Investigating the Impact of a Physical Activity & Nutrition Module on the Well-being of 1st year Social Care Students.

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Abstract.

There has been an increase in the number of students in higher education who are experiencing mental illness, mental distress and low levels of well-being. Furthermore, many university students do not meet the physical activity guidelines or meet the recommendations for fruit and vegetable intake. Research suggests that the promotion of healthy behaviours, including physical activity and nutrition, can have a significant impact on well-being. Consequently 'A Healthy Food and Recreation' was designed as a module within the formal curriculum that combines physical activity and nutrition with the intent to enhance student well-being. The aim of this study was to evaluate the impact of 'A Healthy Food and Recreation', on the well-being of first year Social Care students in one University in Ireland. The study also explores whether participants' physical activity and nutrition levels were impacted. Quantitative data was collected from 1st year Social Care students (N=42), via purposive sampling, completing the module 'A Healthy Food & Recreation'. Well-being (WHO-5 Well-being Index), physical activity levels (International Physical Activity Questionnaire - Short Form) and fruit and vegetable intake were measured at the start of semester (Week 4) and again in Week 11-12. There was a large statistically significant increase in well-being from the start of semester compared to the end of semester ($p < .001$). However, there was no statistically significant increase in median MET-minutes from the start of semester to the end of semester and no statistically significant difference in median servings of fruit and vegetables at the start of semester compared to the end of semester. 'A Healthy Food and Recreation' a physical activity and nutrition module, embedded within the curriculum, in Ireland was effective in improving well-being in first year Social Care students. While there is a need to replicate these findings at scale, the public health implications highlight the potential role that universities can play in implementing health promotion strategies through the curriculum to improve the well-being of students.

Keywords: Physical activity; Nutrition; Intervention; Student; Wellbeing.

1. Introduction.

There has been an increase in the number of students in higher education who are experiencing mental illness, mental distress and low levels of well-being (Institute for Public Policy Research (IPPR), 2017). Furthermore, the number of students registering with disability support offices or seeking supports from college counselling services has also increased (AHEAD, 2019). As a result, the gap between the demand for services and supports offered is at crisis level (Hill et al., 2020). Over 38% of students in Ireland are experiencing extremely severe levels of anxiety, 29.9% are experiencing depression, 17.3% are experiencing stress and 32.2% of students have had a formal diagnosis of a mental health difficulty at some point in their lives (Price, Smith & Kavalidou, 2019), this is consistent with findings across the globe (Auerbach et al., 2018; Mahon et al., 2022).

Students with higher levels of emotional, psychological and social well-being show improved academic performance, retention and graduation rates (Hughes & Spanner, 2019), as well as lifelong positive health behaviours (Sanci et al., 2022). However, poor mental health can negatively impact student learning, participation and experience of university life, impact demand for services and increase the risk of student dropout (Union of Students Ireland (USI), 2019). Untreated mental ill health at college is a significant predictor of lower grades and poorer economic and social outcomes (Kosyluk et al., 2016). Poor mental health can affect a student's ability to form meaningful relationships and live healthy lives (Price, Smith and Kavalidou, 2019). Therefore, it is important for universities to understand some of the factors influencing poor mental health to better support students' psychological well-being (Dodd, 2021).

Regular physical activity can significantly enhance the mental health and well-being of university students (Herbert et al., 2020). Regular physical activity is associated with a range of positive mental health related outcomes, including reduced anxiety, stress and depression (Pengpid and Peltzer 2020), and enhanced cognitive function and academic performance (Salas-Gomez et al., 2020). However, almost one third of university students report they do not do enough physical activity to keep healthy (Murphy et al., 2015). Furthermore, higher consumption of fruit and vegetables is positively associated with happiness, life satisfaction, social-emotional well-being and lower levels of depression and anxiety (Blanchflower, Oswald & Stewart-Brown, 2013). However, research has shown that the vast majority of university students do not meet

recommendations for fruit and vegetable intake (Almoraie et al., 2024). Therefore, increasing physical activity and nutritional intake through the curriculum may help to improve well-being and reduce the problematic levels of anxiety, depression and stress prevalent among third level students.

