

Moderating the stereotypical views of health and social care students: the role of interprofessional education

Abstract

The potential of interprofessional education (IPE) to influence the perceptions and attitudes of health and social care professionals towards their colleagues in other disciplines is well recognised. However empirical evidence for the positive impact of IPE on stereotypical beliefs has been limited. We report the findings of a pioneering, large scale study designed to assess the influence of IPE on these beliefs. A pre-test, post-test, quasi experimental design compared students' stereotypical views at the beginning and end of undergraduate studies. 580 students from ten health and social care professional groups undertook assessed IPE modules over three years (the intervention group). Baseline and post course stereotype ratings were compared with those of 672 students in a comparison group, not exposed to IPE modules. Baseline stereotype profiles showed clear variations in the way different professions were perceived, indicating stereotypical beliefs about the characteristics of each profession. Rating patterns were similar for intervention and comparison groups. At graduation only minor changes were observed in the overall rating patterns for both groups. However, more ratings had decreased in the intervention group than the comparison group, suggesting that IPE may play a role in moderating more extreme stereotyping of colleagues in other professions.

Introduction

There is global recognition of the importance of including interprofessional education (IPE) in all health professional programmes in order to enhance interdisciplinary collaboration and effective teamwork (WHO 2010). A number of established theories such as the contact hypothesis (Allport, 1954) and social identity theory (Tajfel, 1981) provide a framework for understanding the potential role of IPE in reducing prejudice, negative stereotyping and intergroup discrimination between health and social care professional groups (Hean, Macleod Clark, Adams, & Humphris 2006). However, there is a paucity of robust evidence to support the effectiveness of IPE in changing the stereotypical views or beliefs of health professionals.

Stereotypes are shared beliefs about individuals based on knowledge of the social groups to which those individuals belong (Quadflieg et al., 2008; Martin, Coulson & Buskist, 2007). They are considered a cognitive component of attitudes, with an attitude defined as an overall evaluation of an object that is based on cognitive, affective and behavioural information (Maio & Haddock, 2010). Studies evaluating IPE participants' stereotypical views about other professions have almost all employed rating scales which involve respondents assessing the relevance of certain characteristics to different health and social care professions. Examples include Carpenter's (1995) scale of eight positive and negative characteristics, which was subsequently used in a further three studies (Hind et al., 2003; Rudland & Mires, 2005; Tunstall-Pedoe, Rink & Hilton, 2003); the Health Team Stereotype Scale, used to measure stereotyping among occupational therapy, physiotherapy and podiatry students (Katz, Titiloye, & Baloun, 2001; Mandy et al., 2004; Parker & Chan, 1986);

the Attitudes to Health Professionals Questionnaire (AHPQ) developed in 2005 by Lindqvist and colleagues for use in the UK and also translated into Danish for use in Denmark (Hawkes, Nunney & Lindqvist, 2013; Jacobsen & Lindqvist, 2009; Lindqvist et al., 2005b); and the scale originally developed by Barnes et al (2000), subsequently refined and modified by Hean and colleagues (Hean et al 2006) and used again in Canada and in the UK as the Student Stereotypes Rating Questionnaire (Ateah et al., 2011; Bell & Allain, 2011). Studies using these scales have consistently shown that students rate the characteristics of each professional group differently which strongly supports the view that students hold pre-conceived, stereotypical beliefs about the characteristics of certain health and social care professions. For example nurses are consistently rated highly on characteristics associated with caring and interpersonal skills whilst doctors are usually rated highly on characteristics associated with confidence and academic ability.

Much less clear is whether exposing students to IPE and interprofessional learning can influence or change their preconceived stereotypical views. In a review of 21 small scale evaluations of IPE programmes, Hammick and colleagues (2007) found limited evidence for the positive influence of IPE on attitudes and perceptions. Comparison of the findings from studies evaluating stereotypical beliefs highlights conflicting results (Ateah et al. 2011; Barnes, Carpenter & Dickinson, 2000; Carpenter, 1995; Jacobsen & Lindqvist, 2009; Lindqvist, Duncan, Shepstone, Watts & Pearce, 2005a; Mandy, Milton & Mandy, 2004; Tunstall-Pedoe et al., 2003). An increase in more positive or less extreme ratings of other professions, following IPE, was reported in five studies (Ateah et al., 2011; Carpenter, 1995; Hawkes et al., 2013; Jacobsen & Lindqvist, 2009; Lindqvist et al 2005a). However, other researchers found that stereotyping did not change or become more exaggerated or extreme over time

following IPE (Barnes et al., 2000; Mandy et al. 2004; Tunstall-Pedoe et al., 2003).

Differences in the scale and methodology of these studies may go some way towards explaining the seemingly contradictory evidence reported. For example, three of the studies showing positive changes over time involved relatively short IPE interventions, the longest lasting two weeks (Ateah et al., 2011; Carpenter, 1995; Jacobsen & Lindqvist, 2009). In contrast, the studies showing no change or a negative change in ratings involved students taking part in IPE interventions lasting for at least one academic term (Barnes et al., 2000; Mandy et al., 2004; Tunstall-Pedoe et al., 2003).

