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Which nursing students are more ready for interprofessional learning? A cross-sectional study

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ABSTRACT

Background: It has been argued that the significance of personality in relation to students' readiness for interprofessional collaboration is an area where more research is needed. Nursing students in particular seem to be unsure about their role in the interprofessional team.
Objective: To explore associations between nursing students' readiness for interprofessional learning and personality traits with regard to biological sex, and previous work experience from health care.
Design: A cross-sectional questionnaire study.
Setting: Nursing students in year one and three enrolled in a three-year undergraduate bachelor in nursing programme.
Participants: Nursing students (n = 284) in semester two and six.
Methods: The participants completed the Readiness for Interprofessional Learning Scale and the Neuroticism, Extraversion, and Openness to experience Five Factor Inventory-3. The data were statistically analyzed by descriptive statistics, t-tests, correlations and linear regressions.
Results: Four of the five investigated personality traits – Extraversion, Openness to experiences, Agreeableness and Conscientiousness - were associated with nursing students' readiness for interprofessional learning. Moreover, nursing students in semester six were more ready for interprofessional learning regarding Negative professional identity and Roles and responsibilities than students in semester two. Female students were more ready for Teamwork and collaboration than male students.
Conclusions: Nursing students being more outgoing, open-minded, agreeable or conscientious seem to be more ready for interprofessional learning. Consequently, personality is of significance for nursing students' readiness for interprofessional learning.

1. Introduction

Today's health care faces major challenges such as growing inequalities of health and unhealth, increased risk of pandemics, and an increasing proportion of older people in society. Frenk et al. (2010) describe how health care students leave universities poorly equipped to meet these challenges and the explanations given are described as; outdated education, competencies that do not correspond to the needs of the population, poor knowledge of teamwork, too few and too short clinical placements. In order to cope with these challenges and to ensure patient safety while maintaining high quality of care as well as being able to meet the patients' complex care needs, collaboration is required across professional boundaries and between different disciplines (ibid). Nursing students often tend to be unsure about their role in the team, which could interfere with team function and decreased quality in the delivery of safe patient care.

2. Background/literature

Interprofessional learning defined by Barr et al. (2005) as "occasions when two or more professions learn with, from and about each other to improve collaboration and the quality of care" is attracting increased interest internationally as a mean to prepare future health care professionals with the objective to enhance teamwork, improve communication and break down territorial barriers. It is anticipated that these approaches can maximize professional resources and optimize patient care (Grumbach and Bodenheimer, 2004). However, being able to collaborate outside the comfort zone of one's own profession is neither intuitive nor easily learnt at work, rather collaboration needs to be implemented into curricula and practiced throughout the course of

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health care educational programmes (Barnsteiner et al., 2007). Furthermore, readiness for interprofessional collaboration seems to be related to biological sex and type of health care education. For example, female nursing students tend to be more positive to collaboration than male medical students are (Hood et al., 2014; Wilhelmsson et al., 2011). The ability to collaborate may also be influenced by the students' personality (Wilhelmsson et al., 2011).

Personality influences our thoughts, feelings and behavior and makes us unique. Personality testing identifies personality characteristics that might inform how an individual responds to or cope with different situations. The Five Factor Model (FFM) is one of the most comprehensive and widely used personality theories (Pervin et al., 2008). The FFM comprises five broad and bipolar personality traits - Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness – with which individuals' different personalities can be described. Neuroticism describes degree of emotional stability, extraversion degree of interpersonal interaction, openness to experience proneness to be open for novel ideas and values, agreeableness quality of social interaction and finally conscientiousness describes degree of goal-directed behavior (Costa and McCrae, 1991). Although the personality traits are claimed to be relatively consistent in adulthood across time and situation (McCrae and Costa, 2002; McCrae et al., 2000), longitudinal data show gradual changes in personality over time in adult samples (Terracciano et al., 2005).

