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Profiling and Cross-Sectional Evaluation of Empathy Levels of Food Science Undergraduates at Wayamba University of Sri Lanka

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Abstract

The most vital and crucial ability that human being should have is empathy. This study was conducted to evaluate empathy skills of food science undergraduates of Wayamba University of Sri Lanka. Perth Empathy Scale was used as the empathy measurement tool. The study population was 501 first, second- and third-year students. PES demonstrated good internal consistency and three factor grouping was obtained for 'general cognitive empathy', 'positive affective empathy' and 'negative affective empathy'. The mean empathy score for the study population was 61.31±10.71. There is no significant difference in the mean empathy score between female (61.66±10.68) and male (60.07±10.73) students. Mean empathy scores among three academic years also do not show a significant difference. Overall, only 17.17% of students have high empathy level. Therefore, introducing empathy-driven teaching and learning to the existing curriculum is strongly recommended.

Keywords: empathy skills; undergraduates; profiling; validation; empathy scale

The most vital and crucial ability that human being should have is empathy, or the capacity to experience and comprehend what others are feeling. Empathy is a special skill that plays an important role in our society's ability to function, promoting a "sharing of experiences, needs, and desires between individuals" (Riess, 2017). More focus has been placed on the idea of empathy over the previous few decades. Even with the growth of modern technology and new concepts like artificial intelligence and robotics, empathy is a factor which can't be created or produced in a way that humans create robots or machines (Inkster et al., 2018). Empathy is one of the key factors that distinguishes human beings from machines and robots. According to Riess (2017), empathy may be learned or enhanced and is not just a natural trait.

The word empathy has come into the discussion in English language for the first time in 1909, which was a translation of the German word '*Einfu hlung'* by Psychologist Edward Tichner which has the meaning of 'feeling into' or 'in feeling'(Cuff et al., 2016; Numanee et al., 2020). Empathy and Sympathy are two separate things that most people confuse with. Simply Empathy and Sympathy can be defined as "feeling as" and "feeling for others", respectively(Cuff et al., 2016).

Empathy comprises two facets: Cognitive empathy and Affective empathy (Brett et al., 2022). Presence of these two components was highlighted byBrett et al. (2022) using multi measure factor analyses of past empathy measures and the difference is basically based on mental health(Numanee et al., 2020). Cognitive empathy is the ability or capacity to be sensitive to understand and appreciate others' perspective while affective empathy is the ability or capacity to be sensitive to and concerned for another person(Quince et al., 2016). The cognitive and affective empathy work in a collaborative way and one's overall empathy ability is created (Cuff et al., 2016). Empathy, both affective and cognitive, is essential for human behavior.

According to the experience gained byF. Diane Barth (2018), a psychotherapist in New York City when talking with clients, colleagues and friends she suggests that teaching empathy at schools should be taken into serious consideration. She further explains that it would diminish problems occurring in high schools due to bullying and harassment if it is started to teach empathy in early grades and keep teaching throughout the time of collages.

When it comes to the state universities in Sri Lanka, most students begin their undergraduate program between the ages of 20 and 22. Most students are exposed to the outside world for the first time and are required to live away from home for at least three to four years while using shared lodging options inside and outside of the university. Students from all over the island who speak different languages and come from different cultural backgrounds mingle at universities. For the majority of new students, these factors result in a lonely and frightening environment. Ragging has become a serious issue in state universities in Sri Lanka for a long time. It is a process where junior students are subjected to psychological, physical, or sexual violence, often resulting in severe health consequences(Wickramasinghe et al., 2022). According to a study conducted at University of Jaffna 59% of the students have experienced at least one type of ragging while emotional ragging was the most experienced ragging form (40%) (Wickramasinghe et al., 2022). Another study was conducted by University Grant Commission (UGC) in partnership with UNICEF and that has shown that 51%, 34.3%, 23.8% and 16.6% of the students have been subjected to verbal harassments, psychological violence, physical abuse and sexual harassments, respectively(UNICEF Sri Lanka, 2022). It has further suggested that ragging has caused major issues of students like upsetting memories and dreams, reduced interest for studies, insomnia, avoiding situations or activities, anger issues, loneliness and avoiding social