This paper considers findings from the New Generation Project Longitudinal Study (NGPLS), a pioneering study exploring the impact of IPE, based on a common curriculum model, on the stereotypical beliefs of a large sample of health and social care students over the course of their undergraduate studies. The analysis of NGPLS baseline data on the stereotypical beliefs of undergraduate health and social care students commencing their undergraduate studies has been described by Hean et al (2006). Subsequent changes in those stereotypical beliefs over time are reported here and comparisons made between students who took part in an IPE programme with those who did not. The following research questions are addressed:

- Do undergraduates' stereotypical beliefs about the characteristics of health and social care professionals change over time;
- What is the influence of IPE on undergraduates' stereotypical beliefs about the characteristics of health and social care professionals?

Methods

Study design

A pre-test, post-test quasi-experimental design was employed. Two cohorts of undergraduate health and social care students, attending one of two neighbouring universities were involved. The intervention group comprised students who started their academic studies in 2003 and who took part in Common Learning (CL), an initiative in which IPE was embedded within their undergraduate programmes. A comparison group, comprising undergraduate health and social care students who commenced academic studies in 2002, did not take part in CL. Students in both groups completed questionnaires at two time points: the first at the beginning of the first term of their first year (Time 1); the second during the final term of their final year (Time 2). The number of years between Time 1 and Time 2 varied from three to five, depending on the length of each undergraduate course.

Common Learning

Students taking part in Common Learning came together in mixed professional groups of 10-12, each with a facilitator, during three interprofessional learning units in students' first, second and final years of study. Details of the facilitative, collaborative interprofessional learning model employed are described by O'Halloran and colleagues (2006).

The instrument

Data were collected using a self-completion questionnaire in which respondents were asked to rate the applicability of nine attributes, or characteristics, to health and social care

professional groups using a five point Likert scale: a score of 5 indicating a rating of “very high” on a characteristic; a score of 1 indicating a rating of “very low” . The development of the study questionnaire, including testing for content validity, test-retest reliability and an example of the questionnaire wording has been described by Hean and colleagues (2006).

The sample

All undergraduate students embarking on health and social care programmes at two neighbouring universities in two consecutive years were invited to participate. The comparison group, who commenced their courses in 2002, comprised students studying medicine, midwifery, nursing, occupational therapy, pharmacy, physiotherapy, podiatry, radiography and social work. The intervention group, comprised students from the same professional groups, with the addition of audiology students.

Asking all students to rate all professional groups would have made the questionnaire impractically long. Four versions of the questionnaire were, therefore created, each asking respondents to rate a different subset of two or three professions. A quarter of students in each professional group received version 1 of the questionnaire, a quarter received version 2, a quarter version 3 and a quarter version 4. Students received the same version of the questionnaire at Time 1 and at Time 2.

Data analysis

The heterostereotype ratings (ratings given by respondents to professions other than their own) were compared over time and between cohorts. The significance of differences

between mean heterostereotype ratings were calculated using paired samples, two tailed t-tests. The effect size of each significant difference over time was calculated using the Pearson correlation, r , as effect size. In the style of Hean et al (2006), a profile of characteristics for each professional group, as perceived by participants, was created by displaying the mean values for all nine characteristics.

Ethical considerations

All students who took part in the study gave their written, informed consent. As described by Hean et al (2006), an independent student guardian was appointed to act as a point of referral for students in the event of any study related problems and to ensure that participants' rights were considered throughout the study.

Results

Response rate

In 2002, of a total population of 1276, 1108 (86.8%) first year health and social care students gave their written consent to take part in the study and completed a Time 1 questionnaire. Of these, 672 (60.7%) responded again, in their final year, at Time 2.

In 2003, of a total population of 1427, 1261 (88.4%) first year health and social care students gave their written consent to take part in the study and completed a Time 1 questionnaire. Of these, 580 (46.0%) responded again at Time 2. The number of participating students in each professional group is shown in Table 1.

INSERT TABLE 1 ABOUT HERE

Demographic details

In both comparison and intervention groups, the majority of respondents were female, were aged under 21 and were embarking on their first degree, diploma or other professional course. Comparing respondents in each group, there was no significant difference in the proportion who were female ($\chi^2 = 1.012$, $p=0.314$). However, significantly more respondents in the intervention group were aged 21 or over on their birthday in the year of study recruitment ($\chi^2 = 9.772$, $p=0.002$). Considering the professions for which respondents were studying, around half of recruited respondents in both the comparison and intervention groups were nursing students. There were differences between the comparison and intervention groups in terms of the proportions of students studying for different professions, for example a greater proportion of nursing and medical students were recruited to the comparison group than to the intervention group.

Non-responders

Comparing responders at both Time 1 and Time 2 with those who responded only at Time 1, responders at both times were significantly more likely to be female (intervention group $\chi^2 = 32.93$, $p<0.001$; comparison group $\chi^2 = 12.46$, $p<0.001$) but no more likely to be aged 21 or over on their birthday in the year of recruitment (intervention group $\chi^2 = 1.328$, $p=0.249$; comparison group $\chi^2 = 1.052$, $p=0.305$). Non-response varied between student professional groups, it was greatest for medical students and pharmacy students.

Respondents' ratings of other health and social care professionals

The mean heterostereotype ratings at Times 1 and 2 are shown in Tables 2 (comparison group) and 3 (intervention group). Significant decreases ($p < 0.05$) between Time 1 and Time 2 are denoted by one asterisk, significant increases ($p < 0.05$) between Time 1 and Time 2 are denoted by two asterisks. All but one of the mean ratings stayed above 3, the neutral point between "very high" and "very low". Mean ratings ranged from 3.03 to 4.83 in the comparison group and from 2.98 to 4.85 in the intervention group.

