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Long-term analysis of a psychoeducational course on university students' mental well-being

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Abstract
Although many higher educational institute (HEI) psychoeducational courses teaching positive psychology interventions report benefits to mental well-being upon completion, they have not typically addressed whether such beneficial effects are sustained long-term beyond the period of the courses. Here, we report a pre-registered follow-up of 228 undergraduate students, from a variety of disciplines, who took a positive psychology course 1 or 2 years previously. Overall, group analysis revealed that students who had taken the course did not continue to show the originally reported benefits at follow-up. Students who had taken the course scored higher on mental well-being than other students tested using a university-wide survey, but they were also higher at baseline 1–2 years earlier indicating a sampling bias. An exploratory analysis, however, revealed that 115 students (51% of the group) who had continued to practice the recommended activities taught during the course maintained their increased mental well-being over the period of follow-up. We therefore suggest that continued engagement is a key factor in sustaining the long-term benefits of positive psychology courses. Implementation of such courses should therefore include provision and mechanisms for maintaining future student engagement.

Keywords Psychoeducation · Longitudinal · Mental well-being

Introduction

Mental well-being is a major concern among university students. In a large-scale survey of 37,500 students across 140 universities in the UK, 22% of students reported a current mental health diagnosis and 88% reported feelings of anxiety (Pereira et al., 2018). The same year, a survey of 12,730 students from 14 UK universities revealed that 45% reported that they were currently experiencing mental health problems, with most experiencing symptoms of anxiety and depression (Union Futures Project, 2018). A similar pattern has been observed in the USA where a nationally representative 2017 survey found that among current college students, over 50% reported hopelessness, over 30% felt depressed, over 60%

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experienced overwhelming anxiety and over 10% seriously considered suicide (American College Health Association, 2018). Another recent survey by the UK Student Minds charity reveals that the pandemic has exacerbated this picture of poor mental well-being (Frampton & Smithies, 2022). It found that 64% of 1000 students surveyed in January 2022 felt that the COVID-19 pandemic had a negative impact on their mental well-being during the previous autumn term, and 43% said that they needed support.

Aside from the unacceptable personal cost to individual students, the burden on professional well-being services to deal with this large demand is both expensive and time-consuming, with student mental well-being problems continuing to rise (Lewis & Bolton, 2023). Student well-being services are also understandably largely reactive in that they are directed at students who have sought support after reaching a crisis point. As with other health issues, prevention would be preferable to treatment. Increasingly, psychoeducational courses that teach positive psychology as part of university degree programmes are seen as one proactive strategy to deal with this problem before it requires the intervention of professional clinical mental health services (Hobbs et al., 2022a). These courses teach various aspects of positive psychology with the goal of empowering students to strengthen and maintain their own mental health by practising evidence-based techniques that have been shown to improve subjective well-being (e.g. Seligman, et al., 2005). Not only do positive psychology interventions improve subjective well-being, but they can also increase resilience making it easier for individuals to cope with life's adversaries (Boniwell & Tunariu, 2019).

A recent systematic review of 27 psychoeducational courses found that most (85%) reported positive psychological benefits of taking such courses (Hobbs et al., 2022a). However, most of these courses did not conduct surveys or follow-ups beyond the immediate period of the course. Only four studies examined longer-term effects and do so only for a maximum period of 4 months post-course. It is therefore still unclear whether the reported beneficial effects of such courses are sustained in the long term. Moreover, the majority of studies reviewed by Hobbs et al., 2022a were at high risk of bias due to methodological limitations. All but one study (Hood et al., 2021) included in the review failed to pre-register their hypotheses and statistical analyses, increasing the likelihood of false-positive findings.

