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Attitudes to Interprofessional Education Among Health Science Students Engaging in a Multidisciplinary Workshop Series

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INTRODUCTION

Collaborative healthcare reduces the risk of gaps and redundancies in the delivery of patient-centred care, increases treatment options and improves patient quality of life (Barr, 2007; Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013). Therefore, ensuring that health professionals are equipped with effective teamwork behaviours and skills, and are competent to work in a collaborative healthcare environment upon qualification is a priority (WHO, 2010). Interprofessional education (IPE) plays an important role in the preparation of students for collaborative practice (Barr, Gray, Helme, Low, & Reeves, 2016). By providing meaningful opportunities for students from single-professions to interact and engage with other disciplines, IPE enables students to reflect on their own roles in the multidisciplinary team (MDT), learn about the roles of others and develop effective teamwork and communication skills that are transferrable to clinical practice (Interprofessional Education Collaborative, 2016).

Student preconceptions of other professions, including stereotypes, and furthermore their readiness for and attitudes towards interprofessional teamwork may impact ability to engage with IPE (McFadyen, Webster, Maclaren, & O'Neill M, 2010; Morison, Marley, Stevenson, & Milner, 2008). Professional identity starts to develop early in undergraduate health science students (Ateah et al., 2011). While this is important, negative attitudes towards other professions, stereotypes and misconceptions, can negatively influence readiness for collaborative-practice (Rudland & Mires, 2005). Instruments such as the Readiness for Interprofessional Learning Scale (RIPLS) and the Interprofessional Education Perception Scale (IEPS) were developed based on the theoretical framework of the Theory of Planned Behaviour on the premise that unless students have a positive attitude towards IPE they are unlikely to engage optimally in IPE activities (McFadyen et al., 2005). The Kirkpatrick's Model of Educational Outcomes for Interprofessional Education, an adaptation of the original model, describes six levels of educational outcomes ranging from reaction to benefits to patients/clients (Freeth, Hammick, Koppel, Reeves, & Barr, 2002). While the outcomes are not hierarchical, there is an understanding that student learning will be improved if their reactions are positive (Level 1) and if their attitudes and perceptions to IPE are positive (Level 2a). Student attitudes may be influenced by multiple modifiable and non-modifiable factors such as gender, profession or previous experience, and may change through participation in IPE initiatives (Maharajan et al., 2017; McFadyen et al., 2010; Wilhelmsson, Ponzer, Dahlgren, Timpka, & Faresjo, 2011). Identifying predictors of student attitude may help identify strategies to optimally prepare students for complex, multidisciplinary IPE initiatives. Furthermore, identifying the influence of structured IPE on student attitudes to IPE may inform the design and delivery of complex learning initiatives.

The aim of this project was to evaluate the reaction and attitudinal changes of students to IPE following participation in a series of IPE workshops. The specific objectives were 1) to evaluate pre-workshop attitudes to IPE among a multidisciplinary cohort of 3rd year Health Science students; and 2) to examine change in attitude to IPE following a series of IPE workshops. The evaluation was designed to align with levels 1 and 2a of the modified Kirkpatrick's model of educational outcomes for IPE (Freeth et al., 2002).

METHODS

Study Design

This evaluation was completed using a longitudinal repeated measures design (**Table 1**). Pre-workshop attitudes to IPE were captured prior to self-directed workshop preparation using a SurveyMonkey® link available on the virtual learning environment (VLE). The second

timepoint coincided with the start of the first workshop. The 2-weeks from pre-workshop preparation to the start of the first workshop was considered a control (preparation) period. The final timepoint coincided with the end of the final (third) workshop. The start of workshop 1 to the end of workshop 3 (2-weeks) was considered the intervention period. Ethical approval was granted from three schools in the Faculty of Health Sciences Trinity College Dublin; the School of Medicine Research Ethics Committee, the School of Pharmacy Research Ethics Committee and the School of Nursing and Midwifery Research Ethics committee.