The Time 1, mean heterostereotype ratings of the intervention group and the comparison group were compared: of 81 pairs of means, there were five significant differences ($p < 0.05$), in each case, the rating of the intervention group was higher than that of the comparison group.

Considering the ratings of each of the nine characteristics shown in Tables 2 and 3, "academic ability" and "interpersonal skills" showed the greatest range in mean heterostereotype ratings, in both cohorts and at both times. Midwives, social workers and nurses received the highest ratings for "interpersonal skills" at both times and in both cohorts, while doctors and pharmacists received the lowest ratings. Doctors and pharmacists received the highest ranking for "academic ability", while nurses and social workers received the lowest ratings. The smallest range in ratings was found for "professional competence" for both cohorts at both times.

INSERT TABLES 2 AND 3 ABOUT HERE

Changes in respondents' ratings over time

Tables 2 and 3 show a marked contrast between the intervention group and the comparison group in terms of differences in mean heterostereotype ratings over time, with more significant differences in the intervention group. In addition, of the significant differences in the intervention group were all decreases while in the comparison group there were also some increases. In the intervention group, at least two mean ratings changed significantly for every profession. In the comparison group there were no significant changes in any of the mean ratings of pharmacy and radiography.

The effect size of each significant difference was calculated using the Pearson correlation, r . A number of significant differences had a medium effect (r greater than 0.3) and these are shown in Tables 4 and 5. None of the significant differences had a large effect (r greater than 0.5) (Field 2009).

INSERT TABLES 4 AND 5 ABOUT HERE

Stereotype Profiles

To visualise the pattern of mean heterostereotype ratings for each professional group over time, a profile of ratings was created. The stereotype profiles of pharmacists and social workers illustrate clearly the differences between the intervention group and comparison group and are shown in Figures 1 to 4.

INSERT FIGURES 1, 2 3 AND 4 ABOUT HERE

As can be seen from these examples, the overall pattern of ratings for pharmacists and social workers changed little over time in both groups, with peaks and troughs appearing in the same places. However, there was a downward shift over time in the profiles for the intervention group, which was not observed in the comparison group. Similar patterns emerged for the other professions rated in this study, with the overall patterns of ratings remaining similar but with a more marked downward shift over time in the profiles of the intervention group.

Changes in the range of ratings (the difference between the highest rated characteristic and the lowest rated characteristic) for each profession over time were explored. In both the comparison group and intervention group, the range of ratings decreased over time for six out of nine professions.

Discussion

At the start of their undergraduate programmes, respondents in both the comparison group and the intervention group rated the characteristics of health and social care professions differently according to the profession being rated, suggesting that pre-conceived beliefs about the characteristics of each profession were held. At the end of their undergraduate programmes, respondents in both groups again rated characteristics differently according to profession. The overall pattern of high and low ratings for each profession showed little

change over time, indicating some stability in respondents' beliefs about the characteristics of other professions. While both groups maintained generally positive views about the characteristics of other professions, the spread of ratings was found to narrow over time, implying that beliefs became less exaggerated.

Individuals use stereotyping to guide intergroup interactions and it is to be expected that health and social care undergraduates at the start of their programmes will hold stereotypical views about other professions (Hean et al., 2006). In addition, it has been suggested that different professions attract individuals with certain cognitive learning skills and styles and that educational experiences and the simultaneous socialisation process within a profession reinforce a profession-specific world-view among neophytes (Hall 2005). It is possible that the maintenance of stereotypical beliefs throughout undergraduate professional programmes found in this study reflects real differences in the characteristics of members of different health and social care professions and thus the continued use of stereotyping to guide interprofessional interactions. Another possible explanation relates to the measures used in the study to investigate the effect of contact: Contact theory, which has been used as a theoretical underpinning for IPE initiatives, proposes that if members of different professions learn together they will have opportunities to learn about each other and these can potentially dispel existing negative stereotypes (Carpenter & Dickinson; 2008). This is based on the assertion that contact reduces intergroup prejudice by increasing knowledge, reducing intergroup threat and anxiety and enabling empathy and perspective taking (Pettigrew & Tropp; 2008). Brown and Hewstone (2005), however, note that previous research suggests a relatively weak effect of contact on stereotype change, arguing that stereotypes may be more resistant to change than attitudes because of the restricted range

and nature of settings in which intergroup contact takes place. In this study, therefore, respondents' attitudes to other health and social care professions may have changed to a greater degree than the observed changes in respondents' stereotypical beliefs suggest. Brown and Hewstone (2005) also propose that measuring the quality and quantity of intergroup contact and including measures of affective as well as cognitive variables would enhance future research into the relationships between stereotypes and contact. Relating this to the current study, it is possible that changes in respondents' stereotypical beliefs, brought about by contact, could have been better understood if measures in addition to those used had been included.

Some potentially important differences between the intervention group and the comparison group were found. There were more significant differences between ratings of individual characteristics at Time and Time 2 in the intervention group compared to the comparison group. Over time, ratings given by respondents in the intervention group changed more often and over a wider spread of professions. All significant changes in the intervention group were decreases. These findings suggest that exposure to interprofessional education led respondents to moderate their beliefs about the characteristics of health and social care professions and rate those characteristics less highly. A possible explanation for this is that respondents exposed to interprofessional learning become more realistic about the strengths and qualities of their colleagues, while students in the comparison group were less well equipped to reassess the characteristics of groups of professionals of whom they had little experience.