In the present paper, we attempt to address these shortcomings in two pre-registered studies testing the long-term benefits of the Science of Happiness course that runs at the University of Bristol (Hobbs, et al., 2022b; Hood et al., 2021). The Science of Happiness is a popular course taught by two of the authors (BH, SAJ) designed for cross-disciplinary first-year undergraduate students who are able to take "open units" for course credit. The unit is based on the Yale course, "Psychology and the Good Life" delivered by one of the co-authors (LS). The Bristol Science of Happiness course has been running since 2019 and has been offered in various formats (in-person, online, hybrid) to accommodate the COVID-19 pandemic. The topics covered include the nature of happiness and to what extent biology and environment play a role in the individual experience. The course considers the role of genes, cognitive biases, distorted reasoning, brain mechanisms, problem-solving and the importance of social connection, all presented at a level that is accessible to non-specialist audiences. By combining the theoretical background with practical advice, the course is designed to encourage and develop positive habits and coping strategies.

The course includes five key weekly components, including in-person or pre-recorded content lectures, live sessions with the instructors, small group meetings ("happiness hubs") led by senior students, weekly reflective journaling and a group project. In addition to learning about the science of mental well-being, students are instructed to try out

evidence-based activities or "happiness hacks", as a way of fostering positive mental well-being. The course emphasized that it was not intended to be a substitute for professional services nor intended as an intervention to tackle specific mental health concerns. We did, however, note that there was the potential for raised mental well-being as evidenced by previous evaluative studies based on previous iterations of the course.

We have previously reported that the Science of Happiness course produced significant mental well-being benefits for those taking the course in the autumn term compared to a wait-list control group who planned to take the course in the spring (Hobbs, et al., 2022b; Hood et al., 2021). We have shown for both academic years with available data (2019/2020 and 2020/2021) that those taking the course reported significantly increased mental well-being from the first week of the course to the final week, as well as both reduced loneliness and anxiety. We also found that the same benefits were sustained 6 weeks after the course concluded, but the question remains as to whether there is any impact beyond this period into the following academic years.

To answer this question, two cohorts of students who had taken the Science of Happiness course in previous academic years (2019/2020 and 2020/2021) were invited to complete a repeated self-assessment of the well-being measures originally used in 2022 to determine whether they had experienced any long-term change. We also collected reflections on the course in retrospect and information on whether they had managed to maintain the recommended activities. In addition, we also had the opportunity to look for differences between students who had taken the Science of Happiness course compared to the larger body of students who had completed the Bristol University Well-being Survey which also included the same self-assessment well-being measures.

We addressed four pre-registered research questions in this study. As there is limited evidence of the long-term effects of psychoeducational courses on student well-being, we did not make specific hypotheses.

(1) Has well-being changed in students that previously completed the Science of Happiness course?
(2) Is current well-being in students that previously completed the Science of Happiness course comparable to the average well-being of students at the University of Bristol?
(3) What techniques or "happiness hacks" do students remember from the course? Are students continuing to use these techniques after completing the course?
(4) Do students believe that the Science of Happiness course had a positive impact on their well-being? Would they recommend the course to other students?

We did not know whether students would maintain the regular happiness hacks we had recommended in the course. As we discovered, a sizeable proportion did, and so, we also included an additional question that was not pre-registered but deemed worthy of investigation, namely.

(5) Is long-term well-being better in students that have continued to use the 'happiness hacks' taught during the course?

Method

This study was pre-registered on Open Science Framework (https://osf.io/rybex). Data and analysis code are openly available on the University of Bristol Research Data Repository (Data doi: 10.5523/bris.3dbgv3yfqsocq249pro82kazil).

Ethics

This research was approved by the University of Bristol School of Psychological Sciences Research Ethics Committee (approval code: 011020110763). Participants provided informed written consent as part of an online survey during data collection.

Participants

The study sample consisted of undergraduate students who had previously completed the Science of Happiness course at the University of Bristol in the 2019/2020 and 2020/2021 academic years. The Science of Happiness is a credit-bearing course that is open to all first-year undergraduate students at the University of Bristol as an elective (see Hood et al., 2021; Hobbs, et al., 2022b for full details). We invited students who had previously responded to either a pre- ($n = 866$) or post-course ($n = 677$) well-being survey (total $n = 905$, of which 638 had both pre- and post-course data available). There were no further inclusion or exclusion criteria.