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activities(Wickramasinghe et al., 2022). A literature review done in 2019 has addressed negative effects of ragging on students and problems that occur are categorized as; physiological problems, psychological problems, changes in cognitive pattern, behavioral problems and other reactions to stressful conditions (Gunatilaka, 2019). It is further explained in the same paper that ragging has caused for leaving universities, anxiety conditions, alcohol and drug addiction, aggressive behavior, PTSD (Post Trauma Syndrome Disease) and reduced productivity.

One of the key groups that has the capacity to determine the nation's future is undergraduates. In that circumstance, universities play a significant role in developing better individuals who possess both functional abilities and humanitarian behaviors. An empathic person or student won't try to bully or harass someone for their amusement or any other reason. That person will be able to relate to others on a similar level and will comprehend their struggles and circumstances. There has never been any earlier research of this kind conducted in universities in Sri Lanka to understand the empathy skill levels of freshmen. It is important to comprehend this issue and choose specific solutions to deal with associated problems.

However, there are not many studies reported to study empathy levels in university students other than medicine related disciplines. Therefore, this study was conducted to evaluate empathy skill levels among food science undergraduates over first three years and to investigate causal socioeconomic parameters.

Method

Study design and population

Participants in the study consist of first to third year students in the Faculty of Livestock Fisheries and Nutrition at Wayamba University of Sri Lanka Makandura, Gonawila. The four-yearBScHons in Food Science and Nutrition and BScHons in Food Production and Technology Management degree programs were being pursued by the students of interest. The participants in the study came from all around the island and were enrolled at the Wayamba University of Sri Lanka after achieving the necessary cutoff marks (z scores). All participants followed biology or agriculture streams for the aforementioned examination.

Selection and validation of an empathy scaleIt is needed to utilize certain measurements to analyze and discuss the empathy of human beings. It should be done by collecting quantitative data which can be used for further analyses. Specifically designed empathy scales are used for that purpose. Most of the empathy scales are developed considering the healthcare sector and that is one major reason for not having much of an empathy study conducted for general public and university students. The Jefferson's scale for physician empathy (JSPE)(Quince et al., 2016; Shashikumar et al., 2014)and Davis's Interpersonal Reactivity Index (IRI) (Quince et al., 2016), are some main empathy scales used to understand and study empathy skills among personnel in the healthcare sector.

Perth Empathy Scale (PES), Affective and Cognitive Measure of Empathy (ACME), Adolescent Measure of Empathy and Sympathy (AMES), Basic Empathy Scale (BES), Emotion Specific Empathy (ESE), Empathy Assessment Index 17 items (EAI 17), Empathy Assessment Index 26 (EAI 26) Empathy Components Questionnaire (ECQ) Empathic Experience Scale (EES) and Questionnaire of Cognitive and Affective Empathy (QCAE) are some of the commonly used empathy scales or empathy measurement tools all around the world targeting general public(Brett et al., 2022).

Perth Empathy Scale (PES)

PES is a self-report measurement scale which includes 20 items. Each item consists of five options: 1. Almost never, 2. Sometimes, 3. About the half time, 4. Most of the time and 5. Almost always (see Appendix). It is developed in a way that asses both cognitive and affective empathy through 20 item questions and each affective and cognitive empathy is categorized as negative and positive. There are five questions or items from each negative cognitive empathy, positive cognitive empathy, negative affective empathy and positive affective empathy sub scales. PES provides five values as negative cognitive empathy, positive cognitive empathy, negative affective empathy, positive affective empathy and total empathy score for analyzing empathy profile of individuals(Brett et al., 2022).

According to Brett et al., 2022 following guidelines should be met by empathy measurement tools or empathy scales: it must be assessed cognitive and affective empathy, negative and positive valences of empathy. Also, it must be taken into account self-other distinction and emotional congruence. At the end, it must be psychometrically sound having acceptable internal consistency and good factor structure validity.