The findings of this study strongly support previous research which has indicated the existence of stereotypical views among undergraduate and postgraduate students (Barnes et al., 2000; Carpenter 1995; Hean et al., 2006; Hind et al. 2003; Mandy et al., 2004; Rudland & Mires, 2005; Tunstall-Pedoe et al., 2003). Findings reported in other studies relating to changes in stereotypical views following IPE have been inconsistent, with differences in the scale of evaluations and types of IPE intervention investigated making it difficult to draw general conclusions. Similarly it is difficult to compare the results of this study with other reported evaluations. For example, these results contrast with those of Ateah and colleagues (2011), who also used the Student Stereotypes Rating Questionnaire but observed no decreases in mean ratings of the characteristics of various professional groups following an IPE intervention. The difference in results obtained may be explained by the different models of IPE intervention involved: this study evaluated a relatively long term intervention over a number of years; in contrast, Ateah's study evaluated a two and a half day IPE intervention over four to five months. Differences in the numbers and types of participants and the nature of the interventions greatly complicate the comparison of quantitative, 'before and after' outcome measures involving complex IPE interventions.

Some limitations of this study should be considered when interpreting these findings. Firstly, differences in socio-demographic characteristics between the intervention and comparison groups could have independently affected the study results. Our study groups were similar in respect of certain socio-demographic characteristics; however they were not similar in respect of age or in the proportions of respondents belonging to each profession. It is, therefore, possible that differences observed between the two groups may be attributable to age or profession differences rather than IPE. Secondly, confounding factors may have

affected the results, for example previous research suggests that students exposed to IPE may be motivated to participate in additional IPE activities (Hoffman & Harnish, 2007). The questionnaires used in this study did not collect data on additional IPE activities undertaken. Thirdly, the number of students lost to follow-up at Time 2 may have compromised the generalisability of our results. Although Time 2 non-responders were similar to responders in terms of age, differences in gender and in the proportions of respondents belonging to each profession were found. In addition, a greater percentage of students from the intervention group than from the comparison group were lost to follow-up and the possibility that the IPE intervention itself influenced loss to follow-up cannot be ruled out. It was not possible in this study to question non-responders about their reasons for not completing a Time 2 questionnaire; future investigations would be strengthened by analysing study participants' reasons for non-response at follow-up. Losses to follow-up are a major source of bias in cohort studies and the findings should be interpreted in this light.

The data presented in this paper are an important addition to previous research in this area and may inform understanding of the potential impact of IPE. They add to the evidence which supports the existence of stereotypical views about other health and social care professions among undergraduate students, both before and after IPE. While they do not demonstrate an unequivocal reduction in stereotypical beliefs following interprofessional contact, they do point to a moderation in students' beliefs about the characteristics of other professions and suggest more realistic views following IPE. Increased realism and moderation of stereotypical beliefs indicates a positive impact of IPE on undergraduate students in this study. If translated into health and social care practice, this would have implications for aspects of quality of care, such as interdisciplinary collaboration and

teamwork, where realistic views of the characteristics of other health and social care professionals might be expected to be beneficial. Future research, investigating the long-term effects of undergraduate IPE on health and social care practice by following up students who have taken part in IPE after graduation would therefore be of value.

The many contextual factors which characterised this IPE intervention, but which are not shared by other interventions reported in the literature, make it difficult to compare the impact of IPE noted here with other studies. It is also difficult to draw generalised conclusions about the influence of IPE on undergraduate stereotyping. Further research, involving other methodological approaches to evaluating complex IPE interventions, including measuring quality and quantity of intergroup contact and including measures of affective as well as cognitive variables, may help to understand when and within what contexts IPE interventions are of benefit in altering the stereotypical views of undergraduate health and social care students.

Declaration of interest

The authors report no conflicts of interest

References

Allport, G. (1954). *The nature of prejudice*. Reading MA: Addison-Wesley.

Ateah, C., Snow, W., Wener, P., MacDonald, L., Metge, C., Davis, P., . . . Anderson, J. (2011). Stereotyping as a Barrier to Collaboration: Does Interprofessional Education make a Difference? *Nurse Education Today*, *31*, 208-213.

Barnes, D., Carpenter, J., & Dickinson, C. (2000). Interprofessional Education for Community Mental Health: Attitudes to Community Care and Professional Stereotypes. *Social Work Education*, *19*(6), 565-583.

Bell, L., & Allain, L. (2011). Exploring Professional Stereotypes and Learning for Inter-professional Practice: An Example from UK Qualifying Level Social Work Education. *Social Work Education, 30*(3), 266-280.

Brown, R., Hewstone, M. (2005). An Integrative Theory of Intergroup Contact. *Advances in Experimental Social Psychology, 37*, 255-343.

Carpenter, J. (1995). Doctors and Nurses: Stereotypes and Stereotype Change in Interprofessional Education. *Journal of Interprofessional Care, 9*(2), 151-161.

Carpenter, J., & Dickinson, H. (2008). *Interprofessional Education and Training*. Bristol: Policy Press.

Field, A. (2009). *Discovering Statistics Using SPSS*. London: Sage Publications Ltd.