Procedure

As part of the Science of Happiness course, participants had previously completed well-being surveys at either pre- or post-course timepoints in 2019/2020 and 2020/2021. The course was run in two teaching blocks in each academic year (teaching block 1, October–December; teaching block 2, February–May). The course and data collection procedures are described in full elsewhere (Hobbs, et al., 2022b; Hood et al., 2021). In May 2022, we invited participants to complete a long-term follow-up well-being survey using the online survey software Qualtrics. The maximum time period between completing post-course and long-term follow-up surveys was 29 months, and the minimum time period was 12 months. The long-term follow-up survey was active for a 1-month period during which participants who did not respond to the original invitation were sent two reminders. Study data are therefore available for a total of three timepoints: (1) pre-course, (2) post-course and (3) long-term follow-up.

Materials

Well-being

We used the Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS; Shah et al., 2018)) to measure well-being, the Generalized Anxiety Disorder Questionnaire (GAD-7; Spitzer et al., 2006) to measure anxiety and the UCLA Loneliness Scale 3-item version (UCLA Loneliness, Hughes et al., 2004) to measure loneliness. Participants in both the 2019/2020 and 2020/2021 academic cohorts previously completed the SWEMWBS as part of pre- and post-course surveys. However, only participants from the 2019/2020 cohort completed the UCLA Loneliness Scale and only participants from the 2020/2021 cohort previously completed the GAD-7.

Experiences of the science of happiness

We asked participants to what extent they agree with the statement "Overall, the Science of Happiness had a positive effect on my mental well-being" on a 5-point scale ranging from strongly agree to strongly disagree and whether they would "recommend the Science of Happiness to other students?" with a yes/no response. We also asked them whether they had "continued to use any of the techniques or 'happiness hacks' learned during the Science of Happiness, and if yes, what techniques/happiness hacks they had continued to use and approximately how often". Finally, we asked participants to tell us about anything that they "particularly remember from the course" with a free text response.

University well-being survey

We used data from the University of Bristol 2022 well-being survey to allow us to compare levels of mental well-being in students who have previously taken part in the Science of Happiness against the general university population. The survey was sent out in April 2022 to all registered undergraduate and postgraduate students at the University of Bristol. The total number of all students attending Bristol for the 2021/2022 year was approximately 31,000. It is therefore possible that there was some overlap between respondents in our survey and the university-wide well-being survey. We used the summary statistics of the SWEMWBS, GAD-7 and UCLA Loneliness Scale reported in this survey.

Statistical analyses

Unless otherwise stated, all analyses applied two-tailed statistical inferences and were conducted in R version 4.1.2.

Results

Of the 905 students invited to participate in the long-term follow-up survey, 228 (25.2%) responded. Participants had previously taken the Science of Happiness in 2019/2020 (semester 1, 17.5%; semester 2, 24.1%) and 2020/2021 (semester 1, 19.3%; semester 2, 39.1%). There were minimal differences in demographic characteristics between those who responded to the survey and those who did not (Supplementary Table 1).

We anticipated that loss-to-follow-up may be high considering the length of time since completion of the course. We powered our study based on a 30% response rate, a sample size of 271. This would allow us to detect a change of 0.83 points (SD = 2.45) in SWEMWBS scores with 90% power. This change was based on the smallest change in SWEMWBS scores considered meaningful to participants from pre- to post-course in the 2020/2021 cohort (Hobbs et al., 2022b). However, in actuality, we obtained data from only 228 participants. Power calculation indicated that this sample provides 84%

power to detect a change of this magnitude. Our obtained level of power therefore fell short of the anticipated 90% but was still greater than the conventional 80% level within this field (Brysbaert, 2019).

Has well-being changed in students that previously completed the Science of Happiness course?

We used mixed-effects linear regression models to examine change in self-report measures of well-being. The self-report measures were entered as continuous outcomes in separate models. Timepoint (pre-course, post-course, follow-up) was entered as a categorical predictor and participant as a random effect. For the SWEMWBS model, only we also included the year of course (2019/2020, 2020/2021) as a categorical fixed effect to account for this measure being collected across two cohorts of students with potential differential time-related effects associated with the COVID-19 pandemic.