Regarding personality traits and nursing students, Neuroticism has been associated with higher perceived stress (Fornés-Vives et al., 2012) and to coping styles for instance emotional coping (Fornés-Vives et al., 2016). Female nursing students tend to score higher on the personality trait Neuroticism than male nursing students (Fornés-Vives et al., 2012). Personality traits have also been studied among undergraduate nursing and midwifery students undertaking a diploma or bachelor course programme (Baldacchino and Galea, 2012a) but differences in personality traits could not be found between the two groups of students (Baldacchino and Galea, 2012b). However, a recent review concluded that there is some evidence that personality traits are associated with choice of nursing specialty (Kennedy et al., 2014). Regarding personality traits and other students, conflicts seem to be less frequent in groups of students scoring higher on the personality trait Agreeableness (Rhee et al., 2013). Extraversion and Openness to experience seem related to applied medical performance (Doherty and Nugent, 2011) whereas Conscientiousness has been associated with performance in medical school (Doherty and Nugent, 2011) and academic performance (Poropat, 2009; Richardsson et al., 2012). It has also been argued that procrastination may be a negative facet of Conscientiousness (Steel, 2007), which could lead to less ability to accomplish challenging assignments (Steel et al., 2001).

It has been argued that the significance of personality in relation to students' readiness for interprofessional collaboration is an area where more research is needed (Wilhelmsson et al., 2011). Avrech Bar et al. (2018) found in their study that nursing, occupational therapy (OT) and physiotherapy (PT) students scored highest on the personality traits Openness and Agreeableness, suggesting caring natures, altruistic ideals and openness to different types of diversity, for example positive attitudes to interprofessional collaboration. However, nursing students' perception of cooperation and perceived autonomy and competency in their profession was lower than compared to OT and PT students, which might indicate a tendency to believe that they are supporters of physicians (ibid). This is corroborated by our experiential knowledge, as teachers and facilitators in nursing education, of how nursing students often tend to be unsure about their role in the team, which could interfere with team function and decreased quality in the delivery of safe patient care. Therefore, as nurses are a central part of health care teams, further investigations exploring the relationship between readiness for interprofessional learning and personality traits in nursing students are needed. The current study constitutes a window of opportunity as it might provide new knowledge valuable to health care educators in general and nurse educators specifically when implementing and developing IPE initiatives. The specific aim of the study was to explore associations between nursing students' personality traits and readiness for interprofessional learning with regard to biological sex, and previous work experience from health care.

3. Methods

3.1. Design

This was a cross-sectional questionnaire study using a purposive sampling procedure.

3.2. Setting and study population

The study population comprised nursing students in year one and three enrolled in a three-year undergraduate bachelor in nursing programme. Each annual cohort of students consists of approximately 210 students in year one and 200 students in year three. In year one, during the second semester and in year three during the sixth and final semester students have between five and eight weeks of clinical placement in acute hospital settings during which they are supposed to practice collaboration in interprofessional health care teams. Students in year three participate in an additional two week long mandatory interprofessional clinical placement at a clinical training ward where they work with a high degree of independence in interprofessional teams made up of nursing, medical, OT and PT students (Carlson et al., 2011). Students were recruited in September 2017 and January 2018. Written information about the study was posted on the university's learning platform Itslearning©, repeated verbally and distributed manually by the last author during mandatory introduction lectures prior to the start of the clinical placements. Students were informed that participation was voluntarily and completed questionnaires were regarded as consent to participate. The last author had no previous contact with students as teacher or in an examining role.

3.3. Data collection

During the autumn term of 2017, 90 students out of 121 in semester two completed the questionnaires yielding a response-rate of 74%. For semester six students, 49 out of 92 questionnaires were completed yielding a response-rate of 53%. During the spring term of 2018, 87 out of 122 questionnaires were completed by students in semester two, yielding a response-rate of 71%. Fifty-eight of 80 questionnaires were completed by students in semester six, yielding a response-rate of 72%.

3.4. Questionnaires

Background data i.e. age, gender, work-experience from health care were gathered through self-reports.

The Swedish version of the Readiness for Interprofessional Learning Scale (RIPLS) was used to collect data on students' readiness for interprofessional learning (Lauffs et al., 2008). The RIPLS consists of 19 items scaled 1–5 (1 = strongly agree to 5 = strongly disagree). The RIPLS is divided in four dimensions: 1.Teamwork and Collaboration, 2. Negative professional identity, 3. Positive professional identity, 4. Roles and responsibilities. Higher scores on dimensions 1 and 3 indicate higher readiness for interprofessional learning while higher scores on dimensions 2 and 4 indicate lower readiness (McFadyen et al., 2006; Lauffs et al., 2008). Cronbach's alpha for the RIPLS in the present study were: Teamwork and collaboration, 0.778, Negative professional identity, 0.584, Positive professional identity, 0.707, Roles and responsibilities, 0.384.