Hammick, M., Freeth, D., Koppel, I., Reeves, S., & Barr, H. (2007). A best evidence systematic review of interprofessional education: BEME Guide number 9. *Medical Teacher, 29*, 735-751.

Hall, P. (2005) Interprofessional teamwork: Professional cultures as barriers. *Journal of Interprofessional Care, 19* (2) 188-196.

Hawkes, G., Nunney, I., & Lindqvist S. (2013). Caring for attitudes as a means of caring for patients – improving medical, pharmacy and nursing students' attitudes to each other's professions by engaging them in interprofessional learning. *Medical Teacher, 35*, e1302-e1308.

Hean, S., Macleod Clark, J., Adams, K., & Humphris, D. (2006). Will opposites attract? Similarities and differences in students' perceptions of the stereotype profiles of other health and social care professional groups. *Journal of Interprofessional Care, 20*(2), 162-181.

Hind, M., Norman, I., Cooper, S., Gill, E., Hilton, R., Judd, P., & Jones, Sue. (2003). Interprofessional perceptions of health care students. *Journal of Interprofessional Care, 17*(1), 21-34.

Hoffman, S.J., Harnish, D. (2007). The merit of mandatory interprofessional education for pre-health professional students. *Medical Teacher, 29*, e235-e242.

Jacobsen, F., & Lindqvist, S. (2009). A two-week stay in an Interprofessional Training Unit changes students' attitudes to health professionals. *Journal of Interprofessional Care, 23*(3), 242-250.

Katz, J.S., Titiloye, V.M., & Baloun, J.A. (2001). Physical and occupational therapy undergraduates' stereotypes of one another. *Perceptual and Motor Skills, 92*, 843-851.

Lindqvist, S., Duncan, A., Shepstone, L., Watts, F., & Pearce, S. (2005a). Case-based learning in cross-professional groups - the development of a pre-registration interprofessional learning programme. *Journal of Interprofessional Care, 19*(5), 509-520.

Lindqvist, S., Duncan, A., Shepstone, L., Watts, F., & Pearce, S. (2005b). Development of the 'Attitudes to Health Professionals Questionnaire' (AHPQ): A measure to assess interprofessional attitudes. *Journal of Interprofessional Care*, 19(3), 269-279.

Maio, G., & Haddock, G. (2010). *The Psychology of Attitudes and Attitude Change*. London: Sage Publications Ltd.

Martin, G.N., Carlson, N.R., & Buskist, W. (2007). *Psychology*. Great Britain: Pearson Education Limited.

Mandy, A., Milton, C., & Mandy, P. (2004). Professional stereotyping and interprofessional education. *Learning in Health and Social Care*, 3, 154-170.

O'Halloran, C., Hean, S., Humphris, D., & Macleod Clark, J. (2006). Developing common learning: the New Generation Project undergraduate curriculum model. *Journal of Interprofessional Care*, 20 (1), 12-28.

Parker, H.J., & Chan, F. (1986). Stereotyping. Physical and occupational therapists characterize themselves and each other. *Physical Therapy*, 66, 668-672.

Pettigrew, T., & Tropp, L. (2008). How does intergroup contact reduce prejudice? Meta-analytic tests of three mediators. *European Journal of Social Psychology*, 38, 922-934.

Quadflieg, S., Turk D.J., Waiter G.D., Mitchell, J.P., Jenkins, A.C., & Macrae, C.N. (2008). Exploring the neural correlates of social stereotyping. *Journal of Cognitive Neuroscience*, 21 (8), 1560-1570.

Rudland, J. R., & Mires, G. J. (2005). Characteristics of doctors and nurses as perceived by students entering medical school: implications for shared teaching. *Medical Education*, 39(5), 448-455.

Tajfel, H. (1981). *Human groups and social categories: studies in social psychology*. Cambridge: Cambridge University Press.

Tunstall-Pedoe, S., Rink, E., & Hilton, S. (2003). Student attitudes to undergraduate interprofessional education. *Journal of Interprofessional Care*, 17(2), 161-172.

WHO. (2010). Framework for Action on Interprofessional Education & Collaborative Practice. Switzerland: World Health Organisation

