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ORIGINAL ARTICLE

Interprofessional practices and readiness for interprofessional learning among health students and graduates in Rio Grande do Sul, Brazil: a cross-sectional study

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ABSTRACT

This paper reports on a cross-sectional study performed with 370 students and graduates from 15 undergraduate health courses in a public university in Rio Grande do Sul, Brazil. The objective was to identify interprofessional education (IPE) curricular experiences and to evaluate the readiness for IPE among students and graduates who have attended a practical experience of IPE (Integrative Module) compared with undergraduate students who did not. The dimensionality and reliability of the Portuguese-validated expanded version of the Readiness for Interprofessional Learning Scale (RIPLS) with 40-items were also evaluated. This version of RIPLS was validated with 32 items. Cronbach's alpha values of the three factors of the scale were: Factor 1 α = 0.89, Factor 2 α = 0.47 and Factor 3 α = 0.83. IPE initiatives were identified in the undergraduate curricula mainly in the practical experience (Integrative Module) (47.5%), curricular placements (29.8%) and extracurricular activities (29.5%). Students and graduates who participated in the Integrative Module demonstrated greater readiness for IPE than students who did not attend. This study suggested that shared experiences among different undergraduate courses are associated with positive attitudes and greater availability of students and graduates for interprofessional learning and work. Future studies including the psychometric analysis of the Portuguese-validated expanded RIPLS are recommended.

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Interprofessional education; interprofessional relations; curricula; health professions education; Brazil

Introduction

Collaborative professional cultures have been associated with improvements in the quality of health care (Reeves et al., 2016; Hepp et al., 2015). Collaborative health professionals are those who learned how to work interactively as a team and had the opportunity to learn with, from and about the various health professions, enabling them to have a positive impact both on their professional practice and on the quality of healthcare (Reeves et al., 2016, Williams et al., 2013, World Health Organization, 2010). Educational activities encompassing different health professions have the potential to foster collaborative behaviors (Sottas et al., 2016; Knecht-Sabres et al., 2016; Coster et al., 2008). Interprofessional education (IPE) has been recognized as an innovative strategy that plays an important role in order to develop collaborative competencies in undergraduates and graduates allowing to expand the array of actions that can be performed by different professionals groups, therefore contributing to mitigate the shortage of the global health workforce (Frenk et al., 2010). At the same time this collaborative patient-centered health system helps to decrease duplication, omission and errors increasing patient safety (World Health Organization, 2016).

There is growing interest in understanding the role of interprofessional learning in the training of students and health professionals for teamwork (Barr, 2002; Freeth et al., 2005; Oishi et al., 2017; Tamayo et al., 2017). Despite this interest, the evidence base on the effects of interprofessional education and collaboration is still developing and there is a need for further research, including longitudinal studies designed to determine long-term impacts of IPE initiatives (Reeves et al., 2016; Reeves et al., 2017).

The Pan American Health Organization and the World Health Organization (PAHO/WHO) have encouraged their Member States to gain ownership on the IPE approach and support policy-makers to expand its use (Silva et al., 2018). In 2016, a meeting held in Bogota, Colombia decided to constitute a Regional Network for Interprofessional Education of the Americas (REIP) geared toward the promotion of IPE and collaborative health care practice in the Region of the Americas (Regional Network for Interprofessional Education in the Americas, 2017). This initiative was fueled by an understanding that the interdependence between the health care system and the health professional training systems must be acknowledged (Frenk et al., 2010) as a condition needed to strengthen health systems and improve the capacity of human resources to respond to local health needs in a dynamic environment (Pan American Health Organization, 2017; Silva et al., 2018).

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This research is linked to the larger project that aims to contribute to the improvement of RIPLS validation. The project has the participation of four Brazilian universities: Universidade Federal d Rio Grande do Sul, Universidade de São Paulo, Universidade Federal of São Carlos and Federal University of the Recôncavo of Bahia. We acknowledge the authors of the expanded English version of 29-item of the RIPLS (Mattick & Bligh, 2009) who agreed to the extension of the Portuguese RIPLS-40.