Table 1: Study assessment schedule

	Pre-Workshop Online Preparation	Workshop 1	Workshop 2	Workshop 3
	Preparation Period	Intervention Period		
Demographic details	X	X		X
Readiness for Interprofessional Learning Scale	X			
Interprofessional Education Perception Scale	X	X		X
Post-Workshop Evaluation				X

Description of Interprofessional Education Workshops

The Faculty of Health Sciences, Trinity College Dublin comprises four schools (Medicine, Nursing and Midwifery, Dental Science and Pharmacy and Pharmaceutical Sciences) delivering over 10 accredited undergraduate healthcare programs. The faculty-wide IPE program involves a series of three workshops involving students from seven disciplines (Medicine, Nursing, Pharmacy, Physiotherapy, Occupational Therapy, Clinical Speech and Language Studies and Human Nutrition and Dietetics). The course aims are to increase student understanding of the role of different professions involved in patient care and to improve awareness of how effective collaboration can benefit patient care. Students work in small interprofessional groups ($n=10-12$) to discuss patient-centred case studies featuring multi-morbidity, poly-pharmacy and social concerns. The case studies were developed by a MDT of academic and clinical partners. Students are provided with access to simulated patient medical notes, on the VLE, two weeks in advance of the workshops. Students discuss the cases during a series of three face-to-face workshops of 90-minute duration, which are facilitated by Faculty staff.

Participants

Third year health science students from the departments of Medicine ($n=177$), Nursing ($n=142$), Occupational Therapy ($n=42$), Pharmacy ($n=82$), Physiotherapy ($n=35$), Human Nutrition and Dietetics ($n=24$) and Clinical Speech and Language Therapy ($n=24$) attending in the workshops were invited to participate in this study.

Outcomes

Coded questionnaires collected demographic information including discipline, gender, previous clinical experience and previous experience with IPE (**Table 2**). Attitudes were measured using the Interdisciplinary Education Perception Scale (IEPS) and the Readiness for Interprofessional Learning Scale (RIPLS).

Readiness for Interprofessional Learning Scale

Pre-course attitudes and readiness of students for IPE were evaluated using the RIPLS. The RIPLS evaluates students' attitudes to prior to formal IPE (Modified Kirkpatrick's Model Level 2a). The most recently validated version contains 19 statements to examine attitudes towards IPE across four subscales, using a five-point Likert-type scale. The scale is scored using a summative algorithm to calculate student's attitudes towards IPE across the four domains subscales; *Teamwork and Collaboration* (Items 1-9); *Negative Professional Identity* (Items 10-12); *Positive Professional Identity* (Items 13-16); and *Roles and Responsibilities* (Items 17-19). Items in the domain of *Negative Professional Identity* are negatively worded and therefore reverse scored. In all domains, a higher score indicates better readiness for IPE.). The validity of the instrument has been tested and reported as relatively stable with internal consistency (Cronbach Alpha) values for the total scale 0.89, and 0.88, 0.76, 0.81 and 0.43 respectively for each of the subscales listed.

Interprofessional Education Perception Scale

Change in attitude and perception to IPE following participation in the IPE workshops was evaluated using the IEPS. The IEPS evaluates changes in learner's attitudes arising from IPE (Modified Kirkpatrick's Model Level 2a). The most recent version of the instrument contains 12 statements which are rated on a six-point Likert-type scale evaluating three domains: *Competency and Autonomy*; *Perceived Need for Cooperation*; and *Perception of Actual Cooperation* (Luecht, Madsen, Taugher, & Petterson, 1990; McFadyen, Maclaren, & Webster, 2007). The scale is scored using a summative algorithm to calculate student attitudes towards IPE across the three subscales; *Competency and Autonomy* (items 1, 3, 5, 7, 8), *Perceived Need for Cooperation* (items 4 and 6), and *Perception of Actual Cooperation* (items 2, 9, 10, 11, 12). The validity of the instrument has been tested and reported as stable with internal consistency (Cronbach Alpha) values for the total scale 0.88, and 0.82, 0.40 and 0.83 respectively for each of the subscales listed. The test-retest reliability is fair-to-moderate (Weighted Kappa value ranging from 0.102 to 0.478).