Validation of PES

In Sri Lanka, similar research has not employed the Perth Empathy Scale before. The PES is required to be validated with undergraduate Sri Lankan students. Cronbach's alpha (α) and McDonald's omega (ω) were used to gauge theinternal consistency of the data set. Principal factor analysis was also used to investigate the PES's fundamental elements(Babar et al., 2013; Brett et al., 2022).

Bartlett's test of sphericity was used to check whether there is a significant correlation between variables (Babar et al., 2013). For the factor analysis, responses from 501 participants were taken and it was a very good sample size(UCLA: Statistical Consulting Group, n.d.). Kaiser Meyer Olkin test (KMO) was performed for the analysis of sampling adequacy while eigenvalue of >1 was used for the retaining

factor in Principal Component Analysis. Varimax rotation was used as the method of extraction.

Sampling and data collection

For the study, all faculty undergraduates with the exception of those in their last year were used. PES was executed using a Google form, and another Google form was used to gather participants' demographic and socioeconomic information (age, gender, family income, details of the family, educational background etc.). The goal of the study was clearly described to the students before sharing google forms, and their agreement was secured. 30 minutes were allotted for the socioeconomic data questionnaire and 20 minutes for the PES. Students and researchers were present together for the duration of data collection, and it was ensured that the process was carried out scientifically.

Data Analysis

Descriptive analysis of demographic and socio-economic data

Descriptive statistics were used to summarize the data from the demographic and socioeconomic data questionnaire, and the acquired data were tabulated in Microsoft Excel worksheets.

Analysis of empathy scores obtained through PES

The total empathy score as well as the scores for the six subscales (negative cognitive empathy, positive cognitive empathy, negative affective empathy, positive affective empathy, cognitive empathy, and affective empathy) were calculated using Microsoft Excel 2021. Further, the MS Excel was used to calculate the mean, standard deviation, minimum, and maximum. Individuals' total empathy scores were used to determine which of three categories they belonged to: those with low, average, and high levels of empathy (Table 1).

Table 1 Standards for various levels of empathy

Empathy Level	Standard
Low	1 SD below the mean
Average	Between 1SD below and 1 SD above the mean
High	1 SD above the mean

Empathy levels of male and female students and empathy levels in two-degree programs were compared using the independent sample t test (also known as the pooled t test) with 5% significance level. Undergraduates from the first three years were compared using a one-way ANOVA test (α=0.05). For the comparison between the aforementioned groups, seven criteria were taken into account. These criteria included negative and positive cognitive empathy, positive and negative affective empathy, cognitive and affective empathy, and overall score for empathy. The relationship between the three levels of empathy (high, average and low) and various demographic and socioeconomic characteristics was examined using the chi square goodness of fit test (α=0.05).

Statistical Analysis software

Microsoft Excel and SPSS 25 were used for all calculations and statistical analyses.

Results and Discussion

Validation of the Perth Empathy Scale in the study population

Internal consistency of responses

Cronbach's alpha and McDonald's omega were calculated to assess PES's internal consistency. The outcome is displayed in Table 2.

Table 2 Reliability measures for PES responses

Subscale/Composite	Reliability	
	Cronbach's Alpha	McDonald's Omega
NCE	0.859	0.853
PCE	0.830	0.829
NAE	0.687	0.663
PAE	0.704	0.726
GCE	0.917	0.912
GAE	0.779	0.773
Total Empathy Score	0.884	0.875

The minimum value for both coefficients to be considered as consistent is 0.7 (Bird & Viding, 2014; Taber, 2018). According to the results, only negative affective empathy has produced values on the cutoff. All other subscales and composites are within the highly acceptable range according to the(Taber, 2018) interpretation.

