

Psychological wellbeing and programme-related meaningfulness in undergraduate STEM programmes in an Irish University

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Abstract

Psychological wellbeing (PWB) of students impacts their success. The purpose of the current study was to compare the PWB of third- and fourth-year students of two Irish STEM undergraduate programmes. The Ryff 42-item PWB questionnaire was employed, along with asking, for example, how meaningful students found their programme of study and whether they felt they could approach their department lecturers. There were significant differences between the two programmes for Personal growth and Self-acceptance. There was also a significant difference in PWB scores between those whose programme was their first choice at university and those whose programme was not. Results of the current study indicate that mindfulness of students' personal growth is essential, that being offered one's first choice of university programme of study is likely to play a significant role in PWB throughout one's programme of study and that ensuring students' positive perception of approachability of lecturers is important.

Keywords: STEM; Undergraduates; Psychological Wellbeing; Meaningfulness.

1. Introduction

It has previously been reported that a student's success needs attitudes, behaviours and psychological processes that lead to engagement, thriving (Schreiner, 2010), hope (Kibby, 2015), and flourishing (Keyes & Haidt, 2003). One multidimensional approach to wellbeing involves integrating different theories of individual development and adaptive functioning. The 42-item Psychological Wellbeing (PWB) Scale conceptualisation measures six aspects of wellbeing and happiness: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (Ryff *et al.*, 2007; adapted from Ryff, 1989). Results of a study on the reliability of the 42-point Ryff scale (among other-sized Ryff scales) have suggested that the Ryff scales are overall reliable, including across age groups (Shryock &

Meeks, 2018). This scale has been used as a baseline for measuring the efficacy of interventions to improve psychological wellbeing (van Dierendonck & Lam, 2023).

The new study investigates the PWB of third- and fourth-year undergraduate students in two accredited Science, Technology, Engineering and Maths (STEM) programmes attending the same university department, the former leading to a qualification with a non-protected professional title and delivered completely within the department; the latter leading to a professional qualification with a protected title, also being a joint programme with a neighbouring university. Core (profession-specific) programme modules were taught in the studied university department by state-registered members of the profession who were also fulltime lecturers.

2. Methodology

Programme participants – The study was conducted with third- and fourth-year undergraduate degree students attending two programmes at the Department of Biological Sciences, namely the BSc Hons in Nutrition and Health Science (NHS) and the BSc Hons in Biomedical Science (BMS) at the researchers' university. Participants were those in attendance at a given lecture for their programme. All four groups were surveyed within the same week. A total of 77 (65.8% of enrolments) and 53 (94.6% of enrolments) students completed the survey from each of the two programmes. For the participating NHS students, the gender mix was Female 64/77 (83.1%); Male 13/77 (16.9%). A total of 96% of students were aged between 18 and 25 years of age (the remaining 4% indicated that they were >25y). For BMS students the gender mix was Female 37/53 (69.8%); Male 15/53 (28.3%) and one who classified themselves as Other (1.9%). All students were aged between 18 and 25 years of age. For the NHS students, the programme was the first choice for 24/77 (31.2%), second choice for 31/77 (40.2%), third choice for 18/77 (23.4%) and fourth or greater for 4/77 (5.2%). For the BMS students the programme was the first choice for 30/53 (56.6%), second choice for 17/53 (32.1%), third choice for 5/53 (9.4%) and fourth or greater choice for 1/53 (1.9%) of students.

Questionnaire – Anonymised students were presented with a hard-copy of the 42-item Ryff PWB questionnaire (Ryff *et al*, 2007, incorporating a seven-point Likert scale), together with an additional set of six question that asked the participant's gender, age-group, whether the programme of study was the first, second or other choice of the student, whether the programme added meaningfulness to the student's life (testing for student's perception of their programme), whether self-worth was connected to academic performance and whether the student felt that they could approach their MTU lecturers as needed (feelings of security).

Ethics - The study was conducted according to the Declaration of Helsinki (64th WMA General Assembly, Fortaleza, Brazil, October 2013). Ethical approval was granted by the University Ethics committee (No: RECL-20-001-A).