As previously reported (Hobbs, et al., 2022b; Hood et al., 2021), participants showed greater well-being and reduced levels of anxiety and loneliness at post- versus pre-course timepoints (Table 1, Supplementary Table 2). However, we found only weak evidence that these benefits were sustained at long-term follow-up (Table 1, Fig. 1,). On average, participants reported slightly higher SWEMWBS scores at long-term follow-up versus pre-course timepoints, but confidence intervals overlapped with the null ($b = 0.43$; 95% CI − 0.03, 0.89; $p = 0.068$). Similarly, participants reported slightly lower levels of loneliness at long-term follow-up versus pre-course, but confidence intervals again overlapped with the null ($b = -0.34$; 95% CI − 0.69, 0.02; $p = 0.063$). We found no evidence of a difference in anxiety from pre-course to long-term follow-up (GAD-7 $b = -0.19$; 95% CI − 1.02, 0.64; $p = 0.660$).

Table 1 Well-being scores for students who completed the Science of Happiness course at pre-course, post-course and long-term follow-up (LTFU) timepoints, compared with the 2022 University of Bristol Well-being Survey

	Science of Happiness						University-wide well-being survey 2022 ($N = 1080$)	
	Pre-course		Post-course		LTFU[a]			
	M (SD)[b]	*N*	*M* (SD)	*N*	*M* (SD)	*N*	*M*	SD
SWEMWBS[a]	20.89 (3.17)	219	21.78 (3.13)	196	21.32 (3.53)	228	19.77	4.11
UCLA[b]	5.34 (1.69)	91	5.08 (1.58)	87	4.99 (1.91)	93	5.97	1.89
GAD-7[c]	8.13 (4.96)	127	7.04 (4.04)	108	8.05 (4.72)	131	8.91	5.86

SWEMWBS Short version of the Warwick-Edinburgh Mental Well-Being Scale (metric score); *UCLA* University of California, Los Angeles Loneliness Scale; *GAD-7* Generalized Anxiety Disorder Assessment

[a]Note that individuals who completed LTFU scores include those who completed one or both previous surveys

[b]Mean scores with standard deviations *M* (SD) and number of participants (*N*)