Post Workshop Evaluation

Students completed a locally designed post-workshop evaluation form to self-rate both self- and team-performance across four collaborative practice competency domains: teamwork, communication, professionalism, and roles and responsibilities (Interprofessional Education Collaborative, 2016). Questions were rated using a five-point Likert-type scale from Poor to Excellent. The evaluation was completed at the end of the final workshop.

Data Analysis

Data were analysed using IBM SPSS Statistics Version 23. Data normality was evaluated using the Kolmogorov-Smirnov test. Normally distributed continuous variables are presented as mean (standard deviation) and non-normally distributed variables presented as median (inter-quartile range). Categorical variables are presented as frequency (percentage).

Univariate analysis of differences in pre-workshop attitudes to IPE, were compared using the Mann-Whitney U Test and Kruskal-Wallis Test for K-Independent Samples with pairwise comparisons for post-hoc analysis. Statistically significant relationships were further examined in regression analysis. Standard multiple linear regression was used to assess the relationship between demographic data (gender, discipline, previous experience of a joint patient treatment session on clinical placement) and attitude domains of the RIPLS and IEPS. Preliminary analyses were conducted to ensure compliance with the underlying assumptions related to linearity, multicollinearity or homoscedasticity. While datasets were all negatively

skewed, analysis of Mahalanobis distances identified no significant outliers. All categorical variables were coded as dummy variables and entered into the model simultaneously.

An unstructured linear mixed model for repeated measures examined change in attitude to IPE across the three study timepoints to account for the correlation within participants across time and allow the inclusion of participants with missing data. Missing data points were at random and did not relate to data within the dataset. Gender and Discipline Groups (Medicine, Nursing, Pharmacy and Allied Health) were entered into the model as independent factors. Post-hoc comparisons were examined using the Bonferroni test. Statistical significance was considered at $p < 0.05$.

RESULTS

In total 405 students (77% of the total cohort scheduled to attend) completed at least one questionnaire. Specifically, 122 students completed pre-workshop questionnaires online, 244 students participated at the beginning of Workshop 1 and 236 students participated at the end of Workshop 3.

Pre-Workshop Attitudes to IPE

Demographic data for those who completed the pre-workshop questionnaire are presented in **Table 2**. Data are presented for the total group (n=122) and for each discipline (medicine, nursing, pharmacy and allied health). Data from Physiotherapy (n=15), Occupational Therapy (n=10), Clinical Speech and Language Therapy (n=6) and Human Nutrition and Dietetics (n=5) students were pooled under the heading of Allied Health.

Table 2: Demographic characteristics and previous interprofessional education experiences of Health Science students who completed pre-workshop evaluations.

	Total (n=122)	Medicine (n=30)	Nursing (n=27)	Pharmacy (n=30)	Allied Health (n=36)
Gender (m/f)	29 (24) / 93 (76)	14 (47) / 16 (53)	1 (4) / 26 (96)	9 (30) / 21 (70)	5 (14) / 31 (86)
Have you completed any clinical placements / volunteer clinical work to date (yes)?	116 (95)	29 (97)	26 (96)	25 (83)	36 (100)
Have you ever participated in interprofessional education (yes)?	33 (27)	6 (20)	8 (30)	7 (23)	12 (33)
Joint patient treatment session with another profession on clinical placement	53 (43)	13 (43)	18 (67)	2 (7)	20 (56)
In-services (tutorials) with other professions on clinical placement	42 (34)	9 (30)	13 (48)	1 (3)	19 (53)
Shadowing other professions on clinical placement	82 (67)	20 (67)	19 (70)	17 (57)	26 (72)
Multidisciplinary team meetings on clinical placement	87 (71)	29 (97)	25 (93)	3 (10)	30 (83)
Shared teaching with other students in college	75 (61)	18 (60)	16 (59)	20 (67)	21 (58)
Interprofessional education workshops/projects/other activities in college	23 (19)	4 (13)	6 (22)	6 (20)	7 (19)
Shared practical skills sessions with other students in college	61 (50)	18 (60)	15 (56)	18 (60)	10 (28)

Data presented as frequency (column percentage) for each category.