1.1 Interventions to improve wellbeing.

A number of interventions have been implemented in universities to improve mental health and well-being in students. A systematic review by Worsley et al., (2022) found that mindfulness-based interventions, cognitive-behavioural therapy (CBT) and technology delivered interventions were the most effective for improving well-being and reducing depressive and anxiety symptoms. Similarly, a review by Huang et al., (2018) also found CBT and mindfulness interventions to be effective, however, other interventions, including exercise, art and peer support were found to be more effective in reducing depression and anxiety. Yet, many of these university led interventions are targeted towards at risk students and focus on treatment as opposed to prevention. Interventions delivered through the curriculum instead, have the potential to promote health behaviours, be universal and provide an opportunity as a guaranteed point of contact between students and the university (Hughes & Spanner, 2019).

1.2 Physical Activity and Wellbeing.

Research shows that active students enjoy better health (overall and mental) and are happier than their inactive peers (Murphy et al., 2018). The new Irish physical activity guidelines recommend a goal of 150 min/week of moderate-to-vigorous intensity physical activity (Williamson, Murphy & Murtagh, 2024) however, this threshold is not being reached by 36% of Irish university students (Murphy et al., 2015). The transition from school to university may be a time where students become less physically active as many university students drop out from organised sports and physical activities and are unlikely to take up new leisure activities (Deliens et al., 2015). The decline in physical activity participation may also be due to increased sedentary time while studying and during examination periods (Edelmann et el., 2022).

Therefore, there is a need to promote physical activity and provide students with opportunities to be active at university in order to promote positive mental health and well-being both in the short term (during their studies) and long-term. Research also supports that physical activity knowledge has a positive correlation with levels of physical activity and this correlation is

strongest among university student participants (Ma et al., 2020). Increasing knowledge on the importance of physical activity is one of the key learning outcomes of this module and it is expected that increasing knowledge will also increase physical activity levels.

However, only a small number of studies have examined the impact of a physical activity intervention on well-being in university student populations. Herbert et al., (2020) found that a six-week aerobic exercise intervention improved well-being and lowered perceived stress in university students in Germany and Guo et al., (2020) found that exercise interventions significantly decreased depressive symptoms of depressed undergraduates, however much of this research was conducted in China. Another exercise intervention, the 'MED-WELL' programme delivered to medical students in Limerick saw improvement in student physical activity levels and well-being, however the limitations associated with the study (a small sample size conducted in a single medical school without a control group and a low recruitment rate) highlight the need for additional research (Worobetz et al., 2020). Tertiary institutions are ideal settings for implementing and evaluating physical activity interventions, however more research is needed to improve such strategies (Plotnikoff et al., 2015).

1.3 Nutrition and Well-being.

There is growing evidence that people who eat more fruit and vegetables have better mental health (Conner et al., 2015). However, young adults typically have the lowest fruit and vegetable consumption of all age groups and university is an important time to establish healthy behaviours (Rodrigues et al., 2019). A nutrition intervention with 100 university students in the UK showed that snacking on one piece of fruit each day, for 10 days, resulted in reductions in fatigue and anxiety compared to daily snacking on chocolate wafers or potato chips (Smith & Rogers, 2014). Similarly, university students in New Zealand who were provided with a supply of fresh fruits and vegetables over a two-week period showed a significant increase in overall well-being and fruit and vegetable consumption (Conner et al., 2017). Although these two studies were short in duration (10-14 days), they demonstrate the positive impact fruit and vegetable consumption can have on well-being. However, a longer-term follow up is needed to investigate the lasting impact of the interventions on well-being. These interventions also highlight that education on the benefits of fruit and vegetable consumption alone may not be enough to increase fruit and vegetable consumption and improve well-being (Conner et al., 2017). However, conveying the immediate psychological benefits of fruit and vegetable

consumption may have a greater positive impact on behaviour (Conner et al., 2017).

1.4 The Present Study.

One of the key recommendations from the USI research (2019) was to include health promotion as part of the curriculum, as college represents a key period to engage and influence positive health behaviors. In Ireland, there is currently a lack of research and no strong evidence to support curriculum embedded approaches to improving well-being (Upsher et al., 2022). To the author's knowledge, there have been no interventions that target nutrition, physical activity and well-being embedded within Irish university courses, that have been implemented and evaluated. Definite conclusions as to the effectiveness of such programmes at improving health behaviours and well-being are therefore not available. Without such interventions, unhealthy behaviours and low levels of well-being are at risk of continuing which could have both immediate and long-term health implications. To address this research gap, the overall aim of this study was to examine whether the module 'A Healthy Food and Recreation', a combined physical activity and nutrition module, can improve the well-being of first-year Social Care students at Munster Technological University (MTU), Ireland. It follows then that the main hypothesis of the study was:

1. Participation in the module 'A Healthy Food and Recreation' will result in a statistically significant increase in well-being.