These findings are in accord with findings from research conducted at an Australian university that validated PES under university conditions in Australia (Brett et al., 2022). Cronbach's Alpha and McDonald's Omega values for CE, AE, and GE ranged from 0.80 to 0.92 and 0.84 to 0.95 in those two investigations did in above mentioned study, respectively. In present study all values are within an acceptable range, despite the fact that the values obtained for both coefficients in the current investigation are lower than those in(Brett et al., 2022). Hence, the reliability coefficient values in the present study follows that PES can be utilized for the study population.

Principal factor analysis

The validation process also included the use of factor analysis. The KMO test was performed to see whether the sample was adequate for factor analysis. It was confirmed with an overall index of 0.897. According to Bartlett's test for sphericity it was confirmed that the intercorrelation matrix was factorable ($p = 0.000$).

Table 3 shows eigenvalues, variance percentages, and cumulative percentages of the factor analysis. The top three eigenvalues all exceeded 01. Three elements were therefore deemed to be major determinants. However, 54.4% of the overall variability may be

accounted for by the first three components. Figure 01 shows the relevant scree plot.

Table 3 Parameters of total variance of first four factors

Factor	Eigen value	% Of Variance	Cumulative %
1	6.554	32.771	32.771
2	2.616	13.081	45.851
3	1.709	8.544	54.395
4	0.949	4.743	59.138

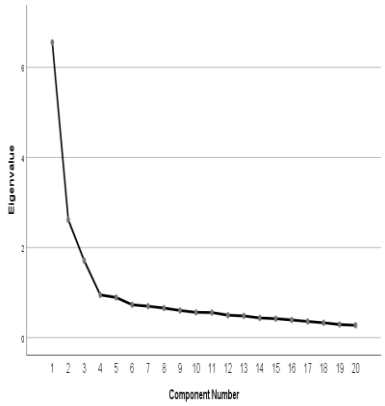

Fig. 1. Scree Plot plotted for eigenvalue against factor number

Table 04 provides the factor loadings for the three factors that were selected. The correlation coefficients between a factor and each distinct variable, or set of 20 questions in the PES, are known as factor loadings. Factor loadings for the three components range in value from 0.56 to 0.81.

Table 04 shows that elements connected to factor 01 are elements of cognitive empathy in PES. So clearly those 10 components are distinguished and grouped under factor 01. Then factor 01 can be referred to as "Cognitive Empathy."

Table 4 Loadings of 03 factor solution for PES

PES	Factor		
	1	**2**	**3**
Q1	0.69		
Q2			0.65
Q3	0.72		
Q4			0.8
Q5	0.75		
Q6		0.68	
Q7	0.69		
Q8			0.58
Q9	0.81		
Q10		0.69	
Q11	0.73		
Q12			0.56
Q13	0.74		
Q14		0.69	
Q15	0.71		
Q16			0.68
Q17	0.74		
Q18		0.75	
Q19	0.7		
Q20		0.65	

There are two other factors other than the factor "cognitive empathy". The components Q2, Q6, Q10, Q14 and Q18 are of negative affective empathy while components Q4, Q8, Q12, Q16 and Q20 are of positive cognitive empathy. All relevant components of negative affective empathy except Q2 were grouped as a factor 2. Similarly, all components of positive affective empathy except Q20 were grouped as factor 03. More or less similar factor loadings were obtained in the previous study conducted for validation of PES (Brett et al., 2022).

The factor analysis results further support the applicability of PES for the research population.

Demographic and socioeconomic characteristics of participants

A total of 501 students, including 158 from the first year, 189 from the second year, and 154 from the third year, participated in the study. However, only 469 individuals completed both questionnaires (PES and Demographic & socio-economic details). The 501 PES responses were used to examine the respondents' levels of empathy. Only 103 (22%) of the total 469 students were male, with 367 (78%) of the total being female. The faculty offers the BScHons in Food Science and Nutrition (FSN) and the BScHons in Food Production and Technology Management degree programs (FPTM). Student enrollment in two-degree programs were 266 and 203 students, respectively out of the students who participated in the study. District wise distribution of the participants was observed widely varying and shown in figure 2.