Pre-workshop attitudes are presented for the total group and for each discipline in **Table 3**. For the first three sub-scales of the RIPLS, students scored >80% of maximum available scores. In the RIPLS domain of *Roles and Responsibilities* students scored 60% of maximum available score. On the IEPS, students scored above 80% in the domains of *Competency and Autonomy* and *Perception of Actual Cooperation*, and above 90% of maximum value in the domain of *Perceived Need for Cooperation*.

Table 3: Pre-Workshop Attitudes to Interprofessional education across each domain of the Readiness for Interprofessional Learning Scale and the Interprofessional Education Perception Scale.

	Scale Range		Study Results	
	Minimum	Maximum	Pre-Workshop Attitudes Scores (n=122)	Student Scores Expressed as a Percentage of Maximum Total Score
RIPLS				
Teamwork and Collaboration	9	45	40 (6.5)	89%
Negative Professional Identity	3	15	13 (3)	87%
Positive Professional Identity	4	20	16 (3)	80%
Roles and Responsibilities	3	15	9 (2)	60%
IEPS				
Competency and Autonomy	5	30	25 (3)	83%
Perceived Need for Cooperation	2	12	11 (2.5)	92%
Perception of Actual Cooperation	5	30	25 (5)	83%

Data for total scores for students studied is presented as median (inter-quartile range). Columns represent the minimum and maximum possible score in each domain, total score for the cohort studied and total score for the cohort studied expressed as a percentage of maximum possible score.

On uni-variate analysis, there were significant differences in the domain of *Teamwork and Collaboration* between genders [males mean (standard deviation) 37(6) versus females 41(6), $p=0.003$], students with previous experience of a joint patient treatment session with another profession on clinical placement [Yes 42 (6.5) vs. No 39 (6.25), $p=0.034$] and between Disciplines ($p=0.001$). Post-hoc comparisons of disciplines revealed that median scores were significantly lower in Medical students compared to both Nursing ($p=0.043$) and Allied Health ($p=0.001$). Pharmacy students did not differ from any other discipline. On multiple linear regression analysis, only male gender was an independent negative predictor of attitude (standardized Beta -0.25, $p=0.009$) with the model explaining 18% of the total variance (adjusted $R^2 = 0.181$).

Similarly, the attitude domain of *Negative Professional Identity* varied by gender [male 12 (2) vs. female 13 (3), $p=0.009$], previous experience of a joint patient treatment session with another profession on clinical placement [Yes 14 (3) vs. No 12 (3), $p=0.019$] and between Disciplines ($p<0.001$). On post-hoc analysis of Disciplines, Medical students had higher negative professional identity scores than both Nursing students ($p=0.011$) and Allied Health students ($p=0.001$). Pharmacy students did not differ. On multiple linear regression analysis,

only Medicine independently and negatively predicted attitude (standardized Beta -0.253, $p=0.023$), with the model explaining 20% of the total variance (adjusted $R^2=0.200$).

In contrast, the attitude domain of *Positive Professional Identity* varied only by previous experience of a joint patient treatment session with another profession on clinical placement [Yes 17 (4) vs. No 16 (2.25), $p=0.05$] and Discipline ($p=0.015$). On post-hoc analysis, Nursing students had higher positive professional identity scores than Medical students ($p=0.011$). Pharmacy or Allied Health students did not differ from any other discipline. On multiple linear regression analysis, only Medicine independently and negatively predicted attitude (standardized Beta -0.29, $p=0.008$) however the model explained just 9% of the total variance (adjusted $R^2=0.091$).

