

Psychometric Features of The Nursing Information Use Scale With A Sample of Nursing Students

by

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Abstract

In this paper the researchers report the psychometric parameters for the Nursing Information Use Scale (NIUS) which measures use of information sources in clinical practice. The primary study aimed to determine whether providing nursing students a handheld, computer-based nursing information system improved use of information sources and clinical learning outcomes (stress, computer attitudes and competence) (Jamieson *et al.*). On recruitment into the study nursing students (N = 131) completed the preliminary, 25 item NIUS with a battery of scales. The NIUS data were exposed to typical psychometric analysis, including factor analysis with a Varimax rotation, reliability and item analysis, and test-retest correlations. Findings indicated a refined, 15-item NIUS with four distinct dimensions or subscales: computer expectations (CE; 6 items), interpersonal information (II; 2 items), traditional information (TI; 5 items), and journal information (JI; 2 items). Internal consistency, Cronbach alpha coefficients were strong for both the total NIUS (15 items, .71) and CE subscale (.86). The II, TI, and JI subscales with fewer items had lower internal consistency (i.e., .47). Six-week temporal stability was strong for the total NIUS score, $r = .82$, $p = .00$, suggesting stability over time. Construct validity for the NIUS and nursing information model was evidenced by positive correlations between the total NIUS and its subscales. Significant associations were also found between student nurses NIUS scores and measures of both their computer competence and attitudes toward computers. While the study findings provide preliminary validity and reliability evidence for NIUS, further examination with larger, more representative samples is required.

Introduction

Nursing informatics is the application of computer and information science to improve information use and/or knowledge to support nursing practice (Hebert, 2000). Many nurse experts have stressed the importance of informatics competencies in the provision of high quality patient care within an information age (Canadian Nursing Informatics Association, 2002; Fetter, 2008; Hebert, 2000; McBride, 2005; Morgan *et al.*, 2007; Thompson & Skiba, 2008). Great attention is currently paid to the informatics competence levels of both practicing and student nurses. Nurse leaders strongly suggest that educators infuse informatics learning opportunities into classroom and clinical learning experiences within nursing curricula (Scott *et al.*, 2008; Ward & Moule, 2007; Willmer, 2005) and develop core informatics competencies (Canadian Nurses Association, 2006; McBride, 2005). Informatics competence supports evidence based patient care as it enables nurses to search for the best available information to inform clinical care decisions (Levett-Jones *et al.*, 2009).

Educators in undergraduate nursing programs are called to demonstrate how their graduates meet information literacy standards (Fetter, 2008). Planning appropriate informatics educational opportunities requires an understanding of how student and practicing nurses currently use various information sources to inform patient care. A greater understanding the types of information sources used by nurses would inform initiatives to promote their use of high quality information and evidence-based practice (Courey *et al.*, 2006). While few researchers have studied information use patterns of practicing nurses, a preference for

interpersonal (Secco *et al.*, 2006), human, or 'interactive' (Spenceley *et al.*, 2008) information sources has been noted.

Numerous researchers have reported barriers to nursing information acquisition in clinical practice. Some nursing characteristic barriers have included limited computer or information technology skill (McBride, 2005), Internet expertise (Bickford *et al.*, 2008; Gilmour, 2007; Gilmour *et al.*, 2008), time to search on shift (Gilmour *et al.*, 2008), and negative attitudes toward computers (Alquraini *et al.*, 2007; Timmons, 2003). Barriers related to the clinical environment or setting include poor access or availability to information technology (Canadian Nurses Association, 2006; McBride, 2005) and computer system or program communication failure issues (McKnight, 2006).

While few studies have been completed of informatics skill and/or information use patterns for student nurses (Levett-Jones *et al.*, 2009), findings to date suggest similar information barriers such as limited student (Moule, 2003) and faculty (Fetter, 2009) computer skill, poor access to computers in clinical settings (Bogossian *et al.*, 2009; Ward & Moule, 2007), lack of appropriate resources, and variability in hardware and software (Fetter, 2009). Furthermore, the wide variation in informatics skill level across different nursing programs and limited to no Internet access during clinical practice (Bogossian *et al.*, 2009; Scott *et al.*, 2008) suggest lack of uniform educational and setting resources. Limited Internet access is of particular concern as it leaves student nurses unable to search for and/or validate health information that clients may desire (Scott *et al.*, 2008). While scales are available that measure computer attitudes, knowledge, and competence (Hobbs, 2002) few are available to specifically assess use of various types of information sources.