Participants' gender distribution is roughly 1:3 (male: female) for second-year students and 1:4 for other two years (Table 5). Overall, the ratio is 1 to 3. Given that there are three times as many female students as male students, this ratio might have an impact on the study findings. According to (Shashikumar et al., 2014), a study conducted in a medical college the ratio of male to female was 2.57:1, which is the opposite of how it was in our study. In a study conducted for dental students it was 1:2.6 (Babar et al., 2013) similar in the present study. For two distinct experiments conducted as part of the same research project, it was 1:5.57 and 1:1.26 (Brett et al., 2022). When compared to relevant prior studies, the gender distribution was different, which could have an impact on the outcomes.

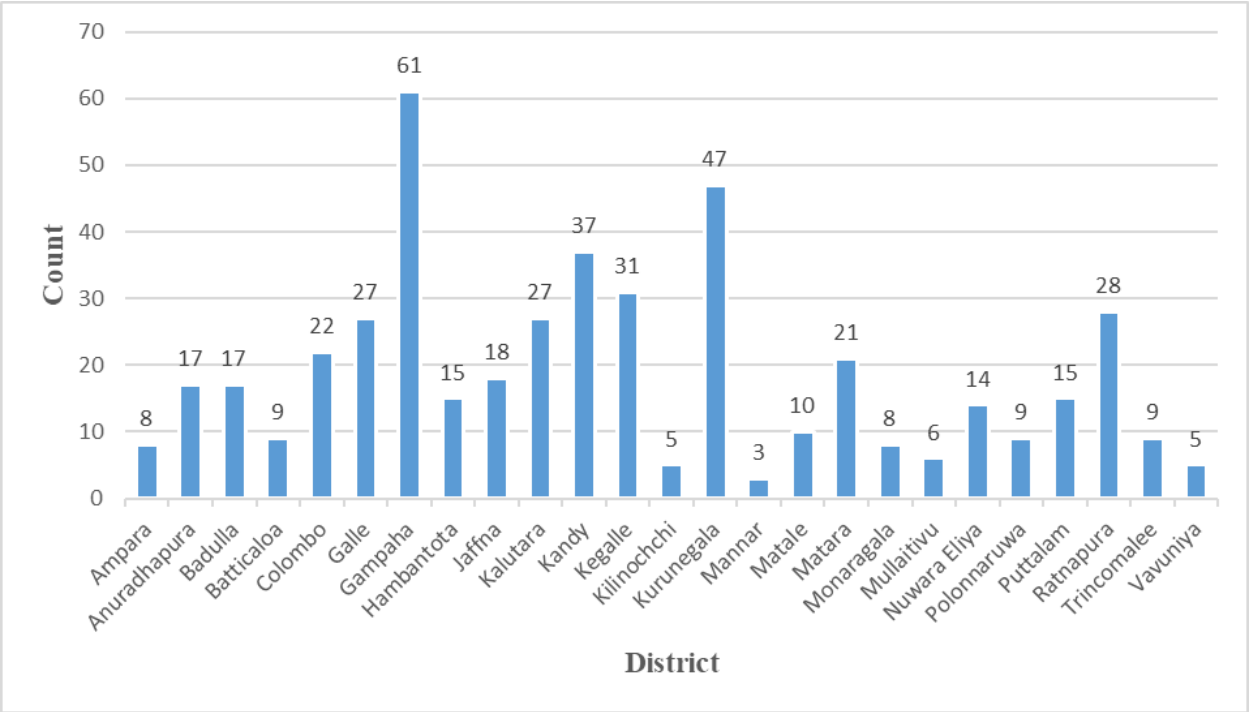

Fig. 2. District wise distribution of participants

Table 5 Gender distribution across three academic years in the population.

Academic Year	Male	Female	Male: Female
First	32	126	1: 3.93
Second	48	141	1: 2.93
Third	33	121	1: 3.66
Overall	113	388	1: 3.43

Overall Cognitive, Affective and Total Empathy

The descriptive statistics for cognitive, affective and total empathy for the whole study population is given in table 05. Based on the PES, the total empathy can vary from 20 to 100. According to Table 06, the mean total empathy in the study population is 61.31. The gap indicates that there is a great need in the faculty undergraduates to improve their empathy skills.

