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Can an Authentic Assessment Task Improve the Health Behaviours of Undergraduate Students?

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Abstract: Currently, more than ever, the mental and physical well-being of university students have been identified as priorities, and universities are well placed to address well-being by integrating health promotion into their courses. This study looks at the effectiveness of embedding an authentic assessment task to improve health-seeking behaviours related to sleep, stress, and nutrition into the curricula of undergraduate health-science students. Qualitative and quantitative data were gathered both pre- and post-test, and content was qualitatively analysed. The study found that students were willing and able to improve health-seeking behaviours, with a significant increase in fruit consumption. There was no reported change in stress or sleep.

Keywords: health promotion; health behaviours; authentic assessment; undergraduate student; university; sleep; nutrition

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1. Introduction

The role of higher-educational institutions in promoting and supporting the health and well-being of students is well established [1]. Impacts of COVID-19 have negatively affected the mental health and health-seeking behaviours of university students [2]. Even prior to the COVID-19 pandemic, universities recognised that students' physical and mental health were integral to success in studies, and there is evidence that students who experience ill health are at a higher risk of dropping out of their courses, which negatively impacts their academic successes and career paths [3,4]. Part of the funding models for universities is student retention and course completion [5]. Consequently, promoting students' health and well-being has become a critical aspect of higher-education-institutions' objectives to achieve fiscal and organizational success [6]. The World Health Organization proposes a settings-based approach to improve health within educational institutions [7]. Universities offer a favourable environment for implementing health promotion programs due to their ability to cater to a large and diverse student population during a crucial developmental period of lifestyle and health-seeking-behaviour skills. A whole-of-university approach requires dedicated services, programs, policies, and the embedding of health promotion into pedagogy, curricula, and assessments [8,9].

There is a strong association between poor health-seeking behaviours (specifically dietary and sleep behaviours) and increased risk of poor mental-health-related outcomes [10]. Healthy lifestyle behaviours are important long-term in preventing and managing chronic diseases, reducing healthcare costs, and improving quality of life [11–13]. In the Australian tertiary student population, one in four students report having been diagnosed with a

mental health disorder and up to 80 percent are not meeting national recommendations for health behaviours [14]. Undergraduate health-science students are future health professionals; therefore, it is essential that they have the knowledge and skills required to promote healthy lifestyles in themselves and their future patients. However, studies have shown that health-science students are not always more knowledgeable about health behaviours than other students, and their own health behaviours are not ideal [15,16]. The stress of new academic and external demands on undergraduate students can reduce the prioritisation of health-seeking behaviours and negatively affect their health and mental well-being [17]. Commencing tertiary education coincides with more independence for many students; however, typically skills such as self-efficacy and accountability have not yet been developed, leaving them at higher risk of adopting unhealthy behaviours [18]. Therefore, it is crucial to provide undergraduate health-science students with effective and engaging health promotion opportunities that can improve their knowledge, skills, and behaviours.

An authentic assessment is an educational strategy that emphasises real-world tasks relevant to students' future professional work [19]. In health-science units, embedding authentic learning tasks has been shown to improve student motivation, engagement, and learning outcomes in various educational settings [20–22]. A recent systematic review and meta-analysis examining the effectiveness of interventions targeting health behaviours (e.g., physical activity and nutrition) amongst university students concluded that initiatives spanning a university semester or less resulted in more positive health outcomes for students and that interventions embedded within a unit of study were more effective [18]. The authenticity of assessments is now more important than ever, considering recent technological advances with specific reference to artificial intelligence potentially undermining academic integrity. The purpose of this study is to examine the effectiveness of an authentic assessment task embedded in the curriculum in improving health-seeking behaviours of undergraduate health-science students.

2. Methods

2.1. Study Design

This study used a mixed-method approach to investigate whether embedding an online behavioural-change intervention as an authentic assessment task was effective in improving health-seeking behaviours related to sleep, stress, and nutrition among undergraduate health-science students.