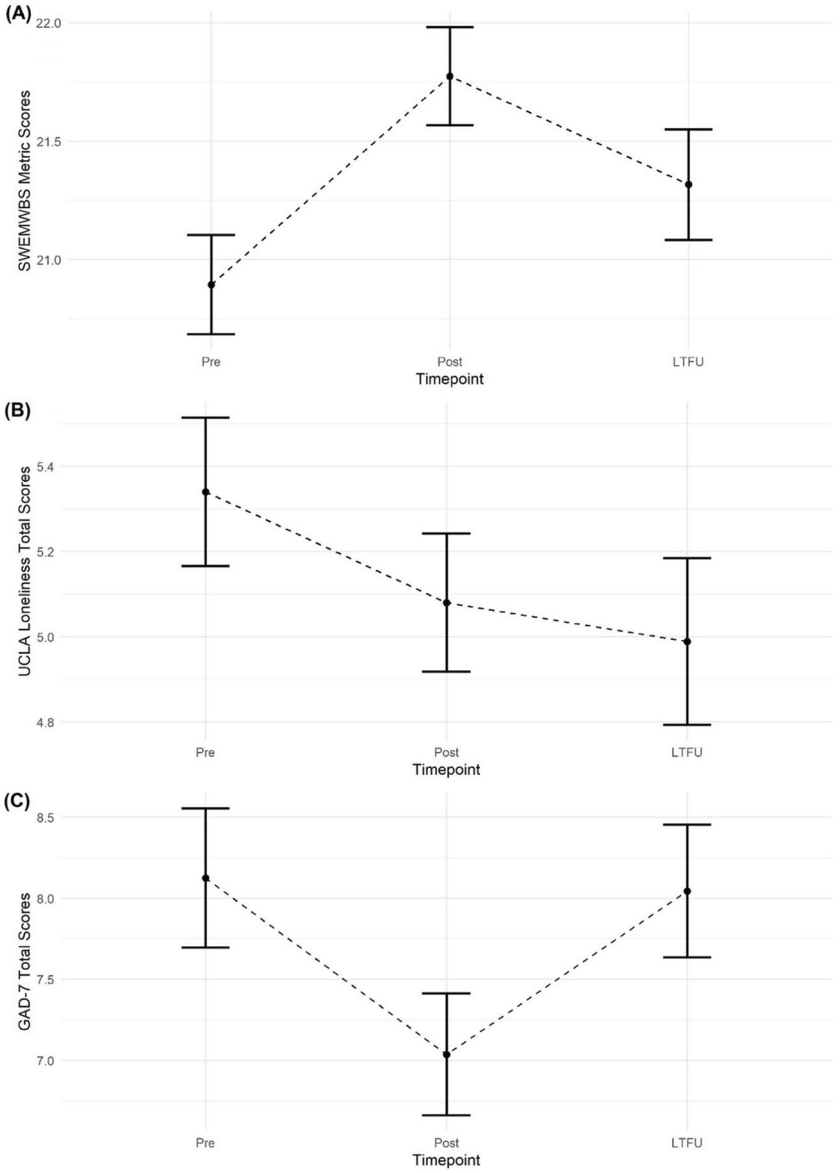

Fig. 1 Mean scores for **A** SWEMWBS (higher scores indicate greater mental well-being), **B** UCLA Loneliness Scale (higher scores indicate greater loneliness) and **C** GAD-7 (higher scores indicate greater anxiety) questionnaires at pre-course, post-course and long-term follow-up (LTFU) timepoints. Error bars represent standard errors

Is current well-being in students that previously completed the Science of Happiness course comparable to the average well-being of students at the University of Bristol?

We used two-sample *t*-tests to compare means and standard deviations for measures of well-being (SWEMWBS, UCLA Loneliness, GAD-7) for our dataset of students that

previously completed the Science of Happiness course against means and standard deviations from the wider university population, obtained from the University of Bristol Student Well-being Survey.

Compared to the university-wide well-being survey, students who completed the Science of Happiness showed greater levels of well-being (SWEMWBS $t(369.4) = 5.84$, $p < 0.001$) and lower levels of anxiety (GAD-7 $t(379.07) = -3.06$, $p = 0.002$) and loneliness (UCLA Loneliness $t(323.74) = -4.99$, $p < 0.001$) at long-term follow-up (Table 1). However, we also observed the same pattern when comparing university-wide well-being to pre-course measures of well-being (SWEMWBS $t(382.87) = 4.53$, $p < 0.001$) and loneliness (UCLA Loneliness $t(109.75) = -3.37$, $p = 0.001$), but not anxiety (GAD-7 $t(170.31) = -1.65$, $p = 0.100$).

Do students believe that the Science of Happiness course had a positive impact on their well-being? Would they recommend the course to other students?

We calculated the number and proportions of students for each response to the statements "Overall, the Science of Happiness had a positive effect on my mental well-being" and "Would you recommend the Science of Happiness to other students?" Participants gave largely positive feedback on the course. Over half of the participants strongly agreed or agreed that "the Science of Happiness had a positive effect on [their] well-being" ($n = 117$, 52.46%). The remainder predominantly responded neutrally ($n = 87$, 39.01%), with only 19 participants disagreeing or strongly disagreeing (8.52%). Additionally, more than 90% of participants said that they would recommend the Science of Happiness to other students ($n = 209$, 93.72%).

Are students continuing to use the techniques or 'happiness' hacks' taught during the course after completing the course?

We calculated the number and proportion of students who reported that they continued to use techniques taught during the course and mapped out categories of techniques students reported continuing to use NVivo (version 1.51).

