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The Readiness for Interprofessional Learning Scale: A possible more stable sub-scale model for the original version of RIPLS

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Abstract
The original version of the Readiness for Interprofessional Learning Scale (RIPLS) was published by Parsell and Bligh (1999). Three sub-scales with acceptable or high internal consistencies were suggested, however two publications suggested different sub-scales. An investigation into how to improve the reliability for use of the RIPLS instrument with undergraduate health-care students commenced. Content analysis on the original 19 items involving experienced health-care staff resulted in four sub-scales. These sub-scales were then used to formulate a possible model within a structural equation model. The goodness of fit was assessed using a sample ($n = 308$) of new first year undergraduate students from 8 different health and social care programmes. The same data was fitted to each of the two original sub-scale models suggested by Parsell and Bligh (1999) and the results compared. The fit of the new four sub-scale model appears superior to either of the original models. The new four factor model was then tested on subsequent data ($n = 247$) obtained from the same students at the end of their first year. The fit was seen to be even better at the end of the academic year.

Keywords: *Interprofessional Learning, RIPLS, structural equation modelling, confirmatory factor analysis*

Introduction

The Readiness for Interprofessional Learning Scale (RIPLS) (Parsell et al., 1998; Parsell & Bligh, 1999) has been of interest to several international research groups since its development but there have been few publications with data obtained from RIPLS (Horsburgh et al., 2001; Hind et al., 2003). The web-based virtual RIPLS Interest Group based at the Peninsular Medical School has some 20 members, several of whom appear to be actively using the instrument or at least planning to (http://emily.pms.ac.uk/). A new, as yet unpublished, version is being developed at the Peninsular Medical School. Some research groups interested in interprofessional education (IPE) have opted to use this newer version even before the development has been completed (Tayside Centre for General Practice Community Health Sciences). With different possible sub-scales being found and

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publication of weak reliability data, there must be concern about the interpretation of any results obtained. Action research often involves continual development of such instruments, but researchers who adopt an ''off the shelf'' approach to applying such instruments in their own research without confirmation of the stability of the instrument should take extreme care.

Development of RIPLS

A pilot analysis (Parsell & Bligh, 1999) was based on 120 students from 8 professional groups. They suggested three sub-scales, Teamwork and Collaboration, Professional Identity and Roles and Responsibilities. The paper from this pilot study was however published after Parsell et al. (1998) reported their results from a much larger study at the 8th Ottawa International Conference. In both studies appropriate factor analysis appeared to suggest three sub-scales, the main study suggesting Teamwork & Collaboration, Negative Professional Identity and Roles. Table I lists the items within RIPLS and Table II specifies the different item locations and hence sub-scale names, for these two publications. This work was based on a sample of 914 students from 8 professions and once the sub-scales were identified, the internal consistency of each was reported as 0.85 and 0.46 for Teamwork & Collaboration and Negative Professional Identity respectively, with the Roles sub-scale only

Table I. Readiness for Interprofessional Learning Scale.

Please indicate the degree to which you agree or disagree with the statement by drawing a circle around the number of the response that best expresses your feeling.
The scale is as follows: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

1.	Learning with other students will help me become a more effective member of a health care team	1	2	3	4	5
2.	Patients would ultimately benefit if health-care students worked together to solve patient problems	1	2	3	4	5
3.	Shared learning with other health-care students will increase my ability to understand clinical problems	1	2	3	4	5
4.	Learning with health-care students before qualification would improve relationships after qualification	1	2	3	4	5
5.	Communication skills should be learned with other health-care students	1	2	3	4	5
6.	Shared learning will help me to think positively about other professionals	1	2	3	4	5
7.	For small group learning to work, students need to trust and respect each other	1	2	3	4	5
8.	Team-working skills are essential for all health care students to learn	1	2	3	4	5
9.	Shared learning will help me to understand my own limitations	1	2	3	4	5
10.	I don't want to waste my time learning with other health-care students	1	2	3	4	5
11.	It is not necessary for undergraduate health-care students to learn together	1	2	3	4	5
12.	Clinical problem-solving skills can only be learned with students from my own department	1	2	3	4	5
13.	Shared learning with other health-care students will help me to communicate better with patients and other professionals	1	2	3	4	5
14.	I would welcome the opportunity to work on small-group projects with other health-care students	1	2	3	4	5
15.	Shared learning will help to clarify the nature of patient problems	1	2	3	4	5
16.	Shared learning before qualification will help me become a better team worker	1	2	3	4	5
17.	The function of nurses and therapists is mainly to provide support for doctors	1	2	3	4	5
18.	I'm not sure what my professional role will be	1	2	3	4	5
19.	I have to acquire much more knowledge and skills than other health-care students	1	2	3	4	5

having one item. The authors also suggested in the 1998 conference paper (Parsell et al., 1998) that one item [Item 10 – see Table I] be dropped from the scale as a result of internal consistency problems.