2.2. Participants and Procedure

This authentic assessment task (the intervention) required students to create a personal health initiative (PHI) plan and then implement it for four weeks. All undergraduate health-science students enrolled in the Macquarie University unit of study Behaviour Change for Health and Exercise in Semester 2, 2021, completed the intervention by developing and implementing a PHI plan in week three of the semester as part of their studies. All students were emailed an invitation including informed consent to complete a baseline questionnaire. Following the implementation of the PHI plan over the course of four weeks, those who completed the baseline questionnaire were then invited to complete a post-intervention questionnaire, and all students enrolled in the unit submitted a 400-word written reflection task about the experience. Only reflections completed by students who completed the questionnaires were analysed.

This study used a mixed-method design, combining a single-group pre-test/post-test approach with qualitative content analysis. During week three of the semester, as part of their studies, participants completed an online module guiding them in creating a PHI plan. The online module provided evidence-based education for optimising either sleep or diet. Participants chose one of these goals to achieve over the course of four weeks and then selected two evidence-based strategies from a provided list (Supplementary File) to implement daily. The participants were also guided to engage in mental contrasting with

implementation intentions to form their PHI plans. Mental contrasting with implementation of intentions has been found to facilitate goal commitment and is positively correlated with sustainable behavioural change [23]. Additionally, participants identified one aspect of their environment they could modify to make the 'healthy choice the easy choice', for example, removing communication devices from the bedroom when going to sleep [24]. As part of the assessment task, students then implemented these planned daily behaviours over the next four weeks. This study was conducted in accordance with the Declaration of Helsinki, and its protocol was approved by the Macquarie University Human Ethics Committee (52021974528873).

2.3. Measures

The baseline questionnaire collected data on participants' demographics, including age, gender, living situation, primary language, and weekly hours spent undertaking paid and unpaid work (Supplementary File). Questions to ascertain participants' stress levels and dietary and sleep behaviours were also included. The participants' levels of stress were collected using the Perceived Stress Scale (PSS-10) [25]. Dietary behaviour questions were drawn from the NSW Adult Population Health Survey regarding fruit and vegetable consumption and sugar-sweetened beverage (SSB) intake [26]. Vegetable consumption was assessed as servings of vegetables per day, with options ranging from 'I do not eat vegetables' through to 'more than five servings'. Fruit consumption was assessed as servings of fruit per day, with options ranging from 'I do not eat fruit' through to 'more than two servings'. Sugar-sweetened beverage intake was assessed based on the number of cups of non-diet soft drinks, cordial drinks, and sports drinks consumed per day.

Sleep behaviours were assessed using the Pittsburgh Sleep Quality Index questionnaire [27]. The following seven components were included: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the previous month. After weighing the score of each component, ranging from zero (no difficulty) to three (severe difficulty), each component's score was added to calculate the global PSQI. Global PSQI scores can range from 0 to 21, with poor sleep quality scoring >5.

Following the completion of the intervention after four weeks, the participants were invited to complete the post-intervention questionnaire containing the same questions as the baseline questionnaire, with additional questions included to determine their adherence to the intervention. Adherence to the intervention was reported as a percentage of days per week that the behavioural-change strategies were implemented. Participants who reported $\geq$70 percent of the days were classified as having high adherence and any who achieved less than 70 percent as having low adherence. Participants also indicated the likelihood that they would continue to implement the strategies following the intervention on a five-point Likert scale, with options ranging from 'strongly disagree' to 'strongly agree'. All students enrolled in the unit were also asked to complete a 400-word reflective assessment task, expanding on the perceived barriers and enablers in implementing the PHI. Participants also indicated whether they perceived themselves as successful or unsuccessful in implementing their health behavioural changes.

2.4. Data Analysis

Quantitative data were analysed using SPSS version 27 (IBM, New York, NY, USA). Continuous variables were reported as means with standard deviations and categorical variables as percentages. Changes in the mean daily servings of fruit, vegetables, sugar-sweetened beverages, PSS-10 scores, and PSQI scores following the intervention were calculated using paired t-tests. Statistical significance was set to $p < 0.05$.

