The self-directed learning readiness scale for nursing education revisited: A confirmatory factor analysis

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**S U M M A R Y**

The Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE) was initially developed as an alternative to Guglielmino’s (Guglielmino, L.M. 1977. Development of the Self-Directed Learning Readiness Scale. Unpublished Doctoral Dissertation, University of Georgia. Dissertation Abstracts International, vol. 38 (11a), p. 6467) Self-Directed Learning Readiness Scale. The aim of this study was to re-examine the factor structure of the subscales of the SDLRSNE and provide evidence of its validity. Data was collected using a cross-sectional survey of 227 first year undergraduate nursing students. To examine the factor structure of the SDLRSNE three one-factor congeneric models, each representing a different subscale, were tested with maximum likelihood confirmatory factor analysis. The model fit indices of the three one-factor congeneric models indicate that the resultant models fit the data well, providing support for the factorial validity of the SDLRSNE. Of the 40 items, 11 items had to be removed from the analyses as they failed to provide good fit with their subscales. Further research investigating the factor validity of the SDLRSNE is encouraged, specifically to examine the stability of the items across factors using multi-factor models.

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**Introduction**

The Self-Directed Learning Readiness Scale for Nursing Education (SDLRSNE) was first published in Nurse Education Today in 2001 (Fisher et al., 2001) and since that time there have been many requests for its continued use in nursing education research. O’Shea (2003) rightly claimed that caution is required in the use of the SDLRSNE until there is further evidence of its validity and reliability. The aim of this study was to re-examine the factor structure of the subscales of the SDLRSNE and provide evidence of its validity.

Self-directed learning (SDL) is a method of instruction that can be defined in terms of the amount of responsibility the learner accepts for his or her own learning (Fisher et al., 2001). The learner’s readiness to engage in SDL is defined as “the degree the individual possesses the attitudes, abilities and personality characteristics necessary for self-directed learning” (Wiley, 1983, p. 182).

The Self-Directed Learning Readiness Scale for Nursing Education was initially developed as an alternative to Guglielmino’s (1977) Self-Directed Learning Readiness Scale. Since the development of the Guglielmino SDLRS, there has been significant scrutiny of its underlying theoretical constructs and factor structure. Failure in repeated attempts to replicate the eight-factor structure of the SDLRS proposed by Guglielmino (1977) has raised concerns of its construct validity (Field, 1989, 1991; Hoban et al., 2005).

The development and validation of the Self-Directed Learning Readiness Scale for Nurse Education was conducted in three stages (Fisher et al., 2001). Firstly, 93 items were developed following a comprehensive literature search. The Delphi technique was used to gain consensus from an expert panel of 11 nurse academics and nurse educators as to whether the items reflected the characteristics required for SDL. The resultant 52 items were piloted on a sample of 201 undergraduate nursing students. Principal components analysis with varimax rotation was used to establish the underlying factor structure of the items in the instrument. The final SDLRSNE consist of 40 items distributed across three underlying factors: ‘Self-management’, ‘Desire for learning’, and ‘Self-control’.

**Background**

The internal consistency of the SDLRSNE and its subscales has been reported in several studies (Newman, 2004; Bridges et al., 2007; Smedley, 2007). These studies demonstrate that the SDLRSNE is reliable and internally consistent across various samples. A UK randomized experimental designed study, evaluating the effectiveness of problem-based nursing curricula, reported...
the internal consistency of the SDLRSNE to be 0.86 for ‘Self-management’, 0.85 for ‘Desire for learning’ and 0.89 for ‘Self-control’, and the total scale Chronbach’s coefficient alpha was 0.95.

In a US study of physical therapists, the SDLRSNE was used to determine whether a propensity for self-directed learning correlated with the use of evidence-based practice (Bridges et al., 2007). In this study the Chronbach’s coefficient alpha for a shortened version of the SDLRSNE was 0.87 for ‘Self-management’, 0.85 for ‘Desire for learning’ and 0.80 for ‘Self-control’. This study found that self-directed learning readiness (in particular, the ‘Desire for learning’ subscale) was a significant predictor of the use of evidence-based practice in physical therapists.