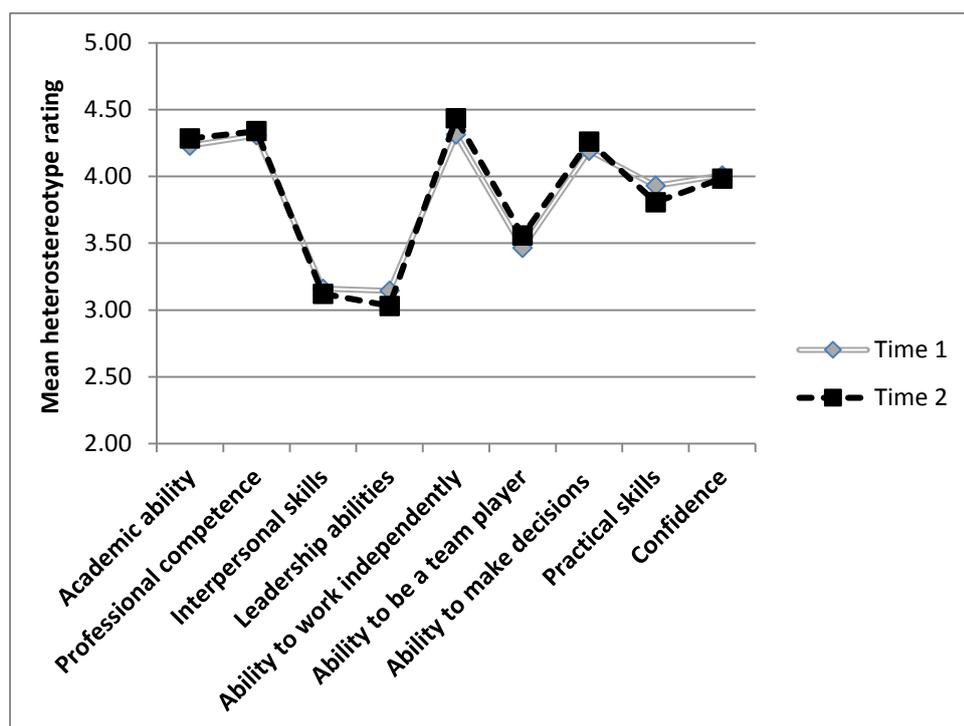


Figure 1 - Changes in the stereotype profile of pharmacists over time (Comparison group)

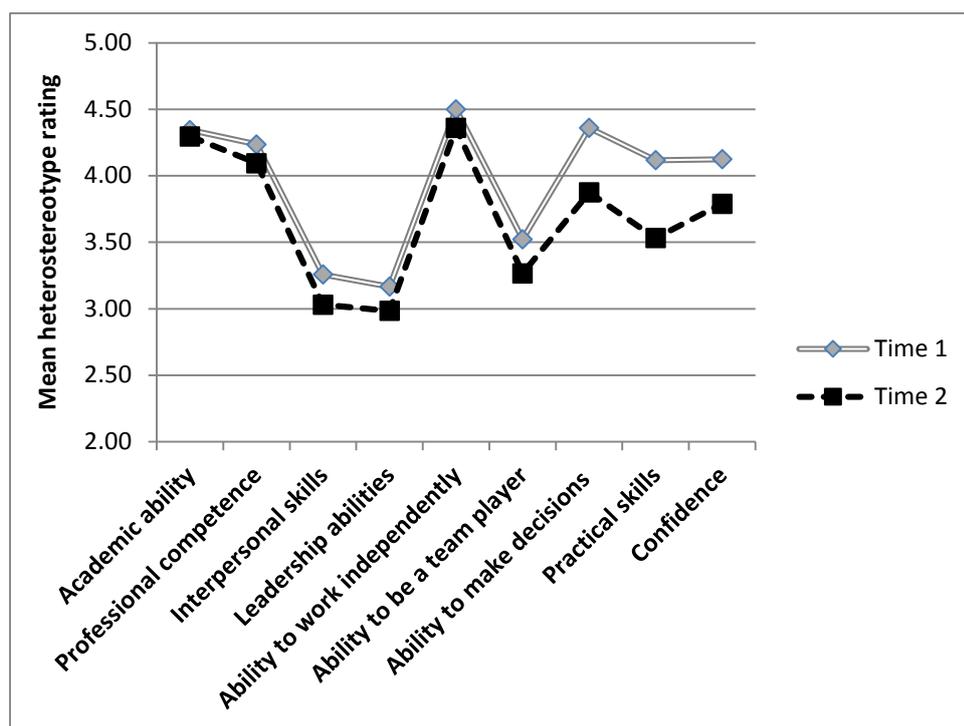


Figure 2 - Changes in the stereotype profile of pharmacists over time (Intervention group)

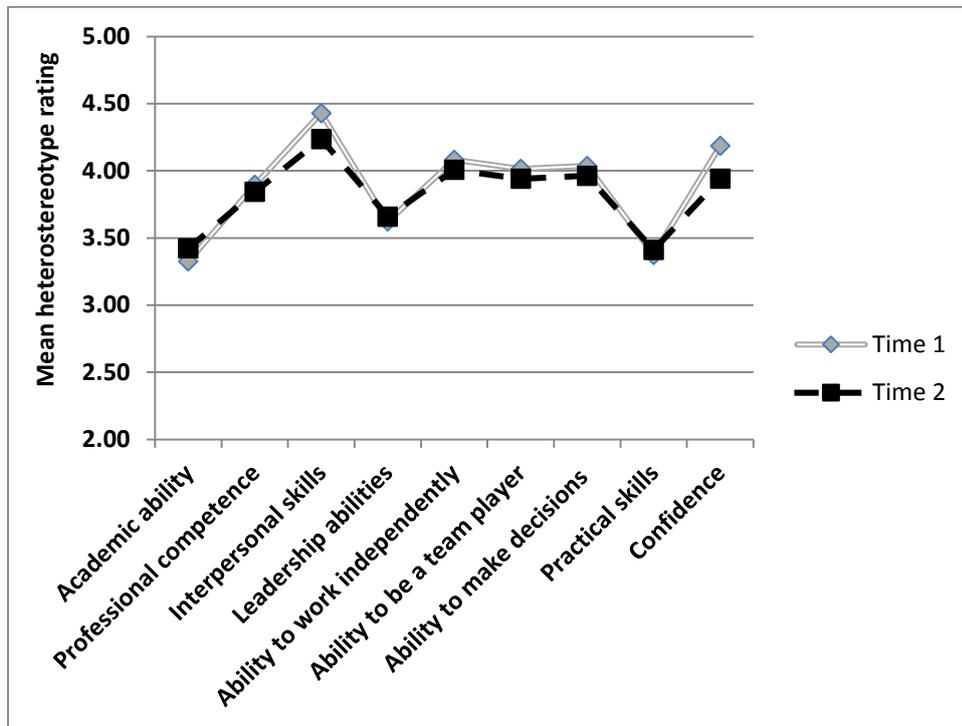


Figure 3 - Changes in the stereotype profile of social workers over time (Comparison group)