When findings of similar investigations are concerned, the mean empathy of 65.42 resulted from a study conducted in an Australian university utilizing PES (Brett et al., 2022). However, (Shashikumar et al., 2014) have mentioned that compared to western countries, Asian countries have less empathy skills.

The cognitive and affective empathy scores on the PES can vary from 10 to 50. According to Table 05, the mean CE and AE in the study population are 34.54 and 26.76 respectively. It shows that participants as a whole possess greater CE abilities than AE skills. This implies that the faculty undergraduates are lacking the capacity to experience the emotions of their colleagues compared to the capacity to comprehend the emotions of others. This result confirmed the study done by(Brett et al., 2022) (37.43 & 27.99, respectively in CE and AE).

The total empathy skills in the study population varies from 28 to 95 resulting in 17.5% of coefficient of variation. The coefficient of variation in similar studies ranged from 11% to 19% (Babar et al., 2013; HåkanssonEklund et al., 2019; Shashikumar et al., 2014).

According to Table 06, CE and AE scores range from 14 to 50 and 14 to 47, respectively, and it indicates a similar variation in both AE and CE skills (20.6% and 21% of CV %, respectively). This confirms that the difference between CE and AE is not due to variation. According to (Quince et al., 2016), though a different scale has been used (Interpersonal Reactivity Index -

IRI), mean CE and AE values are approximately similar in two study populations (19 and 21 respectively). However, mean CE is higher compared to mean AE in (Brett et al., 2022) which has used PES similar to the present study (37 and 28, respectively).

Therefore, these undergraduates need more opportunities to facilitate improving their AE skills as high AE skills really matter for distress and a peaceful environment among undergraduates.

Even if the CE is higher compared to AE, empathy parameters measured for this study are having lower values. This indicates that it is needed to consider more about the empathy skills of undergraduates and have to come up with strategies to overcome this issue and improve empathy skills of undergraduates.

Table 6 Descriptive statistics for CE, AE and total empathy for the entire study population.

Composite	Mean	SD	CV	Minimum	Maximum	Range
CE	34.54	7.11	20.6	14	50	14 - 50
AE	26.76	5.63	21	14	47	14 - 47
Total Empathy	61.31	10.71	17.5	28	95	28 - 95

Effect of gender on empathy skills of the undergraduates

Mean empathy scores of subscales, composites and total based on gender and the year of the study is given in Table 07.

Table 7 Mean empathy scores of subscales and composites based on gender and the academic year.

Subscale/ Composite	First Year Mean		Second Year Mean		Third Year Mean		Overall Mean	
	Female	Male	Female	Male	Female	Male	Female	Male
NCE	17.13	16.84	17.11	16.35	18.03	17.58	17.41	16.85
PCE	17.52	16.91	17	16.38	17.7	17.39	17.39	16.82
NAE	11.94	12.25	12.02	11.92	11.81	10.91	11.93	11.72
PAE	15.95	16.34	14.47	14.33	14.45	13.58	14.94	14.68
GCE	34.65	33.75	34.11	32.73	35.74	34.97	34.79	33.67
GAE	27.89	28.59	26.49	26.25	26.26	24.48	26.87	26.4
Empathy	62.54	62.34	60.6	58.98	61.99	59.45	61.66	60.07

According to table 7, there is no significant difference between male and female empathy scores of all subscales and composites at 5% significance level. This indicates similar empathy skills among male and female students of the faculty. A similar study done for dental students has shown a slightly higher empathy score for male students compared to female students, however, it hasn't shown a significant difference in mean empathy score (Babar et al., 2013). Another study done for medical students, which has used two different scales JSES and IRIECA, has shown that female students recorded significantly higher empathy scores than male students at each time point (first/second years and final years) (Quince et al., 2016). A study done in Australia to validate PES has shown a significant difference between male and female in total empathy score, general affective and cognitive empathy and both positive and negative affective empathy while those are higher in female sample. However, positive and negative cognitive empathy values in that study haven't shown a significant difference(Brett et al., 2022).