An Australian study that evaluated the self-directed learning readiness of undergraduate students in their first year of the Bachelor of Nursing (BN) programme, supported the high internal consistency of the SDLRSNE (Smedley, 2007). Smedley (2007) reported the Chronbach’s coefficient alpha for the subscales to be: ‘Self-management’ 0.81, ‘Desire for learning’, 0.78, and ‘Self-control’ 0.84. The total score and subscale score distributions were consistent with the Fisher et al. (2001) sample.

A further study has examined the factor structure of the SDLRSNE. Hendry and Ginns (2009) identified a four factor model that fit their data. Two factors (‘Self-determination’ and ‘Effective organization for learning’) corresponded to the original ‘Self-control’ and ‘Self-management’ subscales, respectively. The other two factors identified, ‘Critical evaluation’ and ‘Learning self-efficacy’, did not correspond well with the original factors reported by Fisher et al. (2001). This suggests that further research is required to establish the factorial validity for the SDLRSNE.

**Methods**

Data collected from a cross-sectional survey of 227 first year undergraduate nursing students was used to examine the factor structure of the SDLRSNE. The SDLRSNE, together with a participant information sheet, was distributed by the researchers to the convenience sample during their course orientation week. Consent was considered implied on completion and return of the survey. The participants anonymously returned the survey to a centrally located box. No participant names or identifiable characteristics were collected on the survey. Ethical Approval for this study was granted by the University of Sydney Human Research Ethics Committee.

![Fig. 1. One-congeneric model for ‘Self-management’ with standardized regression weights.](image-url)
The SDLRSNE

The Self-Directed Learning Readiness Scale for Nursing Education consisted of a total of 40 items across three subscales: Self-management (13 items), Desire for learning (12 items) and Self-control (15 items). Four items were negatively phrased. Participants were asked to indicate the degree each item reflected their own characteristics using a five-point Likert scale where a score of 1 indicated strongly disagree and a score of 5 indicated strongly agree. The reported Chronbach's coefficient alpha for the total scale in this study was 0.87.

Analysis

To examine the factor structure of the SDLRSNE three one-factor congeneric models, each representing a different subscale, were tested with maximum likelihood confirmatory factor analysis using AMOS (version 17). The separate analyses of the three one-factor congeneric models were chosen over a higher-order or multi-factor model as a result of the relative small sample size. Structural Equation Modelling techniques require large sample sizes to maintain stability in the parameter estimates. Examining the three one-factor congeneric models separately provided a ratio of number of participants to number of parameters to be estimated of at least 10:1.

Influential outliers were identified by examining the standardized residuals covariance matrix and Mahalanobis distances. Outlier cases were deleted accordingly. The data in this study was at the ordinal level, therefore the SEM assumption of multivariate normality was not possible. In addition, the Mardia's coefficients for multivariate kurtosis in each model was >3, indicating significant multivariate non-normality in the data. As a result the Bootlen–Stine bootstrap p procedure was used to adjust model fit and parameter estimates to accommodate the lack of multivariate normality. Standardized residual covariances (cut-off of >4) and modification indices were used in an iterative process to respecify each of the models.

Results

The participants' age ranged from 17 to 55 years with a median age of 18 years. Thirty (13.3%) participants were male and 196 (86.7%) were female. One participant did not indicate their sex.

When all 13 items were included in the analysis of the 'Self-management' subscale the data did not fit the specified factor model ($\chi^2 (65) = 160.205; p < 0.0001$). It was only after the deletion of three items (I do not manage my time well; I solve problems using a plan; I prefer to plan my own learning) that the model for self-management fit the data ($\chi^2 (35) = 46.654; p = 0.662$). Fig. 1 presents the standard regression weights (factor loadings) for the resultant 10 items in the model for Self-management.

