. pharmacy students compared to nursing students, those with healthcare experience compared to those without, first year students compared with graduating students). In summary, given the increasing importance of preparing students to engage in IPCP upon graduation, educational programs require the ability to establish a meaningful baseline in order to assess the impact of general and targeted educational activities on students’ perceptions toward IPE and IPCP.

Study purpose

Due to the importance of developing positive perceptions toward IPCP among health professional students, valid and reliable instruments are needed to assess these perceptions. Further, as the number of health professions participating in IPE activities increases, so does the need for assessment instruments suitable for a broad range of health professions. Finally, those responsible for gathering student perceptions would benefit from a parsimonious assessment tool, as instruments with fewer items are less burdensome to complete and may increase response rates (Galesic & Bosnjak, 2009). The purpose of this study was to compare psychometric properties of the 21-item ATHCT-R (Hyer et al., 2000) and the SPICE-R, a revised version of the 10-item Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education (SPICE) instrument (Fike et al., 2013).

Both instruments are used to assess student perceptions regarding IPE and have been validated (Fike et al., 2013; Forchuk & Vingilis, 2008; Fulmer et al., 2005; Hyer et al., 2000; Leipzig et al., 2002). This study is the first comparison of these two modified instruments using the same analytical method (confirmatory factor analysis), and population, as well as, concurrent administration of the instruments. Although the instruments have been used for similar purposes, they do not explicitly measure the same constructs or were they developed to be administered to the same general populations. Study findings would be useful for those engaged in the assessment of perceptions of IPE and IPCP, especially in and among diverse groups of health professional students.

Methods

Instruments

To measure students’ perceptions regarding IPE and IPCP upon entry to health professional degree programs, two valid and reliable instruments were initially selected for consideration: ATHCT-R (Hyer et al., 2000) and SPICE (Fike et al., 2013). The original ATHCT instrument was developed for the purpose of assessing the attitudes of members of clinical teams (Heinemann et al., 1999).

This is important as the ATHCT-R model was used to assess the attitudes of health professional students learning about team care (Hyer et al., 2000). The ATHCT-R differs from the ATHCT in two other respects as well. First, in addition to the shift from clinical practice to student learning, item scoring on the ATHCT-R, was reversed on several items to reflect positive agreement regarding IPCP. Philosophically, this approach focused on measuring shared perspectives (e.g. agreement) among interprofessional team members. Second, names of the three factors were changed to reflect this revision. The three factors were named Team Value (called Quality of Care in the original ATHCT), Team Efficiency (originally labeled Costs of Team Care), and Shared Leadership (originally Physician Centrality). Scoring of the Likert-type items in the ATHCT-R instrument ranged from 1 = strongly disagree to 6 = strongly agree.

For the present study, the primary reason for evaluating the validity and reliability of the ATHCT-R, as opposed to other similar instruments, was that it was being used as the means of assessing student perceptions in an ongoing IPE and IPCP initiative at the site of this study (Parker, 2012). The items and associated factors from the ATHCT-R are available in Hyer et al. (2000).

The SPICE instrument was originally developed to assess perceptions of medical and pharmacy students (Fike et al., 2013) and consists of 10 Likert-type items, with response options ranging from 5 = strongly agree to 1 = strongly disagree. The SPICE structure consists of three factors: Interprofessional Teamwork and Team-Based Practice, Roles/Responsibilities for Collaborative Practice, and Patient Outcomes from Collaborative Practice. In the current study, item wording was changed so that the instrument could be applied to students from a variety of health professional degree programs rather than just medicine and pharmacy. Also, response order was changed so that options ranged from 1 = strongly disagree to 5 = strongly agree in order to be directionally consistent with the ATHCT-R rating scale (Chan, 1991). The modification of SPICE was named the Student Perceptions of Interprofessional Clinical Education-Revised (SPICE-R) to reflect its broader application.

Setting

This study was conducted at a private urban university in the southwest US. The institution has annual enrollments of about 9000, and offers baccalaureate, masters, PhD, and professional degrees. Health professional degree programs offered include those in Nursing, Pharmacy, Optometry, Physical Therapy, and Health Administration. The university is federally designated as a Hispanic Serving Institution (HSI).

Sample

An instrument was administered to first year students enrolled in a variety of health professional degree programs. The three-part online instrument was administered in September 2013. The first part collected student demographics data. The second part consisted of the 21-item ATHCT-R scale. The third part consisted of the 10-item SPICE-R scale. Thus, the ATHCT-R and SPICE-R
scales were concurrently administered to the same sample of students.

A total of 221 of 277 possible students (80% response rate) completed the three-part instrument (Table I). The sample consisted predominantly of females. Less than 40% of the respondents were Caucasian. Students enrolled in a Doctor of Pharmacy program comprised over 40% of the sample. Participants were also pursuing other degrees including Bachelor of Science in Nursing, Master of Health Administration, Doctor of Optometry, and Doctor of Physical Therapy. Over half of the students had prior healthcare work experience. Respondents were comparable with non-respondents in terms of gender, ethnicity, and age.