Approximately half of the participants reported that they had continued to use the techniques taught as part of the course ($n = 113$, 50.67%). The most commonly reported technique that students continued to use was gratitude ($n = 42$, 37.17%), including writing letters of gratitude to others and making lists of things that they were grateful for (e.g. three good things). Other commonly reported techniques were mindfulness/meditation ($n = 38$, 33.63%), exercise ($n = 24$, 21.24%), journaling ($n = 20$, 17.70%) and kindness ($n = 12$, 10.62%).

Is long-term well-being better in students that have continued to the 'happiness hacks' taught during the course?

As an unplanned exploratory analysis, we investigated whether a change in well-being from pre-course to long-term follow-up timepoints differed between participants who reported continuing to use happiness hacks versus those who did not. We used a mixed-effects linear regression model with SWEMWBS metric scores as the outcome; timepoint (pre-course,

post-course, long-term follow-up), self-reported continued use of happiness hacks (yes, no) and an interaction term between timepoint and continued use of happiness hacks as predictors; and participant as a random effect. To account for the SWEMWBS being collected across two cohorts of the course, we included year as a categorical fixed effect.

We found evidence of an interaction between SWEMWBS metric scores at pre-course versus long-term follow-up and continued use of 'happiness hacks' ($b = -1.41$, 95% CI $-2.33, -0.48$, $p = 0.003$; Supplementary Table 3). Tukey-adjusted follow-up contrasts indicated that participants who reported continuing to use 'happiness hacks' showed a significant increase in SWEMWBS scores from pre-course to long-term follow-up ($b = 1.16$; 95% CI 0.38, 1.94; $p = 0.001$; Fig. 2). In contrast, participants who did not continue to use 'happiness hacks' showed similar SWEMWBS scores on average from pre-course to long-term follow-up ($b = -0.24$; 95% CI -1.04, 0.55; $p = 0.753$; Fig. 2).

We also explored whether participants who continued to use 'happiness hacks' were more likely to agree that the course had a 'positive effect on [their] mental well-being. We created a binary variable to indicate whether participants had agreed ('strongly agree', 'agree') or not ('neutral', 'disagree', 'strongly disagree') with the statement "Overall, the Science of Happiness had a positive effect on my mental well-being") and used this as the outcome variable in a logistic regression model with self-reported continued use of 'happiness' hacks (yes/no) as the predictor.

Participants who reported continued use of 'happiness hacks' were more likely to agree that the course had a positive effect on their well-being (77.9%) versus those that did not continue to use 'happiness hacks' (26.4%) (OR 9.83; 95% CI 5.40, 19.50; $p < 0.001$). There were no significant differences in demographic characteristics between those who reported continuing to use the 'happiness hacks' and those who did not (Supplementary Table 4).

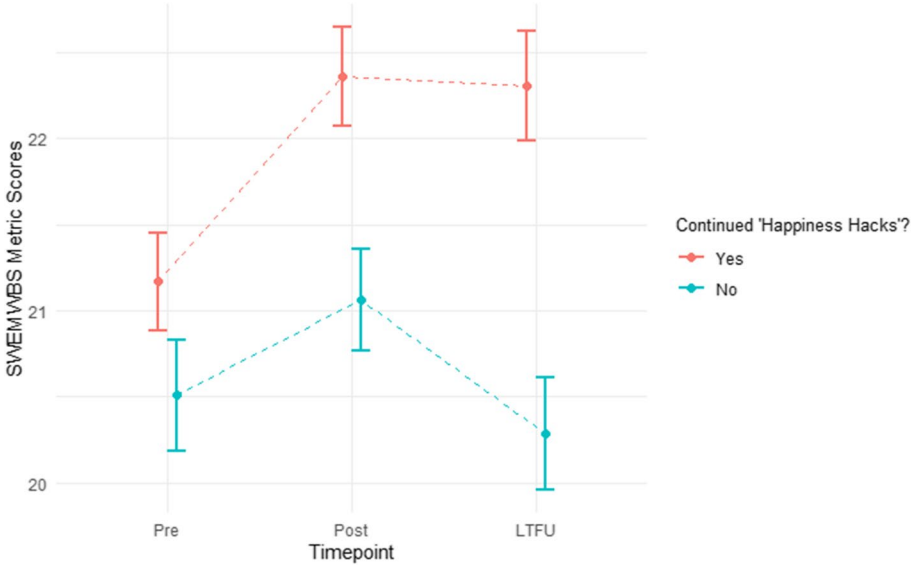

Fig. 2 Mean SWEMWBS metric scores by timepoint (pre-course, post-course, long-term follow-up) and self-reported continued use of 'happiness hacks'. Error bars represent standard errors. LTFU = long-term follow-up