With the introduction of Interprofessional Learning (IPL) in all undergraduate health and social care programmes at Glasgow Caledonian University (GCU), the IPL group at GCU wished to be able to evaluate any changes in the students' changes in perceptions and attitudes over time. Whilst the psychometric properties of RIPLS were not proven completely the Group concluded that this instrument, which was originally developed to assess attitudes to IPE, was one of the scales that might help to evaluate such changes. The other scale selected was the Interdisciplinary Education Perception Scale (Luecht et al., 1990).

Methodology

The Interprofessional Learning (IPL) project at GCU commenced in September 2003 with all first year undergraduate students on seven health and social care programmes being invited to participate along with one undergraduate group from the University of Strathclyde (Table III details professional groups). This cohort of students was the control cohort, in that they were to be the last group of undergraduate students who would not receive the new interprofessional education module during their programme of study. The intervention cohort commenced their academic programmes in September 2004, with all students receiving a formal interprofessional integrated module throughout the first year of their undergraduate programme and themed days during later stages of their programmes. Data collection on both cohorts will take place twice a year during the four years of their programme and where possible twice, after they enter professional practice. This longitudinal study will first report to the Universities involved formally in 2006 when both cohorts have completed two years of their degree, then in 2008 when they have completed their undergraduate training and finally in 2010 when hopefully, using the University Student Careers Services, many can be followed into their professional clinical environment.

Table II. Item allocation from factor analysis with sample sizes and percentage cumulative variation explained. N.B. Parsell & Bligh (1998) analysis deleted Item 10. Items are as listed in Table I.

Factor Analysis	Sub-scale 1 Teamwork & Collaboration	Sub-scale 2 *Professional Identity(1999) +[Negative Professional Identity](1998)	Sub-scale 3 *Roles & Responsibility(1999) +[Roles](1998)
*Parsell & Bligh (1999)($n=120$) 42% variation explained	Items 1 – 9	Items 10 – 16	Items 17 – 19
+Parsell et al. (1998) ($n=914$) 48% variation explained	Items 1 – 9 Item 11 Items 13 – 16	Item 12 Item 17 Item 19	Item 18
GCU (Sept.03) ($n=308$) 44% variation explained	Items 1 – 11 Items 13 – 16	Item 12 Item 17	Items 18 – 19

*Parsell & Bligh (1999) study. +Parsell et al. (1998) study.

Table III. Professional group sizes.

Professional Group	Control Group sample size (April 2004)	Intervention Group sample size (April 2004)
Dietetics	18	17
Nursing	59	40
Occupational Therapy	64	59
Physiotherapy	75	72
Podiatry	38	35
Prosthetics & Orthotics	21	16
Radiography	49	34
Social Work	24	11
Total	348*	284*

*Only complete data sets could be used for the SEM work, i.e., 308 and 247 respectively.

Ethical approval for the study was granted by each of the appropriate Schools within GCU and the National Centre for the Education & Training in Prosthetics and Orthotics at the University of Strathclyde.

Data collection in September 2003 resulted in 348 of 363 RIPLS instruments being returned giving a 96% response rate, but, of these, 40 were wasted due to major incompletion issues. Hence an overall response rate of 85% was achieved yielding a sample of 308 containing complete data.

Given the different reported sub-scales and weak reliability data (Parsell et al., 1998; Parsell & Bligh, 1999) and the possible instability of the RIPLS instrument, the researchers at GCU commenced by following the factor analysis procedures reported at the 8th Ottawa International Conference (Parsell et al., 1998). The results suggested that the undergraduate data from their study did not reflect the same structure or support the internal consistency values of the sub-scales reported previously. With this obvious inconsistency it was decided to approach the reliability and stability of the instrument from a different direction. Rather than having the data obtained drive the sub-scales, it was decided to use Content Analysis on the items to ascertain if clinical professionals could agree on which items belonged together and then develop a model using Confirmatory Factor Analysis (CFA) within Structural Equation Modelling (SEM) to test the model on the first set of data. SEM was applied and after fitting, several adjustments were made to the model in light of the diagnostics produced. The resulting GCU model was then compared to the two previously suggested sub-scale models for RIPLS using similar SEM procedures. The final model was then tested on the data collected from the second data collection point (April 2004) when the same students were reassessed ($n = 284$) with 247 being complete cases.