2.1. Analysis of Results

Excel (version 2412) was used for data entry and analysis. The 42-item Ryff PWB questionnaire was scored according to its instructions, i.e. the Likert scale individual student results were scored according to instructions, added as a total for that cohort. Scores were calculated for autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (and the total score for each individual was also calculated). Cohorts were split according to programme and whether it was the first, second or other preference for the student. Note that the mean and the standard deviations were calculated for each measure within each programme, along with noting the lowest and highest individual scores for each measure within the cohorts of NHS and BMS students. Results were statistically analysed and reported using the Welch's unpaired t-test (Welch, 1947) in preference to the Student's unpaired t-test to accommodate any non-normal distribution of data, although it could be noted that the Student's unpaired t-test gave equivalent results when checked.

3. Results

Using the 42-point score (Ryff) for determination of six measures of PWB among third- and fourth-year NHS and BMS students, the following results were compiled, as shown in Table 1.

Table 1. Analysis of the 42-point Ryff scale applied to the combined third- and fourth-year students for each of two undergraduate BSc (honours) science programmes

Student cohort*	Autonomy	Environ. mastery	Personal growth	Positive relations with others	Purpose in life	Self-acceptance
NHS 3+4 (n=77) Mean	0.5921	0.6668	0.7798	0.7864	0.7403	0.6295
NHS 3+4 (n=77) SD^	0.1470	0.1231	0.0905	0.1257	0.1430	0.1609
NHS range	0.2245-0.9388	0.3061-0.9592	0.5714-0.9796	0.1257-1	0.1430-1	0.1609-0.9796
BMS 3+4 (n=53) Mean	0.6276	0.6446	0.8471	0.8009	0.7570	0.70080
BMS 3+4 (n=53) SD	0.15578	0.1637	0.1210	0.1305	0.1635	0.1607
BMS 3+4 Range	0.2653-0.8980	0.2653-0.9388	0.5102-1	0.4286-1	0.2857-1	0.1633-0.9592

*NHS = BSc Hons in Nutrition and Health Science; BMS = BSc Hons in Biomedical Science; ^SD = standard deviation

There were no statistically significant differences for autonomy, environmental mastery, positive relations with others or purpose in life between the programmes but there was a significant difference between the programmes for personal growth ($p < .001$) and self-acceptance ($p < .01$), whereby BMS students scored higher in both cases. When overall (combined) scores for all six measures of PWB were used to test for significant difference between the two programmes, there was no significant difference found ($p = .1$). An investigation of whether there was a significant difference in overall individual scores of the 42-point Ryff scale for PWB those in both programmes who achieved their first choice of programme compared to those for whom it was second or subsequent choice showed a significant difference in total scores ($p = .01$), with the students for whom their programme of study was their first choice scoring higher for PWB.

The combined individual Ryff scores were investigated for all participants for whom their programme of study was their first choice versus those for whom the programme was their second choice and they showed that there was also a significant difference ($p < 0.05$), again with the former scoring higher than the latter. When investigating the difference in each of the six aspects of PWB between those for whom their programme was their first choice versus those for whom it was not, for autonomy and environmental mastery there was no significant difference; for personal growth there was a significant difference ($p < .001$); for positive relations with others there was no significant difference; purpose in life showed a significant difference ($p < .05$) and for self-acceptance there was no significant difference.

The majority of students felt that self-worth was connected to academic performance either very strongly, somewhat strongly, or slightly. NHS students indicated that this was the case for 58/77, or 75.3%. BMS students indicated this to be the case for 44/53, or 83%. While fewer NHS students indicated that academic performance was linked to self-worth than BMS students, the NHS students indicated a greater strength of feeling, however. A further analysis showed that most students also stated their programme of study added meaningfulness to their lives. NHS students gave a total of 66/77 (85.7%). BMS students gave a total of 46/53 (86.8%) but the difference was not significant.

For both programmes 9% of students felt that their self-worth was connected to their academic performance but did not feel that their academic programme of study added meaningfulness to their lives. An analysis of the data to determine the proportion of students for whom their programme of study added meaningfulness to their lives but for whom their self-worth was not connected to academic performance showed this to be acknowledged for 19.5% of NHS students and 13.2% of BMS students. An analysis of whether students felt that they could approach an MTU lecturer if they felt the need showed that 68.8% of NHS students felt this to be the case, similarly to BMS students, at 69.8%.