The Swedish version of the Neuroticism, Extraversion, and Openness to experience Five Factor Inventory-3 (NEO-FFI-3) was used to collect data on personality traits. The NEO-FFI-3 consists of 60 items

scaled 0–4 (0 = strongly agree to 4 = strongly disagree) (Costa and McCrae, 2010). Cronbach's alpha values for the NEO-FFI-3 in the present study were: Neuroticism, 0.842; Extraversion, 0.797; Openness to experiences, 0.715; Agreeableness, 0.752; Conscientiousness, 0.794.

3.5. Statistical analyses

Data were analyzed with the IBM SPSS Statistics version 24. Descriptive statistics i.e. frequencies, percentages, means and standard deviations (SD) were used to describe the study population. Independent sample *t*-tests were used to study differences between subgroups and Chi-squared tests were used for comparisons of proportions. Pearson's correlation coefficients were used to study associations between investigated variables and multiple regression models were calculated to identify predictors of dependent variables. Statistical significance was set to $p \leq 0.05$.

3.6. Ethical considerations

The study was approved by (the regional ethical review board at Lund University). The study adhered to the Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects (WMA, 2013). All participants were informed both verbally and in writing about the aim of the study, that their participation was voluntary and that they could discontinue their participation at any time. A completed questionnaire was considered as consent to participate.

4. Results

4.1. Characteristics of the study population

In total, 284 students completed the questionnaire on background data and these data are presented in Table 1. The students in semester six were older than students in semester two but no difference with regard to gender was found. A larger proportion of students in semester six worked in the field of health care during their education compared to students in semester two. Additional background characteristics are presented in Table 1.

4.2. Differences in readiness for interprofessional learning and personality traits

Students in semester two scored significantly higher on the dimensions Negative professional identity and Roles and responsibilities compared to students in semester six indicating lower readiness for interprofessional learning. Female students scored higher on the dimension Teamwork and collaboration compared to male students (mean 37.0, SD 4.0 versus 38.6, SD 4.3, $p = 0.014$) indicating higher readiness for interprofessional learning. Female students scored higher than male students on the personality traits Neuroticism, Agreeableness and Conscientiousness (Table 2). No difference in readiness for interprofessional learning was found between students who had work experience from the health care sector before starting the education and those without this experience. Students working in the field of health care during their studies scored lower on the dimension Roles and responsibility than students not working in this area during their studies (mean 6.9, SD 2.3 versus 7.8, SD 1.9, $p = 0.001$) indicating higher readiness.

4.3. Bivariate associations between personality traits and readiness for interprofessional learning

The personality traits - Extraversion, Openness to experiences and Agreeableness - were positively associated with readiness for interprofessional learning with regard to Teamwork and collaboration and Positive professional identity. Extraversion, Openness to experiences, Agreeableness and Conscientiousness were negatively associated with Negative professional identity. Conscientiousness was negatively associated with Roles and responsibility. Neither Neuroticism nor age did correlate with readiness for interprofessional learning (Table 3).

4.4. Personality traits as predictors of readiness for interprofessional learning

Four multiple regression models with the four dimensions of readiness for interprofessional learning as dependent variables and personality traits as independent variables were performed (Table 4). The first multiple regression model, explaining 18.5% of the variance in the dependent variable Teamwork and collaboration, identified Extraversion, Openness to experiences and Agreeableness as positive predictors. The second model explaining 12% of the variance in Negative professional identity identified Extraversion, Openness to experiences and semester as negative predictors. In the third model, explaining 12.7% of the variance in Positive professional identity, Extraversion and Openness to experiences were identified as positive predictors. In the fourth and last model, explaining 10% of the variance in Roles and responsibility, Conscientiousness and semester were identified as negative predictors while work experience was a positive predictor of Roles and responsibilities.

5. Discussion

The present study showed that four of the five investigated personality traits were associated with students' readiness for

Table 1
Background characteristics of the study population n = 284.