Statistical analysis

Factor Analysis with varimax rotation as reported by Parsell et al. (1998) was employed to compare initial data analysis with previously reported results. Confirmatory Factor Analysis as a technique within Structural Equation Modelling and Cronbach's Alpha (Cronbach, 1951) measures of internal consistency of the sub-scales were then employed during the development of the new model. The AMOS (v5) software within SPSS (v12) was used to fit the different models and to assess their adequacy.

Results

With the RIPLS items listed as in Table I, and items 10, 11 and 12 being reverse coded (this was not previously suggested in either of the previous papers), Table II details the three factor sub-scales from the initial Factor Analysis of this data and compares the location of each item with previous results.

As can be seen in Table II, Factor 1, which was initially labelled as Teamwork & Collaboration by Parsell and Bligh, consistently contains Items 1 – 9 for each analysis, but with larger data sets seems to also contain possibly Item 11 and Items 13 – 16. The other two factors seem even less stable with items sometimes being in one factor or another. The other two factors were originally labelled as Professional Identity and Roles & Responsibilities but with slight differences for the two Parsell and Bligh analyses.

The comparison of internal consistency values between the two Parsell and Bligh models and the initial factor analysis model from this study are detailed in Table IV.

Once again Factor 1 (sub-scale 1) appears acceptable but the problem of different analyses allocating different items to this sub-scale caused major concern.

The results from the Content Analysis, initiated in an attempt to solve this structural problem, clearly suggested that there should be four sub-scales that represent:

- Teamwork & collaboration;
- Negative Professional Identity;
- Positive Professional Identity;
- Roles & Responsibilities.

A four sub-scale model was thus fitted using SEM and the model structure can be seen in Figure 1.

Within the proposed model the 4 sub-scales are labelled as SS1, SS2, SS3 and SS4 and defined as:

SS1: Teamwork & collaboration (Items 1 – 9)
SS2: Negative Professional Identity (Items 10 – 12)
SS3: Positive Professional Identity (Items 14 – 16)
SS4: Roles & Responsibility (Items 17 – 19)

The adequacy of this new fitted four sub-scale model, when compared to the two previously suggested models based on the September cohort data, can be seen in Table V where the

Table IV. Cronbach Alpha measure of internal consistency of each sub-scale.

Study	Teamwork & Collaboration Sub-scale 1	*Professional Identity (1999) +[Negative Professional Identity](1998) Sub-scale 2	*Roles & Responsibilities(1999) +[Roles](1998) Sub-scale 3
*Parsell & Bligh (1999) ($n = 120$)	0.88	0.63	0.32
+Parsell et al. (1998) ($n = 914$)	0.85	0.46	–
GCU (Sept.03) ($n = 308$)	0.80	0.21	0.40

*Parsell & Bligh (1999) study. +Parsell et al. (1998) study.