Secondary hypotheses were:

2. Participation in the module 'A Healthy Food and Recreation' will result in a statistically significant increase in physical activity levels.

3. Participation in the module 'A Healthy Food and Recreation' will result in a statistically significant increase in fruit and vegetable intake.

2. Methodology.

2.1 A Healthy food and Recreation Module.

This module is designed to equip students with an insight into the study of nutrition, health and physical activity for service users in the context of everyday activities and life experiences in social care. Lectures (2 hours) are coupled with practical cookery (1.5 hours) and physical

activity classes (1.5 hours) per week. Students are examined through a written report (where they must design a nutrition plan and a physical activity programme) and are also assessed on their practical skills (continuous assessment of practical performance and participation evaluation in food preparation and recreational physical activities). Currently, this mandatory module is only delivered on the Bachelor of Arts Social Care Work programme.

2.2 Participants

A total of 75 first year Social Care students were enrolled in the module 'A Healthy Food & Recreation' at Munster Technological University (MTU), Ireland. All 75 were invited to participate in this research study. The response rate for completion of the questionnaire at baseline (Week 4) was 56% (n=42), this decreased to 50.66% (n=38) in Week 12. The class group was informed by the researcher of the aim/objective of the research, the anticipated outcomes or benefits and what was involved should they choose to participate. All participants were provided with an Information Sheet and Consent Form. Purposive sampling was chosen as the most appropriate sampling method, as the participant characteristics are defined for the purpose relevant to the study. Although the findings of a study using purposive sampling can only be generalised to the (sub) population from which the sample is drawn, the data gathered may be useful in identifying hypotheses that can be tested in further research on the broader student population (Andrade, 2021).

2.3 Data Collection.

Quantitative data collected via a questionnaire. Questionnaires are attractive as a data gathering instrument as they can be used to explore a range of issues, they are economical and efficient, they can target a wide population and they can support or refute hypotheses about the target population (Cohen, Manion & Morrison, 2007). The administered questionnaires examined well-being (WHO-5 Well-being Index)[1], physical activity levels (International Physical Activity Questionnaire - Short Form) along with fruit and vegetable intake. These were measured at the start of semester (Week 4) and again in Week 11-12. All questionnaires were administered in paper-and-pencil format. Well-being was measured using the WHO-5 Well-being Index, this allows for a brief assessment of well-being over a two-week period. Individuals are asked to indicate for each of the five statements how they felt over the past two weeks using a six-point Likert scale ranging from 0 = "at no time" to 5 = "all of the time". The raw scores are transformed to a score from 0 to 100, with lower scores indicating

worse well-being. A score of ≤50 indicates poor wellbeing and score of 28 or below is indicative of depression[1]. These self-report measures have been shown to have high validity and deemed reliable in this population (Lee et al., 2011; Murphy et al., 2017; Sischka et al., 2020).

Physical activity was measured using the International Physical Activity Questionnaire - Short Form (IPAQ-SF). Using the IPAQ-SF scoring protocol, participants were categorised as "high," "moderate," or "low" active. High means participants meet the minimum physical activity requirements, moderate means participants are doing some activity (equivalent to half an hour of at least moderate intensity physical activity on most days), while low means that participants are not meeting any of the criteria for either moderate or high levels of physical activity (Forde, 2018). Fruit and vegetable intake was self-reported in the form of a single item on the questionnaire, "How many ***servings*** of fruits and vegetables do you usually have **per day**?". Examples of what constitutes one serving were provided to reduce reporting error (Kirkpatrick, 2024). Fruit and vegetable intake has previously been validated as an indicator of overall diet quality (Fulton et al., 2016). It was beyond the scope of this study to collect additional data related to dietary intake.