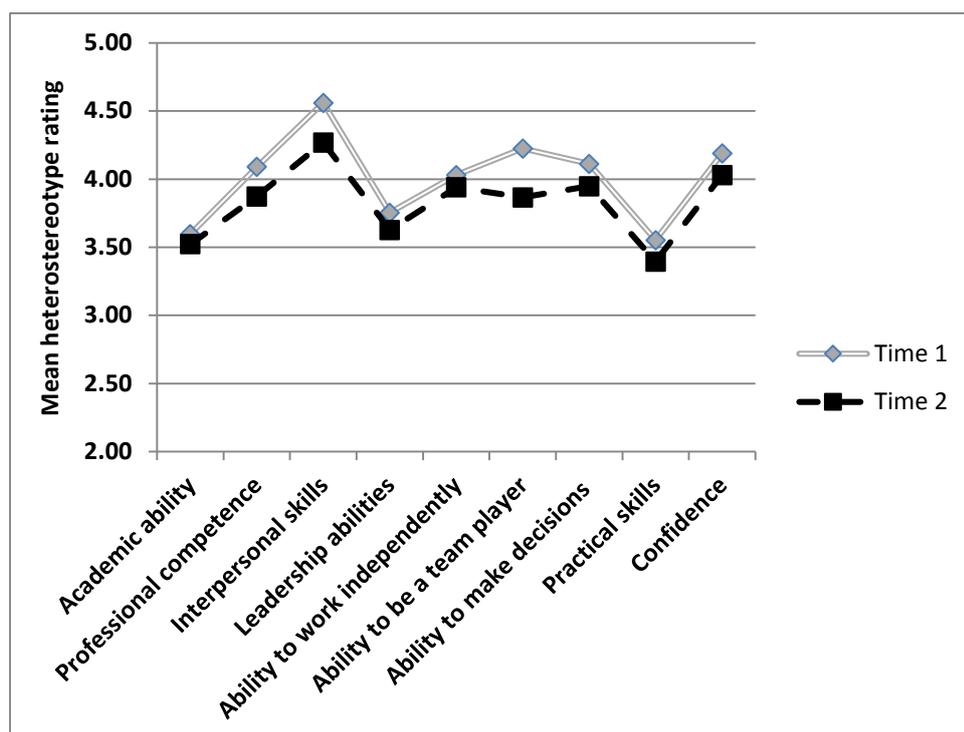


Figure 4 - Changes in the stereotype profile of social workers over time (Intervention group)

Table 1 – Number of respondents in each professional group

Professional group	Comparison group		Intervention group	
	Time 1	Time 2	Time 1	Time 2
Medicine	193	70	177	19
Midwifery	15	12	13	10
Nursing	585	364	604	335
Occupational Therapy	62	54	73	33
Pharmacy	93	47	131	40
Physiotherapy	73	61	75	36
Podiatry	27	25	39	24
Radiography	55	39	63	43
Social work	5	0	58	24
Audiology			28	16
Total	1108	672	1261	580

Table 2 – Comparison group, mean heterostereotype ratings at Times 1 and 2

		Audiologists	Doctors	Midwives	Nurses	Occupational Therapists	Pharmacists	Physiotherapists	Podiatrists	Radiographers	Social Workers
Number of raters		NA	148	160	79	158	138	160	153	157	145
Academic ability	T1	NA	4.83*	3.87	3.53	3.55	4.23	3.82	3.76	4.00	3.33
	T2	NA	4.59	3.87	3.51	3.68	4.28	3.90	3.76	3.91	3.42
Professional Competence	T1	NA	4.38*	4.33	4.04*	4.07	4.31	4.14	4.06	4.15	3.90
	T2	NA	4.23	4.29	3.83	4.00	4.34	4.23	4.14	4.26	3.84
Interpersonal skills	T1	NA	3.19	4.60*	4.49*	4.21*	3.16	3.81	3.74	3.41	4.43*
	T2	NA	3.09	4.34	4.04	3.97	3.12	3.86	3.77	3.49	4.24
Leadership abilities	T1	NA	4.13*	3.75	3.28	3.42**	3.15	3.36**	3.20	3.32	3.62
	T2	NA	3.92	3.75	3.30	3.59	3.03	3.70	3.22	3.32	3.66
The ability to work independently	T1	NA	4.47	4.15	3.68	3.91**	4.31	4.03**	4.16**	4.19	4.08
	T2	NA	4.35	4.23	3.83	4.11	4.44	4.34	4.34	4.23	4.01
The ability to be a team player	T1	NA	3.40	4.11	4.32*	3.95	3.47	3.80	3.63	3.79	4.01
	T2	NA	3.43	3.95	3.87	3.95	3.56	3.95	3.62	3.82	3.94
The ability to make decisions	T1	NA	4.74*	4.23	3.73	3.99	4.19	4.00**	4.07	3.97	4.04
	T2	NA	4.51	4.22	3.59	4.09	4.26	4.17	4.11	3.85	3.96
Practical skills	T1	NA	4.15*	4.59*	4.38*	4.14	3.93	4.44	4.26	4.16	3.37
	T2	NA	3.91	4.39	4.01	4.01	3.81	4.34	4.28	4.05	3.41
Confidence	T1	NA	4.58	4.19	4.03*	4.10	4.01	4.15	3.95	4.03	4.19*
	T2	NA	4.53	4.11	3.70	3.97	3.98	4.20	3.99	4.03	3.94

Grey shading indicates a significant difference in mean rating over time (probability level 0.05). * Indicates a decrease over time and ** an increase.