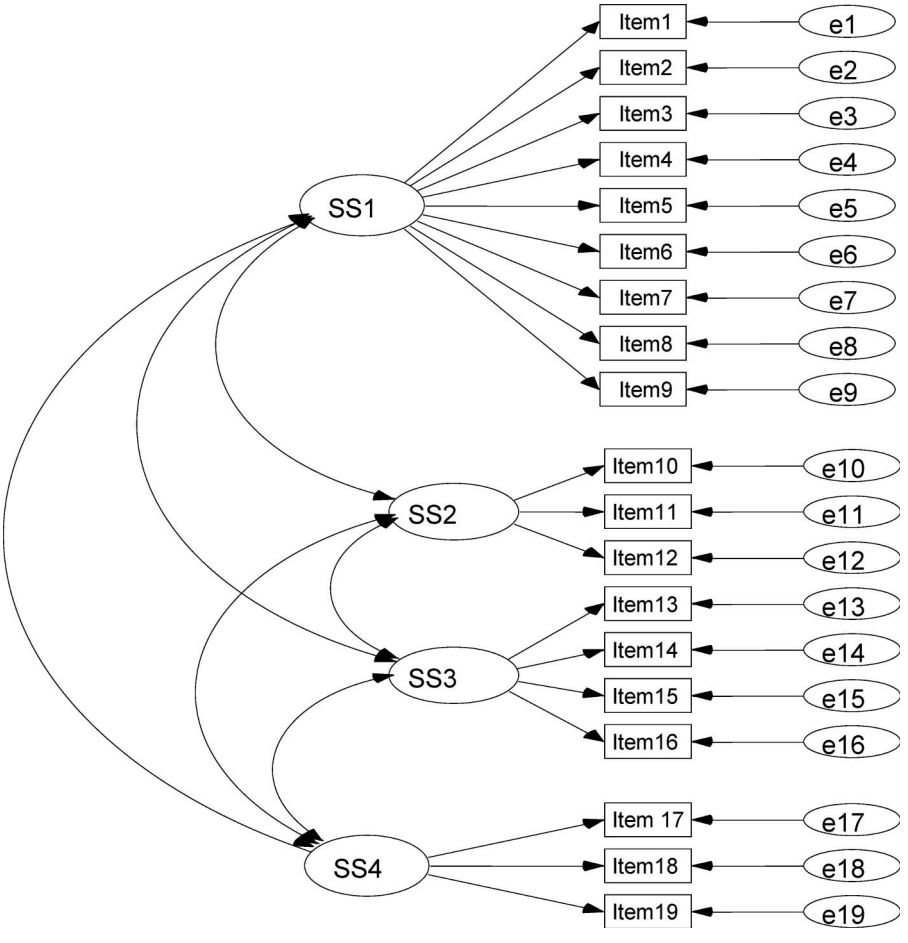

Figure 1. Proposed 4 sub-scale SEM model with sub-scales labelled SS1, SS2, SS3 and SS4 and instrument items labelled Items 1 – 19 and specific error terms e1–e19 in the structure diagram.

Table V. Key goodness-of-fit indicators for an SEM with column 2 [in bold] indicating the desired value ranges for each indicator.

Key indicator	Desired value	P&B Sept 2003	P et al. Sept 2003	GCU Sept 2003	*GCU April 2004*
Chi-square per d.f.	**<2**	2.154	2.264	**1.833**	***1.777***
Goodness of Fit Index (GFI)	**>0.9**	**0.902**	**0.908**	**0.916**	***0.904***
Parsimonious GFI	**>0.9**	0.707	0.700	0.704	*0.695*
Tucker-Lewis Index (TLI)	**>0.9**	0.853	0.858	0.890	***0.932***
Comparative Fit Index (CFI)	**>0.9**	0.872	0.877	**0.906**	***0.942***
Parsimonious CFI	**>0.9**	0.759	0.761	0.774	*0.804*
Root Mean Error of Approximation (RMSEA)	**<0.06**	0.061	0.064	**0.053**	***0.054***
PCLOSE	**Higher better**	2.3%	1.2%	**30%**	***25%***

P&B, Parsell & Bligh 1999 structure; P et al., Parsell et al structure 1998; GCU, new four sub-scale structure model.

goodness-of-fit is assessed using the key SEM indicators. The indicators exceeding their desired threshold are highlighted in bold and the last column contains the testing summary results based on the April 2004 data set. Table VI presents the internal consistencies obtained for the 4 sub-scales when the same analyses were performed.

From Table VI it would appear that at least 3 of the 4 sub-scales are acceptable in terms of internal consistency but the Roles & Responsibilities sub-scale as previously reported by Parsell et al. (1998) should still be treated with some scepticism. Further work is currently being undertaken on the test-retest reliability of this new proposed structure and as new data sets are collected over the next two years the model will be repeatedly tested with respect to the fit of the SEM structure.

Discussion

Parsell and Bligh previously published their doubts regarding the differing possible sub-scales of the RIPLS. With many research groups either using, or proposing to use, the original version, it is only right that when doubts exist regarding sufficient evidence of the psychometric properties of an instrument, researchers should be cautious when using the instrument and in any conclusions drawn from the resulting data obtained. It is possible that the lack of stability of the original models, when applied to the data sets obtained at GCU, is entirely due to the fact that the data was obtained from first year undergraduate students who, by definition, in general will not fully comprehend their positions within individual professional groupings. The April 2004 data appear to confirm or even improve the fit of the proposed model and thus the researchers are confident that the model proposed here is more stable than either of the previous published versions.

Whilst the Roles & Responsibilities sub-scale was considered acceptable for use with more advanced undergraduates (Parsell & Bligh, 1999), the weak internal consistency obtained from this research suggests that this sub-scale may not be appropriate for use with new undergraduates probably due to their lack of experience. The two previous developmental studies (Parsell et al., 1998; Parsell & Bligh, 1999) included medical and dentistry students and in the case of the 1998 main study 43% of the total sample of 914 were from fifth year medical or dentistry programmes. This major difference in the profile of the study samples may account for the lack of similarity to the sub-scales of the new GCU model.