	Total n (%)	Semester 2 n (%)	Semester 6 n (%)	Differences between semester 2 and 6 P-values
Age mean (SD[a])	26.8 (6.1)	26.1 (6.2)	27.9 (5.7)	**0.013**[#]
Gender				0.863[##]
Men	49 (17.3)	31 (17.5)	18 (16.8)	
Women	230 (81.0)	143 (80.8)	87 (81.3)	
Intergender	5 (1.8)	3 (1.7)	2 (1.9)	
Previous work experience in health care				0.621[##]
Yes	159 (56.0)	97 (54.8)	62 (57.9)	
No	123 (43.3)	79 (44.6)	44 (41.1)	
Working in the field of health care during the studies				**0.001**[##]
Yes	138 (48.6)	59 (33.3)	79 (73.8)	
No	145 (51.1)	117 (66.1)	28 (26.2)	

n = number. Independent samples t-test[#] and chi-squared tests[##] were used for comparisons.
Bold numbers indicate a significant difference (p ≤ 0.05).
[a] SD = Standard Deviation.

Table 2
Differences in students' readiness for interprofessional learning and personality traits between semester two and six and between male and female students.

Variables	Semester 2 Mean (SD[a])	Semester 6 Mean (SD[a])	Differences between students in semester 2 and 6 p-values	Male students Mean (SD[a])	Female students Mean (SD[a])	Differences between male and female students p-values
Readiness for interprofessional learning						
Teamwork and collaboration	38.5 (4.2)	38.2 (4.3)	0.580	37.0 (4.0)	38.6 (4.3)	**0.014**
Negative professional identity	5.6 (2.0)	5.1 (1.9)	**0.023**	5.2 (1.6)	5.5 (2.1)	0.381
Positive professional identity	15.7 (2.6)	15.5 (3.1)	0.568	15.5 (2.5)	15.7 (2.8)	0.626
Roles and responsibilities	7.8 (2.0)	6.6 (2.3)	**0.001**	7.7 (2.4)	7.3 (2.1)	0.277
Personality traits						
Neuroticism	22.0 (8.5)	22.0 (8.1)	0.984	18.8 (7.2)	22.7 (8.3)	**0.002**
Extraversion	31.4 (6.9)	30.4 (6.6)	0.243	30.3 (7.8)	31.1 (6.5)	0.502
Openness to experiences	27.9 (7.0)	27.9 (7.0)	0.949	27.9 (6.1)	27.7 (6.9)	0.876
Agreeableness	35.9 (6.4)	35.9 (6.0)	0.942	31.8 (7.8)	36.8 (5.5)	**0.001**
Conscientiousness	35.3 (6.5)	34.5 (6.0)	0.310	32.2 (7.1)	35.6 (5.9)	**0.001**

For the variables Teamwork and collaboration and Positive professional identity, a higher value indicates better Readiness for interprofessional learning. For the variables Negative professional identity and Roles and responsibilities, a higher value indicates lower readiness for interprofessional learning. Independent samples *t*-tests were used. Bold numbers indicate a significant difference ($p \leq 0.05$).

[a] SD = standard deviation.

Table 3
Bivariate associations between readiness for interprofessional learning and personality traits.

	Teamwork and collaboration	Negative professional identity	Positive professional identity	Roles and responsibilities
Neuroticism	−0.076	0.109	−0.100	0.112
Extraversion	**0.342**[a]	**−0.287**[a]	**0.310**[a]	0.047
Openness to experiences	**0.257**[a]	**−0.173**[a]	**0.220**[a]	−0.017
Agreeableness	**0.221**[a]	**−0.131**[b]	**0.143**[b]	−0.052
Conscientiousness	**0.133**[b]	**−0.121**[b]	0.056	**−0.158**[a]
Age	0.062	−0.093	0.066	0.099

Analysis was made using Pearson's correlation coefficient Bold numbers indicate a significant correlation (p ≤ 0.01a or p ≤ 0.05b).

[a] Correlation is significant at the 0.01 level (2-tailed).

[b] Correlation is significant at the 0.05 level (2-tailed).

interprofessional learning. Moreover, students in semester six were more ready for interprofessional learning regarding Negative professional identity and Roles and responsibilities than students in semester two. Female students were more ready for Teamwork and collaboration than male students and those who worked in the field of health care during their studies reported higher readiness for interprofessional learning regarding Roles and responsibility.