Background

In Brazil, the national health system (SUS) is a public system, free at the point of care, financed by federal, state and municipal taxes; even though 26% of the population have supplementary private health schemes that are tax deductible. The system is composed of public and private institutions, but the important innovation introduced since the beginning of the 1990 s was the community health agents and the Health of the Family Strategy (HFS), which is the current model of Primary Health Care (PHC). The HFS served to shape health care in Brazil based on teamwork, placing approximately 40,000 health teams and reaching 62% of population coverage (Macinko et al., 2015; Paim, 2018).

The SUS is a health system with the conditions to be interprofessional due to its team-based approach, and although having a largely biomedical model of health care it has gradually progressed on the path of interprofessionality, especially in PHC. However, the training of health professionals is still dominated by single-professional education (Costa et al., 2018; Peduzzi et al., 2013). This conventional training in professional silos is gradually been challenged by positive curricular transformations guided by the integration among universities, health services and community (Adler & Gallian, 2014; Bravo et al., 2018; Codato et al., 2017; Toassi et al., 2013). These changes were driven by public policies that reoriented health professional training in the country (Câmara et al., 2016) as well as through the action of the Brazilian Network for Interprofessional Work and Education (ReBETIS), bringing to the table the need for interprofessionalism in education and health practices (Freire Filho et al., 2017, 2019).

The curricula of undergraduate courses in Brazil are structured in such a way as to provide students with various opportunities for curricular and extracurricular activities such as: teaching activities (mandatory or optional), research, and university outreach to the community (optional). While outreach activities provide students with contact with the community, extracurricular activities are geared toward complementing the students' education. The extracurricular activities may include: non-compulsory practicum, study groups, research groups, government programs to promote processes of change in the education of health professionals developed in practice settings of public health services, such as the Program for Training Through Work in Health (PET-Saúde). Educational activities focused on the specific knowledge and practices of each professional category has stimulated the development of a professional identity linked to a single area of activity, reinforcing stereotyped conceptions about other professions as well as contributing to the ignorance of the responsibilities and roles of professionals in other areas (McNair, 2005; Peduzzi et al., 2013). It also generates "territorial" behaviors that are an important barrier to people centered collaborative interprofessional practice (Khalili et al., 2013).

Research setting

The Federal University of Rio Grande do Sul offers seats in 14 undergraduate courses in the health area and an undergraduate course in Public Policy that encompasses health topics. Although these courses have added complementary (extracurricular) activities to community-based curriculum and mandatory placements in public health services, they are characterized by curricula structured predominantly in uni-professional teaching activities.

Since 2012, the University offers a practical experience of IPE within the Primary Health Care services aiming to respond to the challenge of integrating teaching between the different health professions. This elective teaching activity is called the Integrative Module. It is an experience of teaching based on the work of interprofessional health teams that allows students, teachers, health professionals and neighborhood dwellers to have a focus on interprofessionality. For all courses, the activity takes place once a week over four months (total of 60 hours). Each edition offers four places per course. Each course establishes the prerequisites for the students to enroll in the course. The teaching is by tutoring – two tutors per eight students from mixed professions -, seeking to maintain the diversity of professions. It also includes moments of concentration bringing together the whole group to share experiences and knowledge. Relational and collaborative skills, essential for teamwork, are encouraged throughout the Integrative Module (Ely & Toassi, 2018; Toassi & Lewgoy, 2016).

The Integrative Module includes the following activities: observing and tracking team work; getting acquainted with the territory where the PHC service is located (jointly with the Community Health Worker – ACS); home visits with the ACS, nursing assistant, nurse and physician; participation in educational groups, community meetings and team meetings. It also contemplates theoretical classroom activities bringing together the entire group of students and tutors to share their experiences and knowledge.

The research reported in this paper studied 15 undergraduate courses in a longstanding public university in Southern Brazil to evaluate readiness for interprofessional learning, by comparing students and graduates exposed to the Integrative Module. A secondary aim was to examine the validity and reliability of the Portuguese-validated and expanded version of the Readiness for Interprofessional Learning Scale (RIPLS) in Brazil.