The current study established validity and reliability for the Nursing Information Use Scale (NIUS) with a sample of nursing students.

Conceptual Model

The current study was guided by a conceptual model of four interrelated concepts: *information source, level of evidence, and computer and informatics competence* (Figure 1) (Secco et al., 2006). *Informatics and computer competence* enable nurses to access information sources (Hobbs, 2002) and to apply information in patient care (Staggers, Gassert & Curran, 2002). Today it is especially vital that nurses have computer competence as increasingly more information is accessed via computers, e.g., Internet websites, electronic library databases, and research journals repositories. Undergraduate nursing students acquire information from various sources: *interpersonal, computer, and non-computer sources*. *Interpersonal information* is gathered via interactions with clinical teachers, fellow students, and practicing nurses. The computer is increasingly used as an information search tool to access expert information in literature repositories, electronic journals, Internet websites, e-mail and chat rooms (Secco et al.). The foundation of evidence-based health care is that decisions, made for and with the client, are informed by the best and latest evidence or information (Guyatt et al, 2000). Informatics competence enables the nurse to access electronic health systems, diagnostic information, to chart, and to search for the best available evidence or research findings to inform patient care (Levett-Jones et al., 2009). Informatics competence is a key determinant of the extent to which nursing practice decisions are informed within an information-rich, high tech health care environment.