2.4 Data Analysis

The hypotheses were tested using the quantitative data (well-being scores' physical activity scores and fruit and vegetable intake) and were analysed using IBM SPSS (Version 26.0 for Windows). Descriptive statistics were used to explore and summarise the data. Normality was examined using descriptive statistics, histograms and Shapiro-Wilks tests were used to determine whether the measurements were normally distributed. Mean and standard deviation were calculated for all continuous variables, while frequency and percentages were used to summarise categorical variables. All statistical testing was performed using a 5% level of significance. A Wilcoxon Signed Rank Test was used to examine statistically significant differences in physical activity levels and fruit and vegetable intake. While a paired-samples t-test was used to examine statistically significant differences in well-being.

[1] The WHO-5 Wellbeing Index was not used to diagnose in this study.

2.5 Ethical Considerations

Ethical approval was obtained from the MTU Teaching and Learning Unit (TLU) Human Research Ethics Committee (MTU-TLU-HREC-MR-29-A). All participants were briefed on the study and what was expected of them when taking part. Participation in this research was entirely voluntary. Summary of the information Sheet was included at the start of the survey instrument and students were again asked to explicitly provide consent to use the data for research purposes by selecting a tick box. The questionnaire data was collected anonymously. MTU's Code of Good Practice in Research and MTU's Data Protection Policy was used to inform and manage the data, in line with GDPR Regulations.

3. Findings

3.1 WHO-5 Wellbeing Index Score Pre and Post Intervention.

At the start of semester, the overall mean well-being score for respondents was 43.68 (SD = 18.16) compared to 59.68 (SD = 15.76) at the end of semester, higher scores are indicative of higher levels of well-being (WHO, 2024). A paired-samples t-test was conducted to evaluate well-being scores before and after participation in the module A Healthy Food & Recreation. There was a statistically significant increase in well-being scores from the start of semester to the end of semester ($t(37) = -4.22$, $p < .001$). The eta squared statistic (0.32) indicated a large effect size. Participants were also categorised into one of three categories for well-being (high, low, depression) (WHO, 2024), see Figure 1. The number of participants in the high well-being category increased from 41.5% at the start of semester to 76.3% at the end of semester.

3.2 Physical Activity Levels Pre and Post Intervention.

Figure 2 shows the number of students meeting the physical activity guidelines of 150 minutes MVPA per week, pre and post intervention. Although the median score for MET-minutes increased from 3069.00 at the start of semester to 3492.00 at the end of semester, a Wilcoxon Signed Rank Test revealed there was no statistically significant increase in median MET-minutes at the start of semester to the end of semester ($t(35)$, $z = -.590$, $p = .555$).

Figure 1: WHO-5 Well-being Categories pre and post intervention

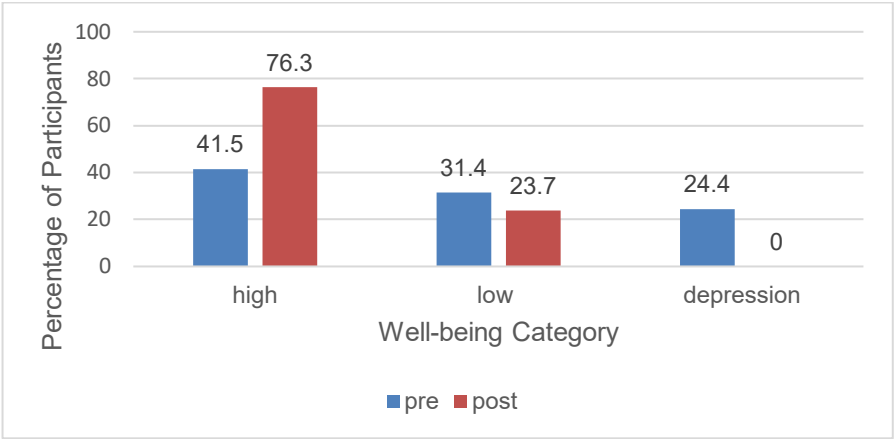
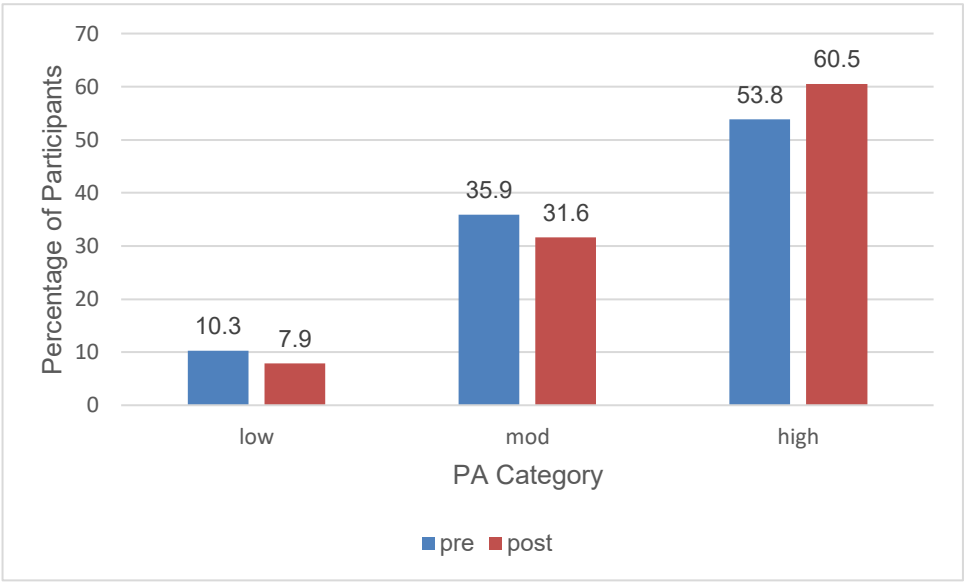