Methods

This is a cross-sectional study carried out with a sample of students and graduates from 15 undergraduate courses: 14 courses in the health area and a course in Public Policies. Those courses are: Biomedicine, Biological Sciences, Physical Education, Speech Therapy, Public Health and Public Policy (all 4 years duration); Nutrition and Social Work (4.5 years duration); Nursing, Physiotherapy, Dentistry and Psychology (5 years duration); Pharmacy and Veterinary Medicine (5.5 years duration); and Medicine (6 years duration).

Sample and recruitment

Two inclusion criteria were used in the study: 1) undergraduate and graduate students who participated in the practical experience of IPE (Integrative Module) between 2012 and August 2017 (n = 448); 2) undergraduate students in their last year of these courses in 2017 who had not participated in this experience (n = 517).

The students were invited to participate in the study by individual electronic messages sent by the principal researcher.

The message included an web link to an information sheet and informed consent form, and to the questionnaire hosted on a web interface with automatic storage of data.

Instrument

The data were collected through the online application of the Portuguese validated, expanded[1] version of the Readiness for Interprofessional Learning Scale (RIPLS) (Peduzzi et al., 2015), adding sociodemographic and training information of the participants as well as IPE experiences during graduation.

RIPLS is a self-report psychometric scale that allows the evaluation of students' readiness for interprofessional learning (Parsell & Bligh, 1999). The original version was composed of 19-items (Teamwork and collaboration, Professional identity, Roles and responsibilities) (Parsell & Bligh, 1999). This scale was later to encompass 29-items within four factors (Teamwork and collaboration, Professional identity, Roles and responsibilities, and a new factor related to Patient-centeredness) (Mattick & Bligh, 2009). The Brazilian version of the RIPLS was validated using the expanded version of 29-items (Mattick & Bligh, 2009) and resulted in a scale of 27 items distributed in three factors: Factor 1 – Teamwork (items 1–9 and 12–16), Factor 2 – Professional identity (item 10– 11,17,19, 21–24) and Factor 3 – Patient-centered health care (item 25–29) (Peduzzi et al., 2015).

In the current research, additional items were included: 2 items previously excluded in the Brazilian validation; and, 11 items based on the literature, as well as health policies and practices in SUS. The new expanded scale seeks to strengthen Factor 2 that was less stable in the validation, presenting a Cronbach's Alpha of 0.66, as well as to homogenize the number of items per factor. The scale of responses is represented by a Likert-type semantic numbers/labels (1 = Strongly Disagree, 2 = Disagree, 3 = Do not agree or disagree, 4 = Agree, 5 = Strongly agree). Higher response scores meant that there was a greater agreement with the analyzed item and stronger attitudes and readiness for interprofessional education.

Data analysis

Data analysis consisted of three steps. Evidence of validity based on RIPLS's internal structure (American Educational Research Association, American Psychological Association & National Council on Measurement in Education, 2014; Rios & Wells, 2014) was verified, and the fit of a structural model, tested by a Confirmatory Factor Analysis (CFA) using the Mplus 7 software (Muthén & Muthén, 1998-2012). The model specified encompassed an oblique three-factor model (Peduzzi et al., 2015), in which the RIPLS items represented endogenous categorical level variables, with the polychoric correlation matrix as the appropriate information source for the analysis of items that surpassed this level of measurement. The adopted estimation method was the Mean and Variance Adjusted Weighted Least Squares (WLSMV). The criteria for judging the fit of the structural model (Kline, 2011; Rios & Wells, 2014) were: Comparative Fit Index – CFI (≥ 0.90), Tucker Lewis Index – TLI (≥0.90) and Root Mean Square Error of Approximation – RMSEA (≤0.06, having a critical limit of 0.08). The nomenclature used to address the validity of the measurement instrument used in the present study is in line with the definitions of evidence of validity described in the Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association & National Council on Measurement in Education, 2014).

In a second stage, we performed descriptive analysis (frequencies and percentages) of the sociodemographic characteristics of the sample (e.g. gender, level of schooling, undergraduate course, first or second half of the undergraduate course, adequacy of academic situation). Measures of internal consistency and building factor scores representing the sample scores in the dimensions evaluated by the RIPLS were performed using the IBM SPSS v23.0. Finally, significant differences were verified between groups at the alpha ≤0.05 level, using as dependent variables the factorial scores of the RIPLS; and as independent variables those descriptive of the sample. Student t test and ANOVA were used to perform these comparisons.