As expected, no difference regarding personality traits was found between students in semester two and six but there were differences between female and male students. The female nursing students in the current study scored higher on the personality trait Neuroticism than male nursing students, which is in line with previous research (Fornés-Vives et al., 2012). Besides higher scores on Neuroticism, female students scored higher on the personality traits Agreeableness and Conscientiousness, which is in line with previous research showing that women tend to score higher on Neuroticism and Agreeableness (Costa Jr. et al., 2001; Schmitt et al., 2008; Weisberg et al., 2011) and Conscientiousness than men do (Schmitt et al., 2008). However, it has also been reported that women score higher on Extraversion compared to men (Schmitt et al., 2008). This difference between studies may be due to differences in study populations and use of different questionnaires to measure the Big Five personality traits – Neuroticism, Extraversion, Openness to experience, Agreeableness and Conscientiousness.

In line with previous research (Wilhelmsson et al., 2011), the current study showed that female nursing students were more ready for interprofessional learning with regard to Teamwork and collaboration than male students. Given that Teamwork and collaboration constitutes one part of team functioning in interprofessional health care teams (Canadian Interprofessional Health Collaborative, 2010) and that almost one fifth of the students in the current study were males, nursing programmes need to develop educational strategies to better support readiness for interprofessional learning among male students. The students in semester two scored higher on the dimensions Negative professional identity and Roles and responsibilities, signifying lower readiness for interprofessional learning. This finding may be quite logical because the students in semester two were just about to start their first clinical placement as nursing students at the time for data collection. Although the difference was significant it was rather small, which also may signify that the students in term six need to be strengthened even more regarding their professional identity and the roles they play in the team. Considering, that no differences in the other two dimensions, Teamwork and collaboration and Positive professional identity, between students in semester two and six was found, it could be argued that nursing students need more education focusing interprofessional learning to increase their readiness prior to their clinical placement in semester six.

Four of the five investigated personality traits were associated with interprofessional learning, which shows that students' individual differences probably need to be taken into consideration in learning activities focusing interprofessional learning. The personality trait Extraversion reflects a person's degree of interpersonal interaction (Pervin et al., 2008). A person scoring higher on Extraversion could be described as talkative and optimistic preferring to socialize in large groups. A person scoring lower on this trait is more introvert and reserved in disposition preferring solitude or small groups (Costa and McCrae, 2010). These dispositions may explain that Extraversion was positively associated with both Teamwork and collaboration and Positive professional identity showing that students scoring higher on this personality trait were more ready for interprofessional learning. The dimension Teamwork and collaboration measures readiness of interprofessional learning focussing on learning together with other students and the dimension Positive professional identity measures aspects of shared learning depicting a higher degree of interpersonal interaction (Lauffs et al., 2008), which is probably in accordance with students scoring higher on Extraversion. Students scoring lower on Extraversion seemed less ready for Teamwork and collaboration and they also reported lower Positive professional identity, which may be explained by personality characteristics such as being quieter and preferring smaller groups. The dimension Negative professional identity includes beliefs that it is not necessary to learn together with other students (Lauffs et al., 2008). The current study found a negative association between this dimension and Extraversion implying that students scoring lower

Table 4
Multiple regression models with readiness for interprofessional learning as dependent variable.

Variables	B (SE)	P-values	Beta	95% CI for Exp(B)	
				Lower	Upper
Teamwork and collaboration					
Extraversion	0.193 (0.037)	**0.001**	0.310	0.121	0.266
Openness to experiences	0.128 (0.034)	**0.001**	0.205	0.060	0.195
Agreeableness	0.084 (0.039)	**0.033**	0.123	0.007	0.160
Conscientiousness	−0.010 (0.040)	0.798	−0.015	−0.089	0.069
Sex	1.091 (0.587)	0.064	0.106	−0.064	2.247
Semester	0.171 (0.516)	0.740	0.020	−0.845	1.188
Working during studies	0.376 (0.500)	0.453	0.044	−0.608	1.359
$R^2 = 0.185$					
Negative professional identity					
Extraversion	−0.078 (0.018)	**0.001**	−0.268	−0.113	−0.043
Openness to experiences	−0.041 (0.017)	**0.014**	−0.142	−0.074	−0.009
Agreeableness	−0.029 (0.019)	0.124	−0.092	−0.066	0.008
Conscientiousness	−0.012 (0.019)	0.534	−0.039	−0.050	0.026
Sex	0.450 (0.285)	0.115	0.094	−0.111	1.010
Semester	−0.648 (0.251)	**0.010**	−0.159	−1.142	−0.155
Working during studies	−0.008 (0.242)	0.973	−0.002	−0.486	0.469
$R^2 = 0.120$					
Positive professional identity					
Extraversion	0.117 (0.023)	**0.001**	0.290	0.072	0.163
Openness to experiences	0.073 (0.023)	**0.002**	0.181	0.028	0.118
Agreeableness	0.034 (0.026)	0.191	0.078	−0.017	0.085
Sex	−0.006 (0.389)	0.989	−0.001	−0.771	0.760
Semester	0.131 (0.346)	0.705	0.023	−0.550	0.812
Working during studies	0.290 (0.334)	0.386	0.053	−0.368	0.949
$R^2 = 0.127$					
Roles and responsibilities					
Conscientiousness	−0.061 (0.020)	**0.003**	−0.177	−0.101	−0.021
Sex	−0.137 (0.308)	0.657	−0.026	−0.742	0.469
Semester	−0.980 (0.279)	**0.001**	−0.217	−1.529	−0.430
Working during studies	0.596 (0.270)	**0.028**	0.137	0.064	1.128
$R^2 = 0.100$					