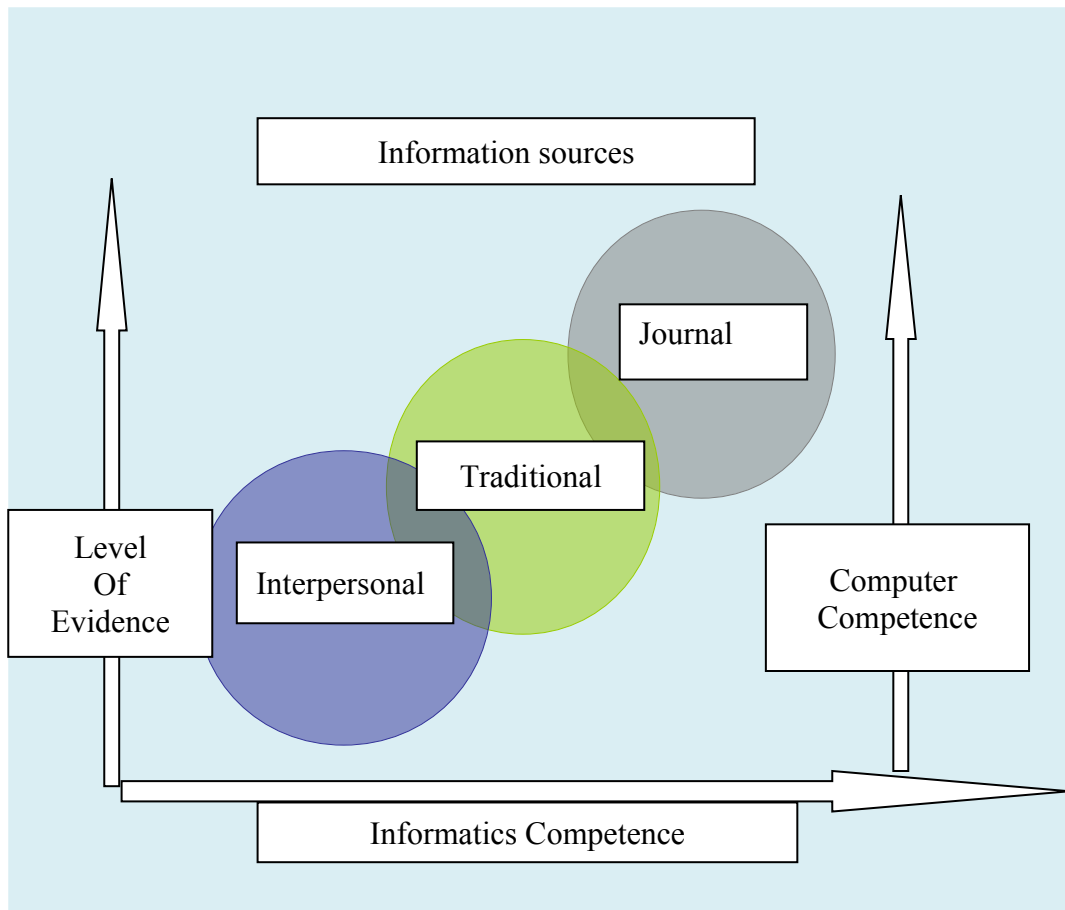


Figure 1. Information Use Model (Secco et al., 2006)

Methods

Procedure

After receipt of ethical approval student nurses (along with clinical teachers) recruited into the primary study completed consent forms, demographic information, and the pretest research scales. The primary study intervention provided a group of nursing students (n = 25) with a handheld computer or personal data assistant

(PDA) loaded with an integrated nursing electronic software program (i.e., '[Nursing Central](#)') for a six-week clinical rotation. The comparison group nursing students did not have access to a PDA. The four study scales completed at intake were analyzed using SPSS, version 16 to determine psychometric features of the NIUS.

Instruments

The Nursing Information Use Scale (NIUS) was initially designed as a 25 item, Likert survey for a study of barriers and information use among practicing pediatric nurses (Secco et al., 2006). The NIUS was initially organized around six categories or information sources (interpersonal, non-computer, computer), computer attitudes (impact on nursing care and expectations that computers improve nursing care), and barriers to information. Use of the NIUS demonstrated that pediatric nurses with greater educational preparation (baccalaureate degree versus diploma) used significantly more traditional, or textbook and print-based journal. Furthermore, greater computer competence was a factor related to greater use computer-based information sources (Secco et al., 2006). Some of the NIUS anchor responses were modified for consistency to allow factor analysis (i.e., 'strongly agree' to 'strongly disagree').

A revised Computer Competence Scale (CCS) (Kaminski) was used as a measure of computer and informatics competence using a number of computer soft- and hardware applications. A five-point, Likert response was added as a rating scheme for each item to permit scoring and data analysis.

The Attitudes Toward Computers scale (ATC) (Nickell & Pinto, 1986) contains 20, five-point Likert items that measure attitudes toward computers. The Likert responses ranged

from strongly disagree (1) to strongly agree (5). Items in the ATC are designed to measure perspectives on the value and utility of computers.

Results

Sample

A sample of 2nd, 3rd, and 4th year nursing students (N = 131) was recruited from two nursing Eastern Canadian Universities, Cape Breton University (64.1%; n = 84) and St. Francis Xavier University (35.4%; n = 47) (Table 1). The average age of the final sample was 25.2 years and more than 90% of participating students were female (93.1%; n = 121). Almost 40% (38.7%) of nursing students worked an average of 11.05 hours per week outside of school in a health or related setting. Close to 20% of the study participants had a previously earned university degree (n =25).

Item Reduction of the NIUS

Factor Analysis: Exploratory principal components factor analysis with a Varimax rotation and eigenvalue value cutoff set at 1.0 refined the NIUS. The best fit was a four-factor model (explained variance 46.4%) with satisfactory explained variance (43.4%). NIUS items with load strength of at least .25 and clear single factor load were retained. Six items that failed to meet these requirements were removed. The strongest factor load items informed the naming of the factors: computer expectations (CE), and use of journal information (JI), traditional information (TI) and interpersonal information (II) (Table 2).

Reliability Estimation: The Cronbach alpha coefficients for the total NIUS (.71) and CE (.86) were strong. The internal consistency coefficients for the JI, TI, and II subscales were weaker (.47). Evaluation of inter-item and item-total score correlations and item deletion

Cronbach alpha coefficients resulted in deletion of another 4 items. The items deleted had either redundant (inter-item correlation $> .8$) or weak ($< .35$) correlations with the other items. Strong temporal stability for the NIUS was reflected in a strong six-week test retest correlation, $r = .82$, $p = .00$, $n = 127$.