Finally, there were significant differences in the domain of *Perception of Actual Cooperation* between students with experience of a joint patient treatment session with another profession on clinical placement [Yes 26 (5) vs. No 24 (4), $p=0.001$] and Discipline ($p=0.004$). On post-hoc analysis of Discipline, median scores were significantly lower among Medical students compared to both Nursing ($p=0.005$) and Allied Health ($p=0.028$) students. Pharmacy students did not differ. On multiple linear regression analysis, experience of a joint patient treatment session with another profession on clinical placement was an independent positive predictor of attitude (standardised Beta 0.283, $p=0.005$) while Medicine was an independent negative relationship with the attitude domain (standardized Beta -0.315, $p=0.003$), with the model explaining 17% of the total variance (adjusted $R^2=0.168$).

Change in Attitudes and Perceptions to IPE

There was evidence of an improvement in attitude to IPE across all three domains of the IEPS over time ($p<0.001$ for all). In the domains of both *Competency and Autonomy*, and *Perceived Need for Cooperation*, attitude scores increased significantly ($p<0.001$) between Pre-workshop and Workshop 1 but not from Workshop 1 to Workshop 3. In both domains, females reported significantly higher scores at the end of Workshop 3 in both the domain of *Competency and Autonomy* [26.22 (95% Confidence Interval (CI) 25.64 to 26.81)] and *Perceived Need for Cooperation* [11.06 (95% CI 10.77 to 11.34)] compared to males [24.76 (95% CI 23.83 to 25.69)] and [10.62 (95% CI 10.18 to 11.09)], $p=0.02$ and $p=0.03$ respectively.

In contrast, attitudes in the domain of *Perception of Actual Cooperation* increased significantly from both Pre-workshop to the start of Workshop 1 and again from Workshop 1 to Workshop 3. There was no interaction between the attitude scores in this domain and either gender or discipline group over time.

Post Workshop Evaluation

In total, 222 students completed the evaluation at the end of workshop 3. Almost all students rated both their own performance and the performance of their team as either *Good* or *Excellent* across all four IPE competencies.

DISCUSSION

Results demonstrate that third year health science students exhibit high readiness for IPE prior to engaging in IPE and that attitudes continue to improve following engagement in a workshop program. In the domains of both *Competency and Autonomy*, and *Perceived Need for Cooperation*, attitudinal improvements only occurred during online workshop preparation. In contrast, attitudes in the domain of *Perception of Actual Cooperation*

improved both during online preparation and following the three workshops. Post-workshop self-evaluations show that students rated both their personal and their team's performance across the four key IPE competencies as either *Good* or *Excellent*.

This cohort demonstrated high readiness for IPE. In this cohort, baseline scores were >80% of maximum values across almost all domains of the RIPLS and the IEPS. The finding of a lower score on the *Roles and Responsibilities* subscale of the RIPLS is consistent with others (McFadyen et al., 2010; Morison et al., 2008) and may reflect underlying psychometric instabilities (McFadyen et al., 2005). Consistent with other literature, discipline of study was identified as an independent predictor of attitude to different subdomains (Hawk et al., 2002; Horsburgh, Lamdin, & Williamson, 2001; Maharajan et al., 2017), predicting attitude to *Negative Professional Identity* and *Positive Professional Identity* and *Perception of Actual Cooperation*. The professional identity subscales examine students' attitudes towards profession-specific versus multidisciplinary care (McFadyen et al., 2010). The *Perception of Actual Cooperation* domain reflects on a professions own ability to work closely with other professions, disseminate information and to develop good interprofessional relationship (Hawk et al., 2002). Importantly, in the current study previous experience of joint patient treatment session with another profession on clinical placement positively and independently predicted attitude to *Perception of Actual Cooperation*, demonstrating the value of early experiential interprofessional experiences. These experiences were highest amongst Nursing and Allied Health students, possibly reflective of their clinical placement structures, responsibilities and experiences to date. While Pharmacy students in the current study did not differ in pre-workshop attitude when compared to other disciplines, this may change as exposure to experiential learning deepens in their new program, currently being implemented.