Ethical considerations

The Research Ethics Committee of the University approved this research by Opinion 1.856.686.

Results

The sample of the study consisted of 370 students and graduates of the 15 courses (Table 1). Of these, 187 had participated in the practical experience of IPE called Integrative Module, and 183 were final year students who had not experienced the practical experience of IPE (38.4% response rate among the target population).

Dimensional analysis of expanded RIPLS – Confirmatory factor analysis

In order to evaluate dimensionality and verify the evidence of validity based on internal structure, the analysis used a factorial/CFA model specified to test the adequacy/fit of the three-dimensional model of RIPLS of the Portuguese version: Factor 1 – Teamwork and collaboration; Factor 2 – Professional identity and Factor 3 – Patient-centered health care (Peduzzi et al., 2015). The RIPLS expanded version of the 29-item (Mattick & Bligh, 2009) was used in the Brazilian validation of the scale and also in other two validations: by Reid et al. (2006) and by El-Zubeir et al. (2006). The three processes of validation resulted in the three-factor model.

The model predicts the grouping of items into three factors: Factor 1 – Teamwork and collaboration; Factor 2 – Professional identity and Factor 3 – Patient-centered health care. Acceptable adjustment indices were obtained for the factorial model (CFI = 0.90, TLI = 0,90 and RMSEA = 0.06 [90% CI:0.06 to 0.07]), suggesting the adequacy of the three-dimensional structure tested for the extended version of the scale (RIPLS-A32). The internal consistency indexes obtained for the three factors were as follows: Factor 1 – α = 0.89, Factor 2 – α = 0.47 and Factor 3 – α = 0.83 (Table 2).

The structural relationship between the factors was measured using the standardized correlation coefficient (Φ), with the following indexes: Factor 1 and Factor 2 (Φ = −0.90); Factor 1 and Factor 3 (Φ = 0.74) and Factor 2 and Factor 3 (Φ = −0.71). The

Table 1. Characteristics of research participants.

Variables	n	%
Sex		
Female	293	79.2
Male	77	20.8
Age group		
Up to 25 years	216	58.4
26 to 35 years	121	32.7
36 years or older	33	8.9
Level of schooling		
Undergraduate student	292	78.9
Graduate professional	78	21.1
Undergraduate course		
Biomedicine	10	2.7
Biological Sciences	20	5.4
Physical Education	26	7.0
Nursing	23	6.2
Pharmacology	36	9.7
Physiotherapy	13	3.5
Speech-Language Pathology and Audiology	14	3.8
Medicine	11	3.0
Veterinary Medicine	15	4.1
Nutrition	30	8.1
Dentistry	88	23.8
Public Policies	18	4.9
Psychology	20	5.4
Collective Health	31	8.4
Social Work	15	4.1
First or second half of the course		
First half of the course (more basic)	110	29.7
Second half of the course (more advanced)	181	48.9
Graduate professional	78	21.1
Has withdrawn from the course	1	0.3
Adequacy of academic situation		
Is at the recommended stage of the course	175	47.3
Is not at the recommended stage of the course	117	31.6
Has already completed the undergraduate course (graduate)	78	21.1
Participated in another educational course		
Yes, in undergraduate level	61	16.5
Yes, in refresher level	12	3.3
Yes, in postgraduate level (Master's and Doctoral)	11	3.0
Yes, in postgraduate level (specialization, residency)	25	6.7
Yes, in technical-professionalizing level	73	19.7
No	188	50.8
Has completed another undergraduate course		
Yes	29	7.8
No	341	92.2
Total	**370**	**100.0**

coefficients revealed relations of strong magnitude between the factors, expressing directly proportional relations (F1 and F3) and inversely proportional (F1 and F2, F2 and F3).

Factor scores were calculated using the simple arithmetic average of the answers given to the items grouped in each factor. Considering the Likert scale of responses, scores can range from 1 to 5 points. It is important to note that Factor 2 had most of its items reversed for the composition of the scores with the intention of making the interpretation to follow the positive direction (see Table 2). Thus, when analyzing the correlation between the factor scores, the coefficients were all positive and directly proportional: Factor 1 and Factor 2 (r = 0.57, $p < .01$); Factor 1 and Factor 3 (r = 0.59, $p < .01$) and Factor 2 and Factor 3 (r = 0.41, $p < .01$).