The reflections were analysed following Braun and Clarke's steps for deductive semantic thematic analysis [28]. Inductive semantic thematic analysis was then used to develop explicit meanings from data that were not relevant to the preconceived themes. The reflections were read several times by two investigators (J.J. and L.S.) before the initial codes

were generated deductively from phrases and sentences in the data using NVIVO v.12 (QSR International Pty Ltd., Burlington, VT, USA). The reflections were then analysed inductively for additional codes that appeared to be contradictory or belonged to a new category. The codes were then sorted into themes that were revised by both investigators to ensure that they accurately described the final dataset. A third investigator (M.K.) randomly reviewed five reflections for analysis triangulation. Data saturation was irrelevant in this study, as all participants' reflections were coded. A summary of the themes with relevant de-identified quotations was emailed to participants for member checking with a $10 gift card utilised as an incentive to complete this process [29]. All participants responded and confirmed that the barriers and facilitators they experienced were accurately reflected in the summary.

3. Results

A total of 28 students (34 percent) participated in the study. The mean age of the participants was 21.4 + 2.9 years, and 64.3 percent of the cohort was female. For most participants, English was the primary language spoken at home (85.7 percent) and they lived with family (75%). On average, participants worked 18 ± 11 h per week, and most participants were domestic students (92.9%) in their second year of study (57.6 percent). Smoking was reported by 3.6% of participants.

A significant increase was observed in the mean daily servings of fruit (Table 1). No significant change was observed in vegetable or sugar-sweetened beverage consumption. However, a positive trend was noted for both variables. Subjective sleep quality was reduced post-intervention, although there was no change in the remaining PSQI subcomponents or overall sleep quality.

Table 1. Pre- and post-intervention dietary behavioural, sleep, and stress data.

	Baseline	Post-Assessment	(95% CI); *p*
Daily Dietary Behaviours (mean ± SD)			
Vegetable Servings	2.2 + 1.1	2.5 + 1.2	(−0.66, 0.13); 0.06
Fruit Servings	1.2 + 0.8	1.8 + 0.9	(−0.10, −0.14); 0.01
Cups of Sugar-sweetened Beverages	0.27 + 0.5	0.24 + 0.6	(−0.19, 0.24); 0.81
Sleep Quality (PSQI weighted score) (mean ± SD)			
Subjective Sleep Quality	1.7 + 0.71	2.0 + 0.72	(−0.52, −0.53); 0.02
Sleep Latency	1.2 + 0.95	1.1 + 1.0	(−0.21, 0.28); 0.77
Sleep Duration	2.9 + 3.3	2.6 + 3.3	(−1.09, 1.73); 0.64
Sleep Efficiency	0.7 + 1.0	0.5 + 0.8	(−0.29, 0.57); 0.50
Sleep Disturbances	1.1 + 0.4	1.1 + 0.4	(−0.26, 0.19); 0.75
Use of Sleep Medication	0.1 + 0.6	0.3 + 0.8	(−0.40, 0.11); 0.26
Daytime Dysfunction	1.0 + 0.8	1.1 + 0.7	(−0.49, 0.28); 0.57
Global PSQI	8.7 + 3.5	8.8 + 3.9	(−1.54, 1.39); 0.92
Stress (PSS-10)	21.5 + 3.6	20.8 + 4.3	(−0.87, 2.2); 0.375

The planned behavioural-change strategies were reported to have been implemented ≥70 percent of the days per week by over half of the participants (57 percent). Most participants (82 percent) planned to continue to implement these behaviours beyond the intervention.

A thematic mind map was created as the final stage of data analysis to illustrate the refined themes and sub-themes derived from the participants' reflections (Figure 1). The mind map outlines five themes and twelve sub-themes that were identified from the thematic analysis. A definition of each theme, the sub-themes, and quotes exemplifying the impact of each theme on enacting behavioural change are displayed in Table 2. It was observed that each theme could function as either a facilitator or a barrier, dependent on intrinsic and extrinsic factors specific to each individual participant.



Figure 1. Mind map of facilitators and barriers in implementing the personal health initiative from the participant's perspective.

Table 2. Themes and corresponding quotes referencing relevant barriers and facilitators.