Bold numbers indicate a significant difference ($p \leq 0.05$).

on this personality trait were more inclined to hold this kind of beliefs regarding interprofessional learning. These findings demonstrate that learning activities aimed at supporting students' interprofessional learning need to be designed with special regards to students being more reserved and quiet in disposition. One such activity might be small group discussions among a team of interprofessional students sharing knowledge on generic patient cases as an introduction to the more demanding learning environment during clinical practice, thus facilitating an opportunity of starting a process of friendship and trust.

The personality trait Openness to experience was positively associated with Teamwork and collaboration and Positive professional identity and negatively associated with Negative professional identity. Openness to experience reflects a person's degree of seeking experiences and enjoyment (Pervin et al., 2008). A person scoring higher on Openness to experience could be described as being curious, open to novel ideas and unconventional values whereas a person scoring lower on this trait tends to prefer the habitual and conventional. Low scorers are more reluctant to new ideas and muted in disposition compared to high scorers (Costa and McCrae, 1991). Being more open-minded in disposition may lead to better readiness for Teamwork and collaboration and Positive professional identity, which the current study could show. Openness to experience was also identified as a negative predictor of Negative professional identity, indicating lesser readiness for interprofessional learning. This finding may be explained by that persons scoring lower on Openness to experience are more reluctant to engage in novelties (Costa and McCrae, 2010), which learning with other health care students means. Therefore, the current study suggests that reluctance towards interprofessional learning is to be taken into consideration and discussed with students when preparing them for teamwork and collaboration during pre-clinical education. Moreover, students need to have the opportunity to practice interprofessional learning during their education, which is in line with Barnsteiner et al.'s (2007) argumentation that competencies to enable interprofessional teamwork should be implemented into curricula and practiced throughout the course of health care educational programmes. Thus, we suggest that campus-based interprofessional learning activities, for example student-led workshops or case-studies, are implemented not only in nursing education but also in collaborating health care educations.

The personality trait Agreeableness was identified as a positive predictor of Teamwork and collaboration, meaning that students scoring higher on this personality trait were more ready for interprofessional learning with regard to this specific dimension. It is in the nature of this personality trait to collaborate (Costa and McCrae, 2010), which explains the current finding. This finding is also in line with previous research showing that nursing students scoring higher on Agreeableness are more inclined to cooperate with other professions (Avrech Bar et al., 2018). The current study demonstrates that students scoring lower on Agreeableness i.e. being less inclined to collaborate (Costa and McCrae, 2010) which might imply less preference for teamwork. These students need to be identified and given opportunities to practice collaborative skills.

In contrast to previous research (Avrech Bar et al., 2018), the current study did not identify the personality trait Conscientiousness as a positive predictor of Teamwork and collaboration. Instead, Conscientiousness was a negative predictor of interprofessional learning with regard to Roles and responsibilities, indicating that students scoring higher on this personality trait are more inclined to be clear about their professional role and responsibility in team. This is in line with the characteristics of this personality trait such as being goal-directed, reliable and well-organised (Costa and McCrae, 2010). Based on

this result, the challenge for nursing education is to clarify the nurse's role and responsibility in health-care teams in order to empower nursing students' to position themselves as competent and proficient team-members.