Interprofessional experiences among undergraduate students

Results show that students and graduates perceived interprofessional learning with colleagues from other courses in: practical experience of IPE (Integrative Module) (47.5%), in the curricular placements in health services (29.8%) and in extracurricular activities (29.5%). Of these activities, only the curricular placement in health services is a mandatory activity (Table 3).

The placement period was in public health services of primary, medium and high complexity; and, it was supervised by a preceptor from the same professional area of the students, while opening the opportunity to work with different professionals within the teams. It is important to note that the 84 students who reported not having participated in the internship were not yet undergoing the cycle of training in which this activity was offered.

Readiness of students and graduates

Regarding the readiness for interprofessional learning among participants (Table 4), the results of the RIPLS showed a significant difference in Factor 2 – Professional Identity for the condition "Graduated professional" that presented significantly higher scores in comparison with the group of undergraduate students.

Participating in the practical experience of IPE (Integrated Module) was also associated with higher readiness for interprofessional learning. Participants in this group had significant differences in the scores of the three factors of RIPLS, and significantly higher average in comparison with the group that did not participate in the Integrated Module.

Regarding outreach activities, significant differences were observed in the scores of Factor 2 – Professional Identity (F [3,366] = 5,402, $p \leq 0.001$) and Factor 3 – Patient-centered health care (F [3,366] = 3,793; $p \leq 0.011$). In these factors, the groups that participated "together with students/professionals from other health courses" (F2 M = 4.35, F3 M = 4.42) or participated "in a shared way, interacting actively with students from other courses" (F2 M = 4.41, F3 M = 4.50) obtained significantly higher scores in comparison with groups that participated only with students from the same course or did not participate at all.

There were significant differences in the scores of Factor 3 of RIPLS – Patient-centered health care (F [3,366] = 2,723, $p = .044$) in the curricular placements. Students and graduates who participated "in a shared way, actively interacting with students from other courses" (M = 4.48) presented significantly higher scores when compared to groups where there was no interaction or that had not yet completed the practicum.

In the various extracurricular activities, the answers indicated that Factor 2 – Professional Identity, students and graduates who participated "in a shared way, actively interacting with students from other courses" (M = 4.44) presented significantly higher scores when compared with groups in which there was no interaction or that did not yet complete the curricular stages (F [3,366] = 5,018; $p = .002$).

No significant differences were identified among the 15 undergraduate courses studied for any of the RIPLS factors. However, when analyzing the courses that train the professions that are part of the Health of the Family Strategy (HFS) – Dentistry, Medicine and Nursing – compared with the other courses, a significant difference was identified for Factor 3 – Patient-centered health care ($t = 2{,}371$; $df = 368$; $p = .018$). Students and graduates of the courses that are part of the HFS

Table 2. CFA Results RIPLS-A32.