4. Discussion

Wellbeing has been stated to be important for university students as it has direct associations with mental illness and academic outcomes, in addition to having intrinsic value (du Toit *et al*, 2022). Furthermore, van Dierenderonck & Lam (2022) have shown that psychological eudaemonic well-being or happiness can be enhanced by targeted intervention programmes. The current study sought to investigate levels of eudaemonia among students in two STEM undergraduate programmes, investigating whether students differed between programmes and whether accepting their first or subsequent choice of programme affected PWB two to three years later while undertaking the programme. The programme for which the students enrolled was the first choice for only 41.5% of students in the current study – for NHS students it was the first choice for 31.2% of students, whereas it was first choice for 56.6% of BMS students.

It should be noted that the NHS programme, while training students to be nutritionists at graduation does not have as great an emphasis on vocational training as the biomedical science programme, which has mandatory professional or state body accreditation, needed to allow graduates of the programme to practise as medical scientists in Ireland. The current study, which tested for autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance showed that there was a statistically significant difference between students of the two programmes only for personal growth and for self-acceptance, with BMS students scoring higher. The higher scores for personal growth among the BMS students may possibly be explained by having module-based emphasis and training on continuous professional development, whereby BMS students (unlike NHS students) are, for example, mandatorily required to engage with reflective practice as undergraduates.

While acknowledging the relatively small sample size of BMS students when testing for a significant difference between the personal growth scores for BMS students for whom Biomedical Science was their first choice ($n=30$) and those for whom it was not ($n=23$), no significant difference was observed for the two groups ($p>.5$). Previous studies (Patanapu *et al*, 2018; Robitschek *et al*, 2012) have shown that those with well-developed personal growth initiatives are more likely to present with enhanced coping skills, deal with life challenges in a proactive manner, and to respond proactively to change compared to those with poorly developed personal growth initiatives. This may in turn explain why the higher self-acceptance scores were found among BMS than NHS students, accompanying the higher personal growth scores. It is difficult to ascertain whether being on a joint programme affected the BMS students and this would require a separate study.

The results for the six aspects of PWB were compared for these two groups with a study of college students spanning different-discipline programmes in central India (Sharma & Sharma, 2018) that used the same Ryff 42-item scale. Autonomy scores among the Irish students were lower than those of the Indian students and environmental mastery scores were very similar in

both studies. Personal growth scores were much higher in both programmes for the Irish students than for the Indian students, as were positive relations and purpose in life. Self-acceptance was considerably lower among the NHS students than the Indian students, which were in turn lower than the BMS students. One explanation for the comparatively low scores for autonomy in the current study may be that both programmes are highly prescribed with a strong emphasis on continuous assessment and laboratory and other report writing, both of which activities require a high level of compliance for the student to be successful in their degree studies.

Bell and Brooks (2017), in the UK, have found that teaching and course organisation were the most important predictors of overall student satisfaction, resources being found to be rated far less important. According to Bell (2021), a study has shown that students particularly emphasised staff approachability, empathy, sensitivity and caring. In the current study, which asked whether students felt able to approach their MTU lecturers as needed, 69 and 70% of NHS and BMS students, respectively, felt that they could approach their lecturers. There is room for improvement in these cases, however, whereby the importance of staff approachability could be emphasised at department- and university-level.

In the current study, the overall PWB of the respondents of the programmes showed that a student attending the Department of Biological Sciences is more likely to have a lower PWB score in the latter half of their degree programme if they have entered a degree programme that was not their first choice. A German study (Berlingieri *et al*, 2023) has reported that students who enrol in their preferred field show a higher identification with their field of study, report a higher satisfaction with their studies and spend four hours more per week studying two to three years after university entry. A greater level of course promotion and career guidance may be needed by the department in the current study of its programme for students preparing for entry to tertiary education. However, further study is required to determine the motivation of students for the choices they made of their preferred programmes at university, including geographical location.

The limitations of the study included that only 65.8% of the students enrolled on the NHS programme were surveyed, that the total survey population size was 130 participants and that the study was conducted at one time point only.

5. Conclusion

The results of this current study are important as they indicate that mindfulness of students' personal growth is essential, that being offered one's first choice of university programme of study is likely to play a significant role in PWB throughout one's programme of study, and that ensuring students' positive perception of the approachability of lecturers is something that might be considered. The findings of this work are transferable and can be considered for the wellbeing

of students on other programmes of study. Finally, the results of this study suggest the need for a follow-up study as part of a continuous improvement initiative.

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