Analysis

To evaluate the validity and reliability of the instruments of interest (ATHCT-R and SPICE-R), confirmatory factor analysis (CFA) was based upon an a priori model specification (Schumacker & Lomax, 1996) and conducted using AMOS version 21 (SPSS Inc., Chicago, IL). Data distributions were reviewed to verify the appropriateness of using maximum likelihood estimation (Kline, 2005). For each of the pre-specified models, goodness-of-fit was assessed using a variety of indicators (Tabachnick & Fidell, 2007). Goodness-of-fit indicators included the chi-square test (a non-significant finding is desired; skew <2, kurtosis <7: Curran, West, & Finch, 1996). This finding supports the use of maximum likelihood estimation with CFA. Figures 1 and 2 provide a CFA graphical representation for the ATHCT-R and the SPICE-R.

Goodness-of-fit indicators for the two models are provided in Table II. The chi-square test was statistically significant for each of the models. However, NC was <3 suggesting that the models demonstrated acceptable fit. Of the two models, only SPICE-R demonstrated acceptable fit with respect to CFI. Both models had acceptable RMSEA indices. Based on these collective fit indices, the SPICE-R model demonstrated acceptable fit. The ATHCT-R model was not acceptable, given that the CFI index fell below commonly accepted standards.

A comparison of the two models is provided in Table III. All standardized regression weights (Figures 1 and 2) were statistically significant for both models. Although both models fall short of ideals with respect to standardized regression weights, the 10-item SPICE-R model had a notably higher percentage of large regression weights (Figure 2) compared with the 21-item ATHCT-R model (Figure 1). For SPICE-R, 80% of the standardized regression weights exceeded 0.6 and 50% exceeded 0.7 (Table III). The ATHCT-R model was less than 25% of the regression weights exceeded 0.6 and less than 10% of the weights exceeded 0.7.

Since convergent validity is demonstrated when items converge on constructs, the SPICE-R model displayed stronger convergent validity. Further, of the two models, SPICE-R performed the best with respect to average variance extracted. With regard to reliability, each of the models had one factor with reliability lower than desired. However, Cronbach’s alpha for ATHCT-R was 0.79 and for SPICE-R was 0.86, indicating stronger reliability for SPICE-R.

For discriminant validity, factors should not overlap excessively. To ensure that factors do not measure the same construct, recommendations are that correlations not exceed 0.85 (Kline, 2005). Factor correlation coefficients did not exceed this threshold for either of the models. In addition, modification indices were generated using a threshold of 10. There were no modification indices suggesting that items should cross-load to factors, thus supporting discriminant validity of the SPICE-R model.

In summary, based on the a priori models, only SPICE-R achieved acceptable fit on all measures (NC, CFI, RMSEA). Factor loadings, represented by standardized regression weights, were notably higher for SPICE-R. Each of the models had a
Discussion

This is the first published comparison of psychometric properties of ATHCT-R and SPICE-R concurrently administered to the same sample. Although both instruments were used to measure student perceptions of IPE and IPCP, they are not equivalent. Of the two models, SPICE-R produced the best results for average variance extracted and best demonstrated construct validity and reliability. This is especially significant as the factor analytic approach in this study, i.e., CFA, is a theory testing procedure as opposed to exploratory factor analysis (EFA) which is a theory generating procedure (Stevens, 1996). As such, this study furthers the effort to establish psychometrically sound IPE assessment tools as CFA is designed to "confirm" measurement scales put forth in published research rather than proposing new scales which then require analytic confirmation. As detailed by Kenaszchuk et al. (2010), this is a short-coming of EFA, the factor analysis method employed in many IPE and IPCP related measurement scale development efforts. EFA is data driven and is "...subject to capitalization on chance variation" (Kline, 2005, p. 205). Consequently, EFA has the potential to produce a new model each time it is subjected to a different sample. As such, those with a primary interest in student perceptions of IPE and IPCP and who desire to assess perceptions from a broad spectrum of health professional students may benefit from the CFA evaluated, better performing, SPICE-R. That said, those interested in clinical team member perceptions about physicians within the context of interprofessional activities may wish to use ATHCT-R as five of its 21 items are devoted to assessing perceptions of this profession.

Another important aspect of the SPICE-R instrument is that it specifically targets teamwork- and roles/responsibilities-related core competencies for IPCP set forth by IPEC in their watershed Figure 1. Attitudes Toward Health Care Teams-Revised Three-Factor Model.
report (2011). These competencies have been widely adopted by academic administrators and health professional educators charged with revising curricula to meet IPE-related accreditation mandates. As such, the findings of this study, although preliminary, suggest that SPICE-R is a promising instrument for obtaining important baseline data from matriculating health professional students regarding perceptions of IPE and IPCP. For example, the SPICE-R could be used to measure differences between health professions (e.g. nursing compared with health administration). It could also be used to measure differences between those with and without healthcare experience, or those who participated in an interprofessional activity compared with those who did not. From a practical perspective, the SPICE-R, at only 10 items, is shorter and therefore may be required less time to administer. This could contribute to improved response rates (Galesic & Bosnjak, 2009) when compared with the 21-item ATHCT-R. Even more compelling is the fact that the shorter SPICE-R demonstrated stronger measures of validity and reliability compared with the ATHCT-R.