5.1. Methodological considerations

A potential weakness with current study is that the sample was derived from just one university, which means that the sample may not be representative for nursing students in general. This could in turn have consequences for the generalizability of the findings. However, the data were collected during two terms i.e. autumn 2017 and spring 2018 and the sample is rather large, which could be considered as a strength. In future, it is recommended that larger studies including students from different universities and health care educations are performed. Another strength with the current study is that validated and well-known questionnaires were used to assess both personality traits and readiness for interprofessional learning. Though, one weakness with RIPLS is the low Cronbach's alphas for two of the dimensions. In particular, for the dimension Roles and responsibility, this may have consequences for the findings. However, this dimension has been less reliable in previous research based on health professional students including nursing students (Edelbring et al., 2018; Lauffs et al., 2008). RIPLS probably needs some further development and refinement to increase the stability of the dimensions.

6. Conclusion

Nursing students' personality is significant for their readiness for interprofessional learning. These individual differences are suggested to be taken into consideration in learning activities in the nursing education when preparing students for interprofessional team-work in health care. An increased awareness on behalf of lecturers that nursing students have different individual resources for team-work could result in students receiving individual support in their learning and more practice. For instance students being reserved in disposition probably need more support and practice with regard to interprofessional team-work prior to the clinical placement. The generated knowledge could contribute to altered preparations including more team-work practice prior to the clinical placement, which could facilitate the students' achievement of the learning outcomes.

Contributors

All authors have made substantial contributions to (1) the conception and design of the study, the acquisition of data, analysis and interpretation of data, (2) the drafting of the article and by revising it critically for important intellectual content, (3) final approval of the version of the manuscript to be submitted.

Declaration of Competing Interest

The authors report no declarations of interest.

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Ethical considerations

The study was approved by the regional ethical review board at Lund University (registration number 2017:365).

References

Avrech Bar, M., Katz Leurer, M., Warshawski, S., Itzhaki, M., 2018 Feb. The role of personal resilience and personality traits of healthcare students on their attitudes towards interprofessional collaboration. Nurse Educ. Today 61, 36–42. https://doi.org/10.1016/j.nedt.2017.11.005. (Epub 2017 Nov 15).

Baldacchino, D.R., Galea, P., 2012a. Student nurses' personality traits and the nursing profession: part 1. Br. J. Nurs. 21 (7), 419–425.

Baldacchino, D.R., Galea, P., 2012b. Student nurses' personality traits and the nursing profession: part 1. Br. J. Nurs. 21 (9), 530–535.

Barnsteiner, J.H., Disch, J.M., Hall, L., Mayer, D., Moore, S.M., 2007. Promoting interprofessional education. Nurs. Outlook 55, 144–150.

Barr, H., Koppel, I., Hammick, M., Reeves, S., 2005. In: Freeth, D. (Ed.), Effective Interprofessional Education. Blackwell Publishing.

Canadian Interprofessional Health Collaborative, 2010. A national interprofessional competency framework. February. http://www.cihc.ca/files/CIHC_IPCompetencies_Feb1210.pdf.

Carlson, E., Pilhammar, E., Wann-Hansson, C., 2011. The team builder: the role of nurses facilitating interprofessional student teams at a Swedish clinical training ward. Nurse Educ. Pract. 11, 309–313.

Costa Jr., P.T., McCrae, R.R., 1991. Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual: Odessa. Fl: Psychological Assessment Resources.

Costa Jr., P.T., McCrae, R.R., 2010. Revised NEO Personality Inventory-3 (NEO-PI-R-3) and NEO Five-Factor Inventory-3 (NEO-FFI-3) Professional Manual: Odessa. Psychological Assessment Resources, Fl.

Costa Jr., P.T., Terracciano, A., McCrae, R.R., 2001. Gender differences in personality traits across cultures: robust and surprising findings. J. Pers. Soc. Psychol. 81 (2), 322–331.

Doherty, E.M., Nugent, E., 2011. Personality factors and medical training: a review of the literature. Med. Educ. 45 (2), 132–140.

Edelbring, S., Abrandt Dahlgren, M., Wiegleb Edström, D., 2018. Characteristics of two questionnaires used to assess interprofessional learning: psychometrics and expert panel evaluations. BMC Med. Educ. 18, 40. https://doi.org/10.1186/s12909-018-1153-y.

Fornés-Vives J, Garcia-Banda G, Frias-Navarro D, Hermoso-Rodriguez E, Santos-Abaunzo P. Stress (2012) Neuroticism in Spanish nursing students: a two-wave longitudinal study. Res. Nurs. Health 35:589–597.