Figure 2: Physical activity level categories pre and post intervention.

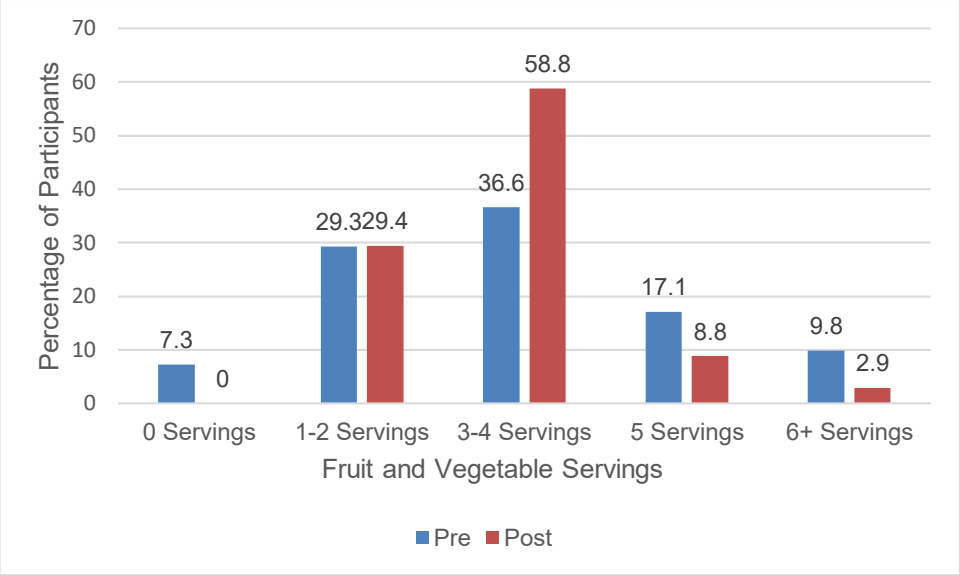


3.3 Fruit and Vegetable Intake Pre and Post Intervention

Fruit and vegetable intake pre and post intervention is presented in Figure 3. At the beginning of the semester only 26.9% (n=11) of participants met the recommended intake of 5-7 servings of fruit and vegetables per day, this declined to 11.7% (n=4) at the end of semester. A Wilcoxon Signed Rank Test revealed there was no statistically significant difference in median servings

of fruit and vegetables at the start of semester compared to the end of semester (t (33), z = -.391, p = .696).

Figure 3: Fruit and vegetable intake pre and post intervention.



4. Discussion.

Due to increased concerns regarding the well-being of third-level students, it has been recommended that well-being should be embedded within the curriculum. Physical activity and fruit and vegetable intake have been positively associated with increased well-being. Therefore, the aim of this study was to evaluate 'A Healthy Food and Recreation', a physical activity and nutrition module, embedded within the curriculum, on the well-being of first year social care students.