Although yet to be tested for this purpose, the SPICE-R instrument might be used to measure the natural progression of students’ perceptions over the course of a professional degree. For example, student perceptions of IPE and IPCP could be assessed at matriculation, at the conclusion of each academic year, or at graduation. Finally, the SPICE-R instrument could also be used to measure perceptions pre- and post-intervention, such as before and after a one day interprofessional seminar, or before and after a semester-long IPE course, similar to what has been demonstrated with SPICE (Zorek et al., 2014).

Although the current study demonstrated better validity and reliability of SPICE-R when compared with the ATHCT-R, there are limitations. First, this study was conducted at one university. Thus, the applicability of these findings to other institutions and health professional students requires more study. In addition, the instruments were only administered once. Therefore, test–retest reliability was not assessed. Similarly, because the instruments were not administered pre- and post-intervention, sensitivity of the tools could not be ascertained. Despite these limitations, the current study characterizes the validity of the ATHCT-R, and provides useful comparison data to a modified instrument with strong psychometric properties (SPICE-R).

Concluding comments
As the development and implementation of IPE activities increase among health professions educators, so too does the need for a valid, reliable, and parsimonious means of assessing baseline student perceptions of IPE and IPCP. Although the ATHCT-R has been used in this manner it was not developed for this purpose. SPICE-R was developed specifically to assess student perceptions toward IPE and IPCP. Further, although continued improvement is recommended and planned, in the statistical comparison reported in this study, the SPICE-R instrument performed better with respect to goodness of fit indices when compared with the ATHCT-R instrument. Finally, in a direct comparison, SPICE-R generally demonstrated stronger measures of reliability and validity, when compared with the ATHCT-R, making it especially attractive to instrument administrators and respondents alike as it requires less time to complete. The SPICE-R instrument demonstrates promise as a valid and reliable tool for measuring health professional students’ perceptions regarding IPE and IPCP.

Table II. Goodness-of-fit characteristics of the two models.

<table>
<thead>
<tr>
<th>Model</th>
<th>Chi-square</th>
<th>Normed Chi-square (NC)</th>
<th>CFI</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATHCT-R³ 3-factor</td>
<td>$\chi^2(186) = 394,420$, $p &lt; 0.001$</td>
<td>2.121</td>
<td>0.832</td>
<td>0.071</td>
</tr>
<tr>
<td>SPICE-R³ 3-factor</td>
<td>$\chi^2(32) = 74.257$, $p &lt; 0.001$</td>
<td>2.321</td>
<td>0.946</td>
<td>0.077</td>
</tr>
</tbody>
</table>

³Comparative Fit Index.
⁴Root Mean Square Error Approximation.
⁵Attitudes Toward Health Care Teams-Revised.
⁶Student Perceptions of Interprofessional Clinical Education-Revised.

Table III. Comparison of the two model structures.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Standardized regression weights</th>
<th>Number of weights &gt; 0.6 (%)</th>
<th>Number of weights &gt; 0.7 (%)</th>
<th>Factor reliability</th>
<th>Average variance extracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATHCT-R³ 3-factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team value</td>
<td>0.42–0.82</td>
<td>4 (36)</td>
<td>2 (18)</td>
<td>0.86</td>
<td>0.38</td>
</tr>
<tr>
<td>Team efficiency</td>
<td>0.54–0.61</td>
<td>1 (20)</td>
<td>0 (0)</td>
<td>0.72</td>
<td>0.34</td>
</tr>
<tr>
<td>Shared leadership</td>
<td>0.28–0.59</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0.58</td>
<td>0.22</td>
</tr>
<tr>
<td>SPICE-R³ 3-factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcomes</td>
<td>0.79–0.82</td>
<td>2 (100)</td>
<td>2 (100)</td>
<td>0.78</td>
<td>0.65</td>
</tr>
<tr>
<td>Teamwork</td>
<td>0.45–0.78</td>
<td>5 (83)</td>
<td>3 (50)</td>
<td>0.82</td>
<td>0.45</td>
</tr>
<tr>
<td>Roles responsibilities</td>
<td>0.59–0.62</td>
<td>1 (50)</td>
<td>0 (0)</td>
<td>0.53</td>
<td>0.37</td>
</tr>
</tbody>
</table>

³Attitudes Toward Health Care Teams-Revised.
⁶Student Perceptions of Interprofessional Clinical Education-Revised.
Further studies should be pursued to confirm these findings, and to establish the sensitivity and external validity of SPICE-R.

Declaration of interest

This activity was supported in part by a cooperative agreement from the US Department of Health and Human Services, Division of Nursing, Health Resources and Human Services Health Profession, Nurse Education, Practice, Quality and Retention (NEPQR) Program – Interprofessional Collaborative Practice – Award # UD7HP25055-02-01. The authors report no declarations of interest. The authors are responsible for the writing and the contents of this paper.

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