Several researchers in the IPE area have attempted to record changes in attitudes (Baxter, 2004; Donohoe & Danielson, 2004). The first three sub-scales of our proposed model appear to be reliable and therefore could be used with some confidence. However, wider analysis is required using various groups at differing stages in training or practice to further support this view and perform a full factor analysis. This could confirm that the data being analysed, more accurately reflects the structures of the sub-scales and hence

Table VI. Cronbach Alpha values as a measure of internal consistency.

Sub-scale	GCU Sept 2003 data	GCU April 2004 data
SS1 (Teamwork & Collaboration	0.79	0.88
SS2 (Negative Professional Identity	0.60	0.76
SS3 (Positive Professional Identity)	0.76	0.81
SS4 (Roles & Responsibilities)	0.40	0.43
Total scale	0.84	0.89

attitudinal changes may be identified with more confidence. Selecting an ''off the shelf'' instrument can be a very convenient way of saving time during a research project as development of such instruments can take years, but without hard evidence that such an instrument is psychometrically acceptable, results will always be open to criticism. The reliability of such instruments in terms of the internal consistency of sub-scales and the test-retest reliability of individual items is crucial to the acceptability of any instrument. Without acceptable levels of both, researchers cannot with confidence trust results obtained. In the original pilot work on RIPLS, Parsell and Bligh (1999) reported internal consistency for their Professional Identity sub-scale as 0.63 and that of the Roles & Responsibilities sub-scale as 0.32. The former value (0.63), according to DeVellis (1991) is undesirable and the latter value (0.32) is unacceptable. In the major study (Parsell et al., 1998) their Negative Identity sub-scale had an internal consistency of 0.46, which once again would be viewed by many as unacceptable. With such information readily available, it is surprising that some researchers have opted to employ RIPLS without it being more rigorously tested.

Another aspect to be considered when selecting such instruments is the population on which they are to be used. In particular, in IPE, undergraduate students continually develop during their academic education and it is entirely feasible that some instruments, or indeed, sub-scales within them, may not always be stable or appropriate or fit the purpose. In the case of RIPLS, as was seen earlier in this paper, the roles and/or responsibilities of clinical professionals may not be entirely clear to the young, inexperienced clinical undergraduate but it is hoped that by monitoring such students longitudinally, confirmation of when such ideas formulate in their professional development will be seen and only then can sub-scales that purport to measure such constructs be used with confidence.

Currently work is being undertaken on the test-retest reliability of the items within RIPLS and early indications are that Items 11 and 12 within the Negative Professional Identity sub-scale are causing concern and, thus, that entire sub-scale may not be appropriate for use at an early career stage.

The RIPLS instrument appears to measure constructs very relevant to assessing change in, or effect of, IPE interventions, and indeed the labels associated with the sub-scales appear most appropriate but until evidence exists regarding for whom the scale is appropriate and on the reliability of the items and the sub-scales, any researcher using or planning to use RIPLS should take care. The authors would however encourage other researchers to further assess the appropriateness of RIPLS on clinical groupings at various stages in their clinical career.

References

Baxter, S. K. (2004). Perspectives and practice: Speech and language therapy students views of an interprofessional learning experience. *Learning in Health and Social Care*, *3*, 102–110.

Cronbach, L. J. (1951). Coefficient Alpha and the internal structure of a test. *Psychometrika*, *16*, 297–334.

DeVellis, R. F. (1991). *Scale development: Theory and applications.* Newbury Park, CA: Sage Publications.

Donohoe, M., & Danielson, S. (2004). A community-based approach to medical humanities. *Medical Education*, *38*, 204–217.

Hind, M., Norman, I., Cooper, S., Gill, E., Hilton, R., Judd, P., & Jones, S.C. (2003). Interprofessional perceptions of health care students. *Journal of Interprofessional Care*, *17*, 21–34.

Horsburgh, M., Lamdin, R., & Williamson, E. (2001). Multiprofessional learning: The attitudes of medical, nursing and pharmacy students to shared learning. *Medical Education*, *35*, 876–883.

Luecht, R. M., Madsen, M. K., Taugher, M. P., & Petterson, B. J. (1990). Assessing professional perceptions: Design and validation of an interdisciplinary education perception scale. *Journal of Allied Health*, Spring, 181–191.

Parsell, G., & Bligh, J. (1999). The development of a questionnaire to assess the readiness for health care students for interprofessional learning (RIPLS). *Medical Education*, *33*, 95–100.

Parsell, G., Stewart, A., & Bligh, J. (1998) Testing the validity of the Readiness for Inter-Professional Learning Scale (RIPLS). Paper presented at the 8th Ottawa International Conference, Philadelphia, PA, USA, 12–15 July 1998.