Theme	Sub-Themes	Quotes from Participants' Reflections
Environment *Definition:"Physical, social, and cultural factors that influence an individual's ability to make healthy choices and engage in health-promoting behaviours"*	Competing motivators Modifications	**Nutrition** Facilitator *"Small changes such as changing to a local fruit shop I was able to avoid distractions of shopping and pre-packaged foods only purchasing what would benefit me, this way when I had a craving, I could choose from what I already have, "surfing the urge" with beneficial foods."* Barrier *" . . . spending time at my partner's house meant that I was unable to eat meals at the same dining table setting as his sister's HSC art major work was residing on the dining table there and we resorted to eating meals at the kitchen bench. This then meant that I was being distracted during meals with conversation going on around me and I was therefore not as mindful while I was eating as I possibly could be."* **Sleep** Facilitator *"I adapted my environment effectively through; organising gym wear the day before, and ensuring I had a tidy, dark room to sleep in with no distractions from technology."* Barrier *"I also underestimated my phone, I thought having it in the corner of my study room on silent was enough, but I kept feeling drawn to it."*

Table 2. *Cont.*

Theme	Sub-Themes	Quotes from Participants' Reflections
Social support *Definition:" The effect of emotional, educational, or practical help from others in positively or negatively impacting health and health behaviours"*	Involvement of family and friends Lack of support	**Nutrition** Facilitator *"My family helped facilitate my goals as they decreased their sugar intake and ate whatever I made and bought."* Barrier *"I struggled with eating dinner away from the TV, as my partner enjoys watching TV while he eats."* **Sleep** Facilitator *"I found that it is easier to make changes in one's life if others are also trying to make the same change, giving a sense of comradery and teamwork."* Barrier *"If other people were busy, I struggled to muster the motivation myself to exercise."*
Time *Definition: "The allocation, scheduling and prioritisation of time in relation to health-promoting behaviours"*	Time management Lack of time	**Nutrition** Facilitator *" . . . the simplicity of having pre-made meals takes that opportunity to snack or deviate from what is planned if the meal is right in front of you."* Barrier *" . . . there are obstacles to implementing the plan, such as the lack of time to prepare cooking materials."* **Sleep** Facilitator No facilitators were identified in the participants' reflections. Barrier *"Going to bed later would lead to waking up later or have less hours of sleep. I would then feel tired and not do the work I had planned for the day, including going out for a walk."*
Mental fortitude *Definition: "An individual's resilience and self-efficacy to achieve health behaviour goals".*	Self-control Positive self-talk Motivation	**Nutrition** Facilitator *"I had felt content with myself and felt full after a wholesome meal, it had made me feel more productive and motivated to continue this behaviour."* Barrier *"There were moments where I did eat a sweet treat instead of a fruit with "It's only one" mindset, leading to a temporary termination of my progress."* **Sleep** Facilitator *"The most important thing I have learnt is being able to acknowledge when I haven't stuck to a goal, being kind to myself and not letting it stop me from reattempting."* Barrier *"Feeling overwhelmed made me feel impulsive, which undermined my ability to exert self-control."*
Specificity of behaviour *Definition: "Completing actions that are direct related to achieving specific health behaviour change goals."*	Temptation bundling Incremental steps Specific goals	**Nutrition** Facilitator *"By religiously practicing my strategy to fill half my plate with vegetables first, I was able apply implementation intentions to mealtimes by pre-planning to plate vegetables first."* Barrier *"The only challenge that I had faced was not being as strict on my meal plans on the weekend . . . "* **Sleep** Facilitator *"My environmental change of getting workout clothes ready the day before became my cue, and the craving was the temptation bundling of only calling a friend while walking. My response was increased motivation to walk, and my reward was internal satisfaction from exercising and socialising."* Barrier *"I didn't put a specific time of day as to when I should go for a walk which made me forget to do it."*

4. Discussion

This is the first Australian study to embed a behavioural-change intervention as an authentic assessment task to improve health-seeking behaviours related to sleep, stress, and nutrition. The findings of this study indicate that there is statistically significant evidence for authentic behavioural-change assessment tasks to improve dietary behaviours. No changes were observed in stress or sleep.