Interestingly, male gender was negatively predictive of pre-workshop attitudes in the domain of *Teamwork and Collaboration*. This subscale considers the need for collaborative practice and effective communication, the ability to participate in MDTs and form relationships with other professions (McFadyen et al., 2005). Furthermore, improvement in attitude in the domains of both *Competency and Autonomy* and *Perception of Actual Cooperation* over the study period was influenced by gender, with males experiencing poorer attitudes at the end of Workshop 3 compared to females. The domain of *Competency and Autonomy* considers professions own sense of autonomy, competency and contributions, and the degree to which other professions' respect them (Hawk et al., 2002). The influence of gender on student attitude to interprofessional collaboration, particularly in the domain of teamwork, has been described previously (Adams, Hean, Sturgis, & McLeod-Clark, 2006; Coster et al., 2008; Curran, Sharpe, Forristall, & Flynn, 2008; Hertweck et al., 2012; Reynolds, 2003; Wilhelmsson et al., 2011; Zanotti, Sartor, & Canova, 2015). Even in first year students, gendered differences in perception of professional identity and stereotypes are reported (Adams et al., 2006; Coster et al., 2008). Educators should be aware of the potential for gender differences in both readiness for and engagement with IPE and identify strategies to overcome equal participation from all students.

Despite high baseline attitudinal scores, students demonstrated small but statistically significant improvements across all domains of the IEPS following the workshops. Perhaps surprisingly, change in attitudes in the domains of *Competency and Autonomy* and *Perceived Need for Cooperation*, increased only following online preparation. While there may have been little opportunity for these scores to improve further following the workshops, results highlight the value of the VLE. These domains capture student attitudes regarding their own professions autonomy and competence, their own contribution to the interprofessional team

and the value of working with others. In this program, students completed baseline questionnaires in advance of self-directed workshop preparation. Therefore, the improvement in these domains may reflect an improvement in student confidence in their ability to contribute to the MDT discussion following preparation, and an improved recognition of the need to consult with other professions to manage the complex patient case presented. These results support both the importance of adequate student preparation and the role of technology to enhance learning in IPE (Barr et al., 2016). Further work examining the potential for IPE to support achievement of learning outcomes in IPE (Bluteau, Clouder, & Cureton, 2017) or extend group interactions is warranted (Clouder, 2008).

Notwithstanding the potential for the VLE to enhance student learning, the value of the interprofessional workshop is clear from the change in the domain of *Perception of Actual Cooperation*. Key strengths of the IPE workshops include the patient-centred case scenarios which are both challenging and realistic, and the multidisciplinary involvement which closely resembles a real-life healthcare clinical team. The *Perception of Actual Cooperation* domain closely considers practical applications of IPE competencies such as interprofessional relationships and dissemination of knowledge (Hawk et al., 2002). While student learning was not directly assessed, in the post-workshop self-assessment, students rated both self and team performance as either good or excellent across all domains.

The repeated measures design is a significant strength of this study. This design enabled the surprising benefits of online preparation to be observed and identified that the face-to-face workshops had greatest influence on *Perception of Actual Cooperation*. Limitations of the study, include the uneven study participation statistics at each timepoint and the use of just one measure of student attitude to measure change. Student participation was voluntary and not all students participated at all timepoints. The use of linear mixed methods enabled the inclusion of all data collected and therefore is most reflective of the cohort studied. While both the IEPS and the RIPLS have been used to examine change in attitude to IPE following a structured activity, psychometrically both questionnaires have acknowledged weaknesses (Oates & Davidson, 2015; Thannhauser, Russell-Mayhew, & Scott, 2010). The IEPS was developed to measure change in attitude arising from IPE and the test-retest reliability has been examined (McFadyen et al., 2007). It was therefore chosen over the RIPLS for use in the repeated study.

In conclusion, results reflect positively on both students' readiness for IPE and proved a valuable activity to improve student attitudes further. The impact of early experiential interactions in clinical environments enhanced student readiness for this complex activity and supports the role of organised joint patient treatment sessions for students on simultaneous clinical placements. All components of the IPE workshops had a marked influence on student attitudes to IPE including profession-specific online preparation. The importance of student preparation for IPE and the potential for technology enhanced learning to add value to complex IPE activities warrants further exploration.

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