The key finding from this study is that participants mean well-being score increased from 43.68 at the start of the semester to 59.68 at the end of semester and that this increase is statistically significant. Higher well-being scores are indicative of higher levels of well-being. These findings are consistent with research by Marinaro et al. (2022) who examined 334 undergraduate university students and found that a 15-week fitness and wellness course demonstrated improvements in overall wellness, emotional wellness, and physical wellness. Similarly, Herbert et al. (2020) and Worobetz et al. (2020) reported that physical activity interventions can

significantly enhance the mental health and well-being of university students. However, these interventions did not include a nutrition element. Furthermore, the interventions by Herbert et al. (2020) and Worobetz et al. (2020) were only six weeks in duration and were not part of the mandatory curriculum. The positive relationship between physical activity and well-being is also highlighted in the SASSI study. In the SASSI study, students that met physical activity guidelines were 55% more likely to report better mental health than those classified as inactive (Murphy et al., 2018).

There was a 6.7% increase in the number of participants who met the minimum physical activity guidelines at the start of semester, compared to the end of semester. In addition, there was an increase in the median score for MET-minutes following the intervention, however, this increase was not statistically significant. Previous studies have reported an increase in physical activity levels following a PA intervention implemented in a university setting (Favieri et al., 2022; Plotnikoff et a., 2015), however many of these interventions were not delivered within a module as part of the mandatory curriculum and participation was voluntary. Given that this population often experience a significant decline in physical activity during attendance at university (Brown et al., 2024), this increase is a promising finding and demonstrates the potential for increasing physical activity levels through a mandatory module within the curriculum. Furthermore, the second data collection took place at the end of semester (Week 12). This is a time that is typically associated with a decline in physical activity, as students often experience difficulty maintaining their level of physical activity during exam periods (Jung & Brawley, 2013). This is supported by Rathonyi et al., (2021) who in a study of 57 university students in Hungary, identified a significant decrease in step count during exam periods. Collecting data at the end of the semester may account for the non-significant increase in MET-minutes in our study.

Compared to the start of semester (53.8%), the total number of students meeting the minimum physical activity guidelines at the end of semester (60.5%) was similar to the 64.3% of Irish university students (n = 8122) reported in the SASSI study (Murphy et al., 2018). In addition, the percentage of students not meeting PA guidelines decreased from 46.2% to 39.5%. This figure is similar to findings in the SASSI survey (35.7%) and Pengpid et al., (2015) who estimated the prevalence of physical inactivity among university students (n = 17,928) in 23 low, middle and high-income countries was 41%.

Results demonstrate that students are consuming below the Irish Dietary Guidelines recommendation of at least 5 servings of fruit and vegetables per day (Department of Health, 2013). At the start of semester, only 26.9% of participants met the recommended intake of 5-7 servings of fruit and vegetables and this declined to 11.7% at the end of semester. Similarly, Ellis et al., (2022) who examined fruit and vegetable intake in university students in Ireland, found that only 21.6% of participants consumed at least five portions of fruit and vegetables daily and is also consistent with findings in the general population that fruit and vegetable intake is below the recommended intake (Irish Universities Nutrition Alliance (IUNA), 2024). It had been expected that nutrition education combined with the practical healthy cooking classes within the module 'A Healthy Food and Recreation' would have improved overall fruit and vegetable intake. Some studies have highlighted the positive impact that nutrition education alone can have on the dietary habits of university students (Dandin et al., 2023; Lopez-Mureno, 2023). However, providing students with fruit and vegetables as part of the module delivery may be needed to increase overall intake (Conner et al., 2017; Smith & Rogers, 2014). Alternatively, improved availability of fruit and vegetables on campus has also been shown to positively influence student intake (Van den Bogerd et al., 2019).

However, the decline in the number of students meeting the recommended fruit and vegetable intake, may in part, be attributed to the timing of the second data collection (Week 12), as this would be considered a high-stress academic period. This is consistent with research by Errisuriz et al., (2016) and Choi (2020) who found that academic stress typically increases the consumption of unhealthy foods (i.e. calorie-dense, low-nutrient foods such as sugar-sweetened beverages, fast food) and decreases the consumption of healthy foods, such as fruit and vegetables. It is noteworthy that the number of students consuming no fruit and vegetables at the start of semester (7.3%) decreased to 0 at the end of semester (0.0%). This suggests that nutritional education around the benefits of fruit and vegetable intake may particularly benefit those with initial low intake. This is an important finding as those with very low intakes of fruit and vegetables have the highest risk of developing diet-related chronic diseases (Wang et al., 2021).