Most of the related previous studies done with different empathy scales report that the empathy level of females is significantly higher compared to males (Fjortoft et al., 2011; Kataoka et al., 2009; Magalhães et al., 2011; Sherman & Cramer, 2005). In the current study it is not showing a significant difference between male and females though the female: male ratio is higher in all studies. Some studies suggest that higher empathy level of females is due to that empathy is a more feminine trait and that females are more emotional compared to males (Babar et al., 2013; Kataoka et al., 2009).

Effect of the degree program on empathy skills

Mean empathy scores of subscales, composites and total for two different degree programs in different academic years are given in the Table 08.

Results indicate that there is no significant difference in empathy skills in undergraduates enrolled in two-degree programs. However, negative cognitive empathy and general cognitive empathy in second year students and negative affective empathy of third year students show a significant difference at 10% level of significance (Table 8).

A previous study done for medical students has shown that there is a significant decline in empathy by the time during their undergraduate period(Shashikumar et al., 2014) and another study done for medical students has shown that first, second and final year students have shown no significant difference(Quince et al., 2016).

Table 8 Mean empathy scores of subscales and composites for two-degree programs in different academic years

Subscale/ Composite	First Year Mean		Second Year Mean		Third Year Mean		Overall Mean	
	FSN	FPTM	FSN	FPTM	FSN	FPTM	FSN	FPTM
NCE	17.85	16.13	16.58*	17.35*	18.18	17.65	17.46	17.06
PCE	17.94	16.72	16.51	17.27	17.69	17.58	17.32	17.19
NAE	12.17	11.79	11.71	12.36	11.54*	11.7*	11.8	11.97
PAE	16.02	16.04	14.28	14.63	13.93	14.65	14.72	15.08
GCE	35.79	32.85	33.09*	34.61*	35.87	35.23	34.78	34.25
GAE	28.2	27.83	25.99	26.99	25.47	26.35	26.53	27.05
Empathy	63.99	60.68	59.08	61.6	61.34	61.58	61.31	61.3

**The mean difference is significant at the 0.1 level*
FSN – BSc Hons in Food Science and Nutrition degree program
FPTM – BSc Hons in Food Production and Technology Management degree program

Effect of academic year on empathy skills

The mean empathy scores for subscales, composites and total in three different academic years are shown in the Table 09.

Table 9 Mean empathy scores of subscales and composites in three academic years.

Subscale/ Composite	Mean			P value
	First Year	Second Year	Third Year	
NCE	17.08	16.92	17.94	0.032**
PCE	17.39	16.84	17.64	0.119
NAE	12.00	11.99	11.62	0.417
PAE	16.03	14.43	14.26	0.000**
GCE	34.47	33.76	35.57	0.063
GAE	28.03	26.43	25.88	0.02**
Empathy	62.50	60.19	61.45	0.133

***The mean difference is significant at the 0.05 level*

According to Table 09, negative cognitive empathy scores are significantly different among three academic years. Mean values indicate that third year students have significantly higher NCE than other two years. Mean positive affective empathy scores are highly significant among three groups (P=0.000). According to the mean values it shows that first year students have significantly high PAE compared to second- and third-year students. Overall, affective empathy skills are higher in First year students compared to other two years. However, the total empathy levels are concerned, there is no significant difference among students in three academic years.

Assessing the level of empathy in the study population

Number of students belonging to three levels of empathy i.e., low, average and high based on gender, academic year and overall are given in the Table 10.

According to Table 10, 70.1 % of the study population are having average empathy skills. 17.2 % of participants show high empathy skills while 12.8 % of participants have shown low empathy skills.

When the academic year is considered, a slightly higher percentage of first year students show low empathy level (16.5 %) compared to other two years (14.8 % and 14.3 % of second- and third-year students respectively). Around 18 % each of first- and second-year students show high empathy level. The percentage of students having high empathy levels is lower in third year students (16.2 %).