Similarly, the original 12 items of the 'Desire for learning' subscale did not fit the specified factor structure ($\chi^2 (54) = 162.512; p < 0.0001$). After 3 iterations and the deletion of three items (I like to gather the facts before I make a decision; I like to evaluate what I do; I am open to new ideas) the model for 'Desire for learning' fit the data ($\chi^2 (27) = 30.342; p = 0.835$). Fig. 2 presents the standard regression weights for the resultant nine items in the model for 'Desire for learning'.

The 'Self-control' subscale consists of 15 items. When all 15 items were included in the model the data was a poor fit ($\chi^2 (90) = 312.515; p < 0.0001$). After five iterations and the
removal of five items (I prefer to set my own goals; I like to make
decisions for myself; I am logical; I have high personal expecta-
tions; I prefer to set my own criteria on which to evaluate my per-
formance) the model had good fit with the data ($\chi^2(35) = 57.339; 
p = .214$). Fig. 3 presents the standard regression weights for the
resultant ten items in the model for ‘Self-control’.

The model fit indices of the three one-factor congeneric models
are presented in Table 1. With multiple goodness-of-fit indices,
good fit is indicated by Root Mean-Square Error of Approximation
(RMSEA) values lower than 0.05, Standardized Root Mean-Squared
Residual (SRMR) values lower than 0.05, Comparative Fit Index
(CFI) values higher than 0.95, and Goodness-of-Fit Index (GFI)
>0.95. The model fit indices for ‘Self-management’ and ‘Desire for
learning’ indicate that the data has good fit with the resultant mod-
els. The ‘Self-control’ model has reasonable fit with borderline
RMSEA and CFI indices.

**Discussion**

The resultant models do provide reasonable evidence of con-
struct validity for the ‘Self-management’, ‘Desire for learning’ and
‘Self-control’ subscales of the SDLRSNE. However, it is clear that
there is some difference in the factor structure of the instrument
when compared with the original exploratory factor analysis
(Fisher et al., 2001). For the majority of the items the proposed ori-
ginal factor structure still hold true, however, in these analyses 11
items have become redundant. On the surface, the items that have
not loaded to their corresponding subscale do not appear to be the-
oretically essential. As a result a revised 29 item SDLRSNE could be
considered following further examination of the factor validity.

A limitation in this study was the relatively small sample size. A
sample size of 227 participants limited the analyses to one-factor
congeneric models and did not allow for the examination of

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**Fig. 3.** One-congineric model for ‘Self-control’ with standardized regression weights.

**Table 1**

<table>
<thead>
<tr>
<th>Goodness-of-fit indices</th>
<th>One-factor congeneric model</th>
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<tbody>
<tr>
<td></td>
<td>Self-management (10 items)</td>
</tr>
<tr>
<td>$\chi^2$ (Bollen–Stine p) (df)</td>
<td>46.654 ($p = .662$) (35)</td>
</tr>
<tr>
<td>RMSEA</td>
<td>.039</td>
</tr>
<tr>
<td>SRMR</td>
<td>.035</td>
</tr>
<tr>
<td>GFI</td>
<td>.960</td>
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<tr>
<td>GFI–AGFI</td>
<td>.023</td>
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<tr>
<td>CFI</td>
<td>.971</td>
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</table>
relationships between variables (items) across factors. In order to examine item interactions across the subscales, higher-order or multi-factor models need to be employed. Such analyses require much larger samples. It is possible that those items found to be redundant in this analysis may have significant interactions with other subscales. This is supported by Hendry and Ginns (2009). In their four-factor solution (made available on request), factor 1 (‘Critical self-evaluation’) consisted of five items, which explain the largest percent of the variation in their solution. Of the five items three items (I like to evaluate what I do; I like to gather the facts; I am logical) were redundant in this current study. It is the authors recommendation that the 40 item SDLRSNE should be used until further research examines the relationships between variables (items) across factors in different samples.

Conclusion

The SDLRSNE was developed to measure readiness for SDL in nursing students. The validity of the scale is supported by the results of this study. The SDLRSNE will continue to be a useful tool in the diagnosis of student learning needs. Further research investigating the factor validity of the SDLRSNE is encouraged, specifically to examine the stability of the items across factors using multi-factor models.

References