Although there was no increase in fruit and vegetable intake, there was a significant increase in well-being. These results are in contrast to those reported by Smith and Rogers, (2014), who found that university students (N=100) in the UK who snacked on one piece of fruit each day

for 10 days reduced anxiety. Likewise, Conner et al. (2017) who reported that students (N=171) in a New Zealand university who were supplied with a supply of fresh fruits and vegetables for a two-week period showed a significant increase in overall well-being. Whereas research by Yang et al., (2020), examining the impact of a health education intervention on Chinese college students (N=532) reported an improvement in dietary behaviours (regular breakfast and decreased consumption of sugar beverages) and physical activity levels, however found no significant difference in well-being. The increase in well-being in our study, despite there being no increase in fruit and vegetable intake, may be in part be attributed to changes in other dietary behaviours. Nutrition education for the module focused on all elements of healthy eating, however fruit and vegetable intake was the only measure of nutrient intake in this study. Therefore, changes to other dietary behaviours may not have been captured. While fruit and vegetable intake can be an important indicator of diet quality, there are additional elements of diet quality that need consideration (Moore, Madrid & Lyndsey, 2023). Nutrition and physical activity were the only components the module promoted to enhance well-being.

4.1 Strengths and Limitations.

This research has evaluated the impact of 'A Healthy Food and Recreation,' a physical activity and nutrition module, on the well-being of first year Social Care students in Ireland. The public health implications of these findings highlight the role that universities can play in implementing health promotion strategies through the curriculum to improve the well-being of students. Furthermore, it is in line with the Healthy Campus initiative, a framework through which Higher Education Institutions can implement national policies and strategies for health and well-being (Higher Education Authority, 2022). In terms of convenience and feasibility, another strength was the inclusion of the International Physical Activity Questionnaire - Short Form and the WHO-5 Well-being Index. These are the most widely used self-reporting instruments and both have been shown to have high validity and deemed reliable (Lee et al., 2011; Sischka et al., 2020).
The small sample size (N=42) is a significant limitation of this research, it would be valuable to increase the size of the sample and include students from other educational institutions. Additional limitations of the research include fruit and vegetable intake as the only measure of nutrient intake and the measurement reliability associated with self-report fruit and vegetable intake. These limitations may explain why we did not see intervention effects on fruit and vegetable intake. While it was beyond the scope of this study, future research should include a more extensive measure of nutrient intake, such as the PANDiet (a single score that measures

the adequacy of nutrient intake and reflects diet quality) (Trijsburg et al., 2019). Another limitation was the absence of a control group and the lack of longer-term follow-up. A control group would have helped to differentiate outcomes associated with the intervention from those caused by other factors (Deaton and Cartwright, 2018) and thus enhanced the findings of the study. Self-report is also a considerable challenge in the assessment of physical activity and sedentary time. The inclusion of accelerometer-based measures in the research may have helped to address the over reporting of physical activity and under-reporting of sedentary time (Chastin et al., 2014; Downs et al., 2014). Future research should also include a qualitative element, as research has shown that quantitative data needs to be supported with qualitative research to fully understand how curriculum-based interventions impact well-being (Upsher et al., 2022).

4.2 Conclusion.

This research has demonstrated that participation in the module 'A Healthy Food and Recreation' resulted in a significant improvement in the well-being score of first year Social Care students. There was also an increase in physical activity, and although this increase was not statistically significant, it is a positive finding. Given the low levels of well-being experienced by Irish students, universities have a duty of care in trying to promote positive mental health and well-being. These findings demonstrate the positive impact that a curriculum-embedded intervention can have on enhancing student well-being. Our findings need to be replicated on a wider scale and may have a public health implication. Our findings highlight the role that universities can play in implementing health promotion strategies through the curriculum to improve the well-being of students. Furthermore, improvements demonstrated in this study suggest that the expansion and evaluation of similar modules in other courses and universities is warranted.

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