Psychometric Properties

The refined NIUS and subscale means are presented in figure 2. The mean for the total NIUS was 3.37 ($SD = .37$; $N = 127$). Nursing students reported most frequent use of traditional information sources such as textbooks ($M = 4.22$; $SD = .42$) compared with either interpersonal ($M = 3.35$; $SD = .85$) or journal ($M = 2.70$; $SD = 1.16$), information sources. Journal information sources were used least frequently. The mean CE, or computer expectations, 3.3 ($SD = .71$), suggested the nursing students had quite high expectations that computer technology will improve patient care.

Convergent and Construct Validity

Convergent validity, tested with Pearson r correlation, revealed moderate to low associations between total NIUS and both ATC, $r = .23$, $p = .01$, and CC, $r = .26$, $p = .003$; the TI factor weakly associated with ATC, $r = .23$, $p = .008$ (Table 3.). Interestingly, all associations between ATC and the NIUS total and subscale scores were significant. Additional construct validity was demonstrated by detection of an expected difference or significantly higher posttest NIUS total mean for senior, fourth year nursing students compared with 2nd and 3rd years nursing students, $t = 7.2$, $p = .000$.

Discussion

This study established psychometric features for the 15 item NIUS; principal components factor analysis identified four subscales: computer expectations, traditional information, interpersonal information, and journal information. The refined NIUS revealed satisfactory internal consistency reliability and strong test-retest stability. Significant associations between nursing students' total NIUS scores and both their computer attitudes and literacy levels provided convergent validity. Construct validity was demonstrated by an expected, significantly higher NIUS scores for senior, compared with more junior, nursing students. Several study findings were aligned with the information use model such as the significant associations between computer competence, total NIUS, TI, and CE. The salience of student nurse computer attitudes was shown in the significant associations with each of the NIUS total and subscale scores.

The total NIUS and factor means indicated that traditional information sources were most commonly used ($M = 4.22$, $SD = .42$), followed by interpersonal ($M = 3.35$, $SD = .85$) and journal information sources ($M = 2.70$, $SD = 2.70$). The higher use of traditional information among nursing students contrasts with reports that practicing nurses tend to favor interpersonal information (Secco et al., 2006; Spenceley et al., 2008). This higher use of traditional information sources may be related to greater student nurse access to these information sources, such as textbooks and quick reference guides. Also, student nurses may hesitate to seek interpersonal information in case it reflects their lack of preparedness as clinical teachers often state the expectation that students come 'prepared' for clinical practice. Finding that nursing students used journal information least ($M = 2.7$) may be

related to limited access to, or understanding of, research journals and articles and/or nurse educators' requirements of textbooks in clinical courses. Access to journal articles often requires computer access to electronic library databases and a recent study noted limited access to computers off campus as an issue for nursing students (Levett-Jones et al., 2009).

The study has several methodological limitations that include a small, nonrandomized sample of nursing students from only two Canadian universities. Further testing of the NIUS with a larger, more varied sample of nursing students is needed. Another limitation was reliance on self-report scales to establish construct validity. In future, triangulation of data collection methods is recommended with observational data to supplement the self-report of information source use and qualitative data collected via semi-structured interview to describe how student nurses describe experiences accessing and using various information sources.

Conclusions

Potential uses for the NIUS in nursing education include tracking information use ability across the nursing program and evaluation of informatics teaching sessions, novel informatics systems, and information management software. The NIUS is appropriate for use by educators and researchers; it is easy to understand and takes only a few minutes to complete. The NIUS may be used to assess effect of clinical and classroom teaching strategies to improve information use among nursing. Greater knowledge about the sources of information used by student nurses can help educators improve access to information and promote informatics skills before graduation. The continuing digitalization of health and nursing information requires that nurse educators focus on informatics courses, learning

modules, and clinical tools/opportunities to promote informatics competence so that student nurses can acquire information to inform patient care and nursing knowledge. Integration of more information technology learning opportunities within nursing education will better prepare nurses to practice within the constantly changing health care technology environment (McNeil *et al.*, 2003; Moule, 2003). It is also important for nurse leaders to encourage clinical practice settings to improve nurses' access to computers and informatics tools within the workplace.