Fornés-Vives, J., Garcia-Banda, G., Frias-Navarro, D., Rosales-Viladrich, G., 2016. Coping, stress, and personality in Spanish nursing students: a longitudinal study. Nurse Educ. Today 6, 318–323.

Frenk, J., Chen, L., Bhutta, Z.A., Cohen, J., Crisp, N., Evans, T., Fineberg, H., Garcia, P., Ke, Y., Kelley, P., Kistnasamy, B., Meleis, A., Naylor, D., Pablos-Mendez, A., Reddy, S., Scrimshaw, S., Sepulveda, J., Serwadda, D., Zurayk, H., 2010. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. Lancet 376 (9756), 1923–1958. https://doi.org/10.1016/S0140-6736(10)61854-5.

Grumbach, K., Bodenheimer, T., 2004. Can health care teams improve primary care practice? JAMA. 291, 1246–1251.

Hood, K., Cant, R., Baulch, J., Gilbee, A., Leech, M., Anderson, A., Davies, K., 2014. Prior experience of interprofessional learning enhances undergraduate nursing and health care students' professional identity and attitudes to team-work. Nurse Educ. Pract. 14, 117–122.

Kennedy, B., Curtis, K., Waters, D., 2014. Is there a relationship between personality and choice of nursing speciality: an integrative literature review. BMC Nurs. 13, 40.

Lauffs, M., Ponzer, S., Saboonchi, F., Lonka, K., Hylin, U., Mattiasson, A.-C., 2008. Cross-cultural adaptation of the Swedish version of Readiness for Interprofessional Learning Scale (RIPLS). Med. Educ. 42, 405–411. https://doi.org/10.1111/j.1365-2923.2008.03017.x.

McCrae RR, Costa PT, Jr. Personality in Adulthood: A Five-Factor Theory Perspective. 2nd ed. New York: Guilford Press; 2002.

McCrae, R.R., Costa Jr., P.T., Ostendorf, F., Angleitner, A., Hrebickova, M., Avia, M.D., et al., 2000. Nature over nurture: temperament, personality, and life span development. J. Pers. Soc. Psychol. 78 (1), 173–186.

McFadyen, A.K., Webster, V.S., Maclaren, W.M., 2006. The test-retest reliability of a revised version of the Readiness for Interprofessional Learning Scale (RIPLS). J. Interprof. Care 20 (6), 633–639.

Pervin, L.A., John, O.P., Cervone, D., 2008. Personality: Theory and Research. 10. Wiley, Hoboken, NJ.

Poropat, A.E., 2009. A meta-analysis of the five-factor model of personality and academic performance. Psychol. Bull. 135 (2), 322–338.

Rhee, J., Parent, D., Basu, A., 2013. The influence of personality and ability on undergraduate teamwork and team performance. SpringerPlus. 2, 16.

Richardsson, M., Abraham, C., Bond, R., 2012. Psychological correlats of university students' academic performance: a systematic review and meta analysis. Psychol. Bull. 138 (2), 353–387.

Schmitt, D.P., Realo, A., Voracek, M., Allik, J., 2008. Why can't a man be more like a woman? Sex differences in Big Five personality traits across 55 cultures. J. Pers. Soc. Psychol. 94 (1), 168–182.

Steel, P., 2007. The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. Psychol. Bull. 133 (1), 65–94.

Steel, P., Brothen, T., Wambach, C., 2001. Procrastination and personality, performance, and mood. Personal. Individ. Differ. 30, 95–106.

Terracciano A, McCrae RR, Brant LJ, Costa PT, Jr. Hierarchical linear modeling analyses of the NEO-PI-R scales in the Baltimore Longitudinal Study of Aging. Psychol. Aging

2005;20(3):493–506.
Weisberg, Y.J., Deyoung, C.G., Hirsh, J.B., 2011. Gender differences in personality across the ten aspects of the big five. Front. Psychol. 1 (2), 178.
Wilhelmsson, M., Ponzer, S., Dahlgren, L.-O., Timpka, T., Faresjö, T., 2011. Are female students in general and nursing students more ready for teamwork and interprofessional collaboration in healthcare? BMC Med. Educ. 11, 15.
WMA, 2013. WMA Declaration of Helsinki - ethical principles for medical research involving human subjects 2013. http://www.wma.net/en/30publications/10policies/b3/, Accessed date: 16 June 2018.