Confirmatory factor analysis		3-factor model			
Items and their contents		F1	F2	F3	rr^{it}
1	Learning with other students will help me become a more effective member of a health care team.	0.71	-	-	00.54
2	Patients would ultimately benefit if health care students worked together to solve patient problems.	0.64	-	-	00.39
3	Shared learning with other health care students will increase my ability to understand clinical problems.	0.70	-	-	00.55
4	Learning with health care students before qualification would improve relationships after qualification.	0.69	-	-	00.57
5	Communication skills should be learned with other health care students.	0.74	-	-	00.63
6	Shared learning will help me to think positively about other professionals.	0.68	-	-	00.59
7	For small group learning to work, students need to trust and respect each other.	0.60	-	-	00.46
8	Team-working skills are essential for all health care students to learn.	0.74	-	-	00.56
9	Shared learning will help me to understand my own limitations.	0.69	-	-	00.60
12*	Clinical problem-solving skills can only be learned with students from my own department.	−0.64	-	-	00.41
13	Shared learning with other health care students will help me to communicate better with patients and other professionals.	0.78	-	-	00.61
14	I would welcome the opportunity to work on small-group projects with other health care students.	0.73	-	-	00.54
15	Shared learning will help to clarify the nature of patient problems.	0.82	-	-	00.65
16	Shared learning before qualification will help me become a better team worker.	0.74	-	-	00.57
40	It is important that health care professionals establish common objectives for teamwork.	0.79	-	-	00.53
10*	I don't want to waste my time learning with other health care students.	-	0.61	-	00.38
11*	It is not necessary for undergraduate health care students to learn together.	-	0.62	-	00.29
21*	I'd feel uncomfortable if another health care student knew more about a topic than me.	-	0.39	-	00.20
38	To develop my professional activities, it is important to know the functions of other health care professionals.	-	−0.66	-	00.22
25	I like to understand the problem in the patient's perspective (patient's situation).	-	-	0.65	00.47
26	Establishing a trust relationship with my patients is important to me (patient's situation).	-	-	0.74	00.57
27	I try to transmit compassion to my patients (patient's situation).	-	-	0.57	00.42
28	Thinking of the patient as a person is important to indicate the correct treatment (patient's situation).	-	-	0.73	00.59
29	In my profession, skills of interaction and cooperation with patients are necessary (patient's situation).	-	-	0.65	00.47
31	The patient is co-responsible for their care.	-	-	0.39	00.33
32	The quality of care provided for the patient depends on knowledge and skills of different health care professions.	-	-	0.68	00.41
33	The patient's opinion can change my clinical conduct.	-	-	0.50	00.46
34	Articulation among health care professionals is fundamental to the quality of care provided for the patient.	-	-	0.85	00.60
35	Understanding the patient's life context contributes to the quality of care.	-	-	0.75	00.50
36	The patient's family should participate in care.	-	-	0.60	00.37
37	The professional's bond with the patient and their family influences the quality of care.	-	-	0.69	00.54
39	The patient must participate in the decisions about their therapeutic plan.	-	-	0.66	00.52
Number of items		15	04	13	–
Cronbach's alpha		0.89	0.47	0.83	–
Adjustment indicators: CFI = 0.90; RMSEA = 0.06 (90%CI 0.06 to 0.07)					

Key: RIPLS Factors = F1. Teamwork and Collaboration; F2. Professional Identity; F3. Patient-Centered Care. r^{it} = item-total correlation coefficient.

Notes: Items 18 and 20 of the scale's original version were not maintained because they did not present saturation ≥ 0.30, like in the study by Peduzzi et al.[18]; other items – 17, 19, 22, 23, 24 and 30 – specified to represent Factor 2 in the extended version presented here did not obtain saturation ≥0.30 and were excluded from the model; among the new items incorporated into the scale in the present study, the following were maintained: 31–40.

* To the calculation of internal consistency and to the generation of factor scores, items 10, 11, 12 and 21 were reversed to make the factor's interpretation occur in the positive direction (the higher the score, the greater the readiness for interprofessional learning).

(M = 4.47) presented significantly higher scores in this factor when compared with students from other courses (M = 4.36).

Discussion

The results of this study suggest that shared experiences among different professions in the undergraduate stage are associated with positive attitudes and greater readiness toward learning to work in an interprofessional fashion.

We chose to use the validated Portuguese version of RIPLS and the expanded scale for the purpose of the present study, as a path for scale improvement. Although RIPLS is a widely used and validated instrument in different languages, structures and cultural contexts (Lauffs et al., 2008; Oishi et al., 2017; Parsell & Bligh, 1999), the literature has discussed its weaknesses (Mahler et al., 2015; Schmitz & Brandt, 2015). These are related to the diversity of factorial solutions presented (sometimes three, sometimes four factors), the low internal consistency of some factors, especially the subscale of "professional identity" and the inability to compare the results of different studies (Mahler et al., 2015; Schmitz & Brandt, 2015). These problems, however, are observed both in RIPLS and in other instruments that evaluate IPE, being associated with the complexity of IPE, as well as the lack of a robust theoretical framework and consensus about the construct (Schmitz & Brandt, 2015). The literature recommends the refinement of RIPLS based on a consistent theoretical framework and the performance of more robust and rigorous psychometric analyzes interpreted in the light of a solid theoretical framework (Mahler et al., 2015; Schmitz & Brandt, 2015).