Over the past decade, interest in embedded interventions in the university curricula following a settings-based approach has significantly increased [30]. This interest stems from the knowledge that mental and physical well-being are associated with optimal cognitive function and are important determinants of university students' academic achievements and future career successes [31–33]. Upsher et al. (2022) embedded a series of modules within the curricula that targeted applied evidence-based approaches to improve mental and physical well-being and found positive improvements in students' well-being and learning outcomes [34]. Two systematic reviews of settings-based approaches also reported a limited number of significant improvements in students' well-being outcomes across the included studies [30,35]. All three studies reported the primary limitation to be small sample sizes, aligning with the findings of this study [30,34,35]. Despite this, the recent increase in interest in interventions that are embedded in university curricula, combined with promising results within this study, calls for more innovation and research in this space.

The analysis of the students' reflections revealed themes that were in line with the key principles of the Ottawa Charter, which serves as the foundation for the Okanagan Charter [7]. These themes also demonstrated similarities to the domains outlined in the Ottawa Charter, suggesting that behavioural changes are more likely to be sustainable as a result of enhanced self-efficacy, social support, and improvements in the environment conducive to health [36]. While these themes often facilitated positive changes, they could also have had negative effects on health behaviours when students encountered adverse internal and external factors. The barriers identified by students were not surprising and aligned with known risk factors for unhealthy behaviours during the transition to tertiary education, such as increased time pressures, financial constraints, and stress [17,18]. These barriers are consistent with other research on Australian university undergraduate health-science students, which identified individual factors (self-efficacy and lack of health knowledge), time constraints, environmental factors, psychological factors, and lack of social support as barriers to implementing healthy behaviours [37]. Recognising the facilitators and barriers to behavioural changes outlined in this study can provide insights into the strategies that students employ to promote change and help in developing approaches to overcome common obstacles to adopting healthier behaviours.

Assessments can drive learning and engagement, especially when they are centred around the learning process [20]. This study utilised cognitive and reflective activities within an authentic assessment framework to encourage sustainable learning. Through this, student autonomy and self-efficacy were championed, contributing to the development of the skills and behaviours required for future sustainable workplace learning [38]. This study found students were willing to engage meaningfully with the assessment model and, through both practical learning and reflection, were able to implement health behavioural changes. Promisingly, most participants indicated they planned to continue these behaviours beyond the intervention period, highlighting the ability of an authentic assessment to promote planned sustainable behavioural changes, although this study has not captured whether students followed through with such behaviours.

There are some limitations worth noting with this study. The small sample size of this study was a primary limiting factor, as it resulted in reduced statistical power and generalisability of the findings. Self-reporting bias was a further limitation due to the potential for differential reporting to align with socially desirable behaviours and/or to demonstrate compliance with the intervention [39]. To mitigate this, an anonymous, online survey platform was employed utilising validated dietary questionnaires [26,27]. No

follow-up of students' behaviours was performed post-intervention, so this study has not captured longer-term students' health-seeking behaviours.

Also, the COVID-19 pandemic was likely to have profoundly impacted the participants in this study, and it is unclear the extent of the impact on this study, particularly on their sleep and stress levels, which may explain findings within these areas. Australian university students were confronted with unprecedented life changes, including a prolonged lockdown. This created countless new external stressors, as individuals were required to rearrange their daily lives and balance competing demands with limited resources. The way students engaged with universities also changed, with the delivery of the curriculum delivered virtually. Interestingly, following analysis of the students' reflections, the COVID-19 pandemic was not reported to be a barrier in implementing the planned strategies to improve health behaviours.

Strengths of the study were the use of validated dietary questionnaires, increasing the validity of self-reporting, and the intervention being delivered online within the pre-existing university curriculum, making it cost-effective.

Considerations for future studies should include aligning the data collection period with the dates allocated for the unit of study and further follow-up. Further emphasis should be placed on mental-well-being outcome measures, given the prevalence of mental health challenges in this population and their correlation with physical well-being. Data on external stressors relevant to the university student population should be collected to identify and address external barriers to health behavioural changes.

5. Conclusions

Embedding a behavioural-change intervention as an authentic assessment task in an undergraduate unit of study is a promising way of empowering students to implement positive health-seeking behaviours. Overall, positive attitudes and improvements to some dietary behaviours resulted from this study; further, students made clear their intentions for these to be continued. In conclusion, future research endeavours could be undertaken to examine ways to empower university students in effectively managing their physical and mental well-being.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/educsci13070727/s1.

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