Out of the study population, a slightly higher percentage of female participants (16.2 %) show high empathy skills than male participants (15.0 %). However, similar percentage of male and female students (around 14 %) are having low empathy skills.

Table 10 : Distribution of empathy levels across various academic years.

	Academic Year	Empathy Levels		
		Low	Average	High
Female	**First Year**	23 (18.2)	78 (61.9)	25 (19.8)
	Second Year	22 (15.6)	95 (67.4)	24 (17.0)
	Third Year	19 (15.7)	80 (66.1)	22 (18.2)
	All 3 batches	54 (13.9)	271 (69.8)	63 (16.2)
Male	**First Year**	3 (9.38)	25 (78.1)	4 (12.5)
	Second Year	9 (18.7)	31 (64.6)	8 (16.7)
	Third Year	5 (15.1)	24 (72.7)	4 (12.1)
	All 3 batches	16 (14.2)	80 (70.8)	17 (15.0)
Overall	**First Year**	26 (16.5)	103 (65.2)	29 (18.3)
	Second Year	28 (14.8)	126 (66.7)	35 (18.5)
	Third Year	22 (14.3)	107 (69.5)	25 (16.2)
	All 3 batches	64 (12.8)	351 (70.1)	86 (17.2)

**Low level of empathy - Scores 1SD or more below the mean, Average level of empathy - Scores between 1SD below or above mean & High level of empathy - Scores 1SD or more above the mean* (Brett et al., 2022)
***cell values show counts and values within parentheses are percentages*

When female participants are considered, 20 % of first year students have shown high empathy while 17 % and 18 % of second year and third year female participants are in the category of high empathy. Among male participants, 17 % of second year students are in the category of high empathy and around 12 % each of first- and second-year students are in the high empathy category.

Association between empathy level and socio-economic factors

Chi square test results for testing associations between empathy levels and some socio-economic factors of the study population is given in the Table 11.

Table 11 Chi square test for association between empathy level and socio-economic factors

Factors	p-value
Ethnicity	0.46
Number of Siblings	0.85
Availability of Parents	0.35
Gender	0.16
Family Income Level	0.67
GCE Advanced Level Attempt	0.50

Ethnicity – Sinhalese, Tamil, Muslim
Number of Siblings - No siblings, One or more siblings
Availability of Parents - None of them, Father or Mother only, Both parents
Gender – Male, Female
Family income level - < 30,000 LKR, 30,000 - 70,000 LKR, 70,000-100,000 LKR, >100,000 LKR
GCE Advanced Level Attempt - First attempt, Second attempt, Third attempt

Chi square test of association was conducted to study the relationship between three empathy levels and selected socio-economic factors (ethnicity, number of siblings, availability of parents, gender, family income and attempt of Advanced Level exam to be selected for university). According to the results obtained from the Chi square tests (Table 11) there is no any significance relationship or association between three empathy levels and selected socio-economic factors.

Conclusion

Perth Empathy Scale can be reliablyused to measure the empathy skills of non-medical undergraduate students under Sri Lankan conditions due to the high internal consistency and reliability of the responses. There is a considerable gap between study results and the maximum empathy levels to be achieved in both cognitive and affective empathy skills of faculty undergraduates. The empathy skills of faculty undergraduates are independent ofgender, the year of the academic program, and the degree program they enrolled. Socioeconomic factors including race, having siblings, family income, having parents, and the advanced level exam attempt a student chooses to take to get into a university have little bearing on the variation in empathy levels across faculty undergraduates. The empathy levels of the participants in the study indicate that the faculty must consider introducing empathy-driven teaching and learning to the existing curriculum. Continued research in more diverse undergraduate populations in Sri Lanka will be a good approach to understand and resolve social issues within the country and to produce better graduates who can perform well in relevant fields and be more humane, given the

importance of empathy to society and the dearth of comparable studies in Sri Lankan conditions.

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