Table 1. Characteristics of the Student Nurse Sample (N = 131*)

	<i>mean</i>	<i>SD</i>
Age	25.23	6.51
Hours worked/week	11.05	11.9
	<i>N</i>	<i>%</i>
Work in Health Care	48	38.7
Previous Degree	43	33.1
Gender		
Female	121	93.1
Male	9	6.9
University		
CBU	84	64.1
ST.FX U	47	35.9
Program Year		
2nd	43	33.1
3rd	44	33.8
4th	25	19.5

Table 2. Load Pattern for the Nursing Information Use Scale (15 items)

	M	SD	CE	JI	TI	II
Computers can improve efficiency of patient care	3.74	1.06	.809			
Computers can improve patient teaching	4.08	.84	.798			
Computers can improve communication among nurses	3.88	1.01	.798			
Computerized literature has a great impact on nursing care	3.92	.80	.760			
Computers can improve access to nursing care resources	4.42	.68	.753			
Often use electronic drug resources	2.81	1.26	.520			
Often use information from review papers in print journals	2.74	1.27		.82		
Often use structured abstracts from journals	2.66	1.22		.789		
Often use traditional nursing textbooks	3.48	.35			.593	
Colleague discussion has a great impact on nursing care	3.25	.29	.		.569	
Often use quick reference textbooks	3.16	.172			.562	
Often use e-mail to get information	2.58	.15			.346	
Non-computerized literature has a great impact on nursing care	3.57	.19			.313	

	M	SD	CE	JI	TI	II
I phone or speak to another professional when information is needed	3.14	1.08				.547
I rely in information from other nurses	3.59	.99				.536
Variance explained (Eigenvalues)			31.36	9.16	8.32	7.54
Cronbach alpha			.86	.86	.47	.47

Figure 2. Descriptive Statistics (N =129)

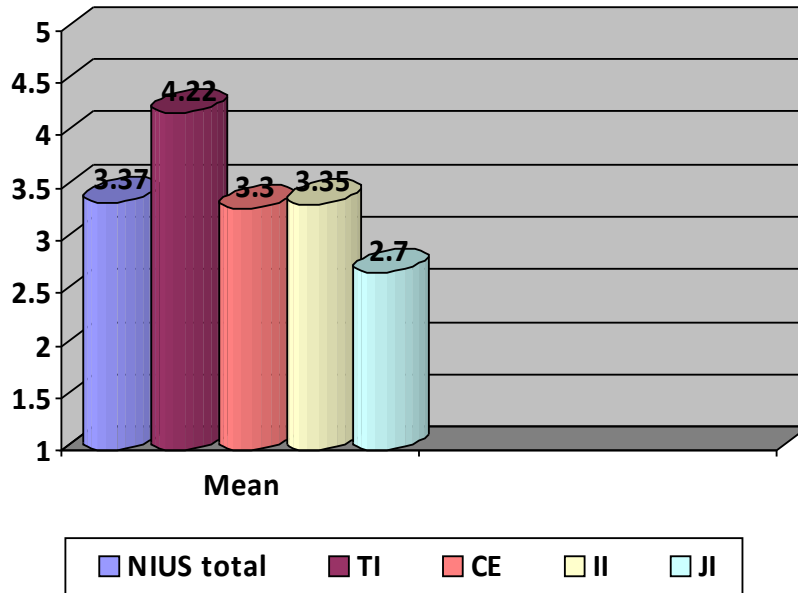


Table 3. Convergent Validity Pearson Correlations*

	CCS ^A	ATC ^B
	r	r
NIUS total	0.26	0.23
Traditional Information	0.23	0.35
Journal Information		0.25
Interpersonal Information		0.31
Computer Expectations	0.30	0.28

*Table includes only significant correlations ($p \leq .05$)

^A CCS Computer Competence Scale (Kaminski)

^B ATC Attitudes Toward Computers (Nickell & Pinto, 1986)

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