Table 3 – Intervention Group, mean heterostereotype ratings at Times 1 and 2

		Audiologists	Doctors	Midwives	Nurses	Occupational Therapists	Pharmacists	Physiotherapists	Podiatrists	Radiographers	Social Workers
Number of raters		138	139	141	62	146	133	146	148	129	137
Academic ability	T1	4.04*	4.85*	3.88	3.62*	3.70*	4.34	3.98	3.73	4.00	3.60
	T2	3.86	4.67	3.85	3.28	3.53	4.30	3.99	3.61	3.90	3.52
Professional Competence	T1	4.25*	4.38*	4.32	4.12	3.97	4.24	4.21	4.08*	4.35*	4.09*
	T2	3.91	4.21	4.20	3.97	3.89	4.09	4.09	3.87	4.10	3.87
Interpersonal skills	T1	3.95*	3.49*	4.71*	4.44	4.18*	3.26*	3.99*	3.63	3.71*	4.56*
	T2	3.70	3.07	4.39	4.21	3.91	3.03	3.74	3.53	3.24	4.27
Leadership abilities	T1	3.40	4.08	3.70	3.43*	3.40	3.17*	3.24	3.27	3.16	3.75
	T2	3.34	3.93	3.67	3.07	3.38	2.98	3.38	3.28	3.20	3.63
The ability to work independently	T1	4.24*	4.50*	4.12	3.75	4.09*	4.50	4.28	4.23*	4.27	4.03
	T2	4.02	4.30	4.24	3.57	3.92	4.36	4.20	4.05	4.18	3.94
The ability to be a team player	T1	3.72	3.53*	4.27*	4.49*	3.88	3.52*	3.75	3.58	3.78*	4.22*
	T2	3.55	3.27	3.88	4.10	3.77	3.27	3.83	3.56	3.48	3.87
The ability to make decisions	T1	4.18*	4.74*	4.28	3.90*	4.08*	4.36*	4.14	4.08*	4.06*	4.11
	T2	3.87	4.49	4.16	3.44	3.86	3.88	4.06	3.72	3.75	3.95
Practical skills	T1	4.17*	4.18*	4.62*	4.43	4.20*	4.12*	4.53*	4.23*	4.33*	3.55
	T2	3.90	4.01	4.35	4.25	3.91	3.53	4.26	4.04	3.94	3.40
Confidence	T1	4.03*	4.51	4.21	3.95	4.03*	4.13*	4.09	3.92	4.03	4.19
	T2	3.76	4.51	4.15	3.75	3.81	3.79	4.13	3.83	3.88	4.03

Grey shading indicates a significant difference in mean rating over time (probability level 0.05). * Indicates a decrease over time.

Table 4 – Comparison group, changes in mean heterostereotype ratings with a medium effect size ($r > .3$)

Characteristic rated	Profession rated	Means T1, T2	t	p	r
Academic ability	Doctors	4.83, 4.59	3.99	<0.001	0.316
Interpersonal skills	Nurses	4.49, 4.04	4.072	<0.001	0.426
Leadership abilities	Physiotherapists	3.36, 3.70	-4.462	<0.001	0.432
The ability to work independently	Physiotherapists	4.03, 4.34	-3.962	<0.001	0.305
The ability to make decisions	Doctors	4.74, 4.51	3.948	<0.001	0.315
Practical skills	Nurses	4.38, 4.01	3.869	<0.001	0.408
Confidence	Nurses	4.03, 4.70	3.556	<0.001	0.380

Table 5 – Intervention group, changes in mean heterostereotype ratings with a medium effect size ($r > .3$)

Characteristic	Profession	Means T1, T2	t	p	r
Academic ability	Nurses	3.62, 3.28	3.543	0.001	0.419
Professional competence	Audiologists	4.25, 3.91	4.170	<0.001	0.344
Interpersonal skills	Doctors	3.49, 3.07	4.523	<0.001	0.363
	Radiographers	3.71, 3.24	4.808	<0.001	0.395
Leadership abilities	Nurses	3.43, 3.07	2.770	0.007	0.337
The ability to be a team player	Midwives	4.27, 3.88	4.649	<0.001	0.379
	Nurses	4.49, 4.10	3.283	0.002	0.390
	Social Worker	4.22, 3.87	3.735	<0.001	0.307
The ability to make decisions	Nurses	3.90, 3.34	3.551	0.001	0.417
	Pharmacists	4.36, 3.88	5.785	<0.001	0.457
	Podiatrists	4.08, 3.72	4.302	<0.001	0.343
Practical skills	Pharmacists	4.12, 3.53	5.712	<0.001	0.452
	Radiographers	4.33, 3.94	4.230	<0.001	0.354