In the present study, the expanded version of the RIPLS was submitted to a confirmatory factor analysis, obtaining satisfactory structural adjustment indexes. This result represents, in terms of evidence of validity, that the theoretical three-dimensional structure for the analysis of the readiness to IPE underlying the instrument (F1 – Teamwork and collaboration, F2 – Professional identity and F3 – Patient-centered health care) is satisfactorily matched to the empirical data.

Regarding the results of the internal consistency analysis of the factors, satisfactory indexes were obtained for Factor 1 – Teamwork and collaboration (α = 0.89) and for Factor 3 – Patient-

Table 3. Activities experienced in the undergraduate course.

Experienced activities in the undergraduate course	Did not participate		Participated only with students from the same course		Participated together with students from other health courses		Participated in a shared way, interacting actively with students from other courses (Interprofessional education)	
	n	%	n	%	n	%	n	%
Curricular placements in health services (teaching)	84	22.7	120	32.4	56	15.1	110	29.8
Technical visit (teaching)	141	38.1	117	31.6	48	13.0	64	17.3
Practical experience of IPE (Integrative Module) (teaching)	174	48.3	–	–	15	4.2	171	47.5
Outreach activities	81	21.9	128	34.6	82	22.2	79	21.3
Research	74	20.0	161	43.5	61	16.5	74	20.0
Extracurricular internship	201	54.3	77	20.8	45	12.2	47	12.7
Diverse extracurricular activities	60	16.2	102	27.6	99	26.7	109	29.5

Table 4. Mean scores and discrimination test of RIPLS factors as a function of sample characteristics.

RIPLS Factors	Variables/categories that define groups	Descriptive statistics			Statistical test	
		n	*M*	*SD*	*t*	*p*
F1	Female	293	4.55	0.40	0.433	0.665
	Male	77	4.53	0.37		
F2	Female	294	4.27	0.53	−0.135	0.893
	Male	76	4.28	0.49		
F3	Female	294	4.40	0.39	0.395	0.693
	Male	76	4.38	0.38		
Level of schooling						
F1	Undergraduate student	292	4.53	0.39	−1.469	0.143
	Graduate professional	78	4.61	0.38		
F2	Undergraduate student	292	4.24	0.52	−2.831	0.005*
	Graduate professional	78	4.42	0.49		
F3	Undergraduate student	292	4.38	0.39	−1.625	0.105
	Graduate professional	78	4.46	0.39		
First or second half of the course						
F1	First half of the course (more basic)	110	4.57	0.37	1.238	0.217
	Second half of the course (more advanced)	181	4.51	0.40		
F2	First half of the course (more basic)	110	4.29	0.52	1.443	0.150
	Second half of the course (more advanced)	181	4.20	0.53		
F3	First half of the course (more basic)	110	4.34	0.41	−1.241	0.215
	Second half of the course (more advanced)	181	4.40	0.37		
Attended the practical experience of IPE (Integrative Module) in health services?						
F1	No	183	4.48	0.41	−3.157	0.002*
	Yes	187	4.61	0.36		
F2	No	183	4.16	0.53	−4.265	0.001*
	Yes	187	4.39	0.49		
F3	No	183	4.35	0.38	−2.230	0.026*
	Yes	187	4.44	0.39		

Note: Significant mean differences are marked with an asterisk (*).
Key: *RIPLS Factors*: Factor 1 – Teamwork and collaboration; Factor 2 – Professional identity; Factor 3 – Patient-centered care.

centered health care (α = 0.83). In Factor 2 – Professional identity, Cronbach's alpha index indicated low internal consistency (α = 0.43). It should be noted that items 17–19, 20, 22–24 that refer to Factor 2, were excluded from the structural model because they failed to obtain saturation equal to or greater than 0.30. Similar results were found in the version of RIPLS validated in Brazil (Peduzzi et al., 2015), in which Factor 2 had already been considered the least stable among the three factors identified (α = 0.66), with a lower value than that found in Factor 1 – Teamwork and collaboration; as well as in Factor 3 – Patient-centered health care (α = 0.90 and 0.75, respectively). Studies of cultural adaptation and validation of RIPLS performed in the Swedish (Lauffs et al., 2008) and Japanese (Tamura et al., 2012) population using CFA, confirm reliable values of internal consistency for Factor 1 (α = 0.89 and 0.92, respectively) and weak reliability for Factor 2 (α = 0.48 and 0.60, respectively).

Another result that deserves attention was found in the structural analysis of the scale, regarding the correlations between the factors. Similar to what was verified in the validation study of RIPLS in Brazil (Peduzzi et al., 2015), there was a positive correlation between Factor 1 – Teamwork and collaboration and Factor 3 – Patient-centered health care, while it was negative for Factor 2 – Professional identity with F1 and F3. This finding reinforces the argument that Factor 2 requires further research for the development of its items, since it seems to express competitive professional attitudes that oppose teamwork and attitudes related to patient-centered health care. Overall, the psychometric indicators assessed for RIPLS in the present study were generally satisfactory and corroborate the results of previous studies in which the best indexes were obtained for the factors that evaluate "teamwork and collaboration" and "patient-centered health care", with less consistent

results for the "professional identity" dimension. In the psychometric analysis performed, of the 11 new items that were added to the scale, only item 30 (predicted for Factor 2) was excluded; the other items were consistent, therefore having the potential to improve the RIPLS, although further studies including the psychometric analysis of the scale with the 40 items are recommended.

The training of health professionals in Brazil underwent curricular changes promoted by the National Curricular Guidelines for undergraduate courses and by nudging programs of training (Braid et al., 2012; Costa et al., 2018). In this context, it is important to note that the students' participation in the National Program for the Reorientation of Training in Health (PET-Saúde) is an example of the curricular placement in SUS settings (Codato et al., 2017). Despite the contribution of these initiatives to coordinate teaching of the courses inserted in the SUS network, there are still weak spots such as the integration between the different courses and actors involved, as well as training for teamwork (Costa et al., 2015).

The current study showed a low (38.5%) percentage of participants who completed the mandatory curricular placement and recognized it as an experience that enabled interprofessional learning with interaction between the different professions. The results show how undergraduate curricula are still structured in a single-professional way, reinforcing the separation of areas of knowledge and practices, and the constitution of "professional tribes" (Frenk et al., 2010).

The practical experience of IPE (Integrative Module) in health services was the activity that presented the highest percentage of responses as an educational activity promoting interprofessional practices in graduate courses. In addition, students and graduates who participated in this initiative presented higher scores of readiness for IPE (in all three RIPLS factors), compared to the group that did not participate. These results reinforce the importance of the presence of practical IPE experiences in curricula (Ely & Toassi, 2018; Toassi & Lewgoy, 2016), contributing to the education of professionals with attitudes that are favorable to collaborative working, with potential for improving the quality of health care (Regional Network for Interprofessional Education in the Americas, 2019).

The fact that there were no differences between courses, regarding readiness for IPE, may be related to the small sample sizes within many of the professional groups and the characteristics of the sample. The participants are mostly students who are at different stages of training in 15 different undergraduate courses with different curricular experiences.

Limitations

There are limitations to the results found in this research. The response rate, especially for the group of students who did not participate in the Integrative Module, limits the generalizability of the findings. In addition, the profile of students who choose the Integrative Module should be considered. Being an elective subject of the curriculum, those students who chose to study it may have a special interest and affinity with the topics addressed, which may also have contributed to the greater readiness for IPE in this group. It is also a limitation that the Portuguese version of RIPLS has been validated with undergraduate students and not in graduate or trained professionals. Multiple testing may also be an issue given same factor scores have been tested over four different scenarios.

Conclusion

The results of this research from Brazil add to the existing body of evidence from across the world (Reeves et al., 2016, Darlow et al., 2015; Ely & Toassi, 2018) that suggests learning activities shared with students from other health courses in an interacting way are perceived by students as interprofessional opportunities to develop positive attitudes and greater readiness to interprofessional work. Our findings reinforce the importance of including IPE experiences that stimulate "learning from, with and about each other" interactively with interprofessional teams in undergraduate curricula and especially in health services integrated with the SUS. Finally, although we found the extended Portuguese RIPLS to be a valid tool for assessing students' attitudes toward IPE, it requires further improvement, especially regarding the "Professional Identity" subscale, which has been unstable in several studies.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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