Response bias

It is possible that the likelihood of response to the long-term follow-up survey may have varied according to the previous effects of the course (i.e. participants that particularly benefited from the course may have been more likely to respond) or demographic differences. To investigate this possibility, we compared pre- and post-course well-being scores and demographics for students who responded to the long-term follow-up survey versus those who did not. Responders and non-responders were largely similar in demographic characteristics (Supplementary Table 1). Additionally, mean scores were similar between responders and non-responders suggesting that response bias relating to well-being or demographics is unlikely to have impacted our findings (Supplementary Table 5).

Discussion

Psychoeducational courses are increasingly common and popular among students especially when they form part of a credit-bearing curriculum (Hobbs et al., 2022a). Our previous student feedback on the course has indicated that students are motivated to learn about positive psychology interventions to help their own mental well-being as well as earn course credit as part of their degree. Indeed, in our earlier work, students who stated that they were motivated to raise their mental well-being by taking the Bristol Science of Happiness course were found to be most likely to benefit from the post-course assessment (Hobbs et al, 2022b). However, most courses that generate positive benefits to mental well-being report generally small effect sizes and have not been studied over the longer term (Hobbs et al., 2022a). Here, we report an analysis of one such course, the Science of Happiness. Whilst there are long-term follow-up studies in school settings (for review see Berger et al., 2022), to the best of our knowledge, the current study is the longest-term period of follow-up of students completing a well-being course as part of a university degree programme.

We found that the previous mental well-being benefits reported by students in the immediate post-course period associated with taking the Science of Happiness initially disappeared in the longer-term follow-up conducted 1–2 years later even though just over half (52%) said they thought the course had improved their mental well-being, and most (94%) said they would recommend the course to others. Clearly, the course was viewed favourably by those who responded but that did not necessarily translate into sustained personal benefits for their own mental well-being as measured by our objective self-assessment surveys. This is consistent with other studies that show that the benefits of programmes for mental well-being are not maintained after interventions have ceased (Schoeps et al., 2020). However, approximately half of the students (51%) reported that they had continued to engage in various recommended activities including writing letters of gratitude to others, meditation, exercise, journaling and kindness. When we compared these students to those who had not maintained engagement in happiness-boosting activities, we found a clear benefit of the continued use of activities over time on scores of mental well-being. Students who reported continuing to use 'happiness hacks' showed a significant increase in well-being from pre-course to long-term follow-up, whereas those who did not showed no change over time. As with many medical or psychological treatments, the dosage (i.e. frequency and timing) of an intervention matters to outcomes (Lyubormirsky and Layous, 2013). This suggests that the benefits of psychoeducational courses can be maintained if students continue to sustain engagement in activities (Lyubomirsky et al., 2011).

In comparison to the university-wide well-being survey, students who completed the Science of Happiness showed higher levels of well-being and lower loneliness and anxiety. However, the well-being and loneliness scores of students who took the Science of Happiness were already better than those who did not take the course at the pre-test indicating that the two groups were not matched. This suggests that students who take this optional unit are already reporting better mental well-being before any intervention. There are a number of possible explanations for this. First, the university-wide survey had a particularly low response rate (< 5%) which is consistent with most attempts to survey this group of students who tend to be overloaded with requests for information and feedback. As it was a voluntary survey, it is possible that those who did respond were already low in mental well-being and wanted to bring this to the attention of the university. It is also possible that students who took the Science of Happiness course may already have had better mental well-being than others who are unfamiliar with or do not prioritise this topic.

We also considered the issue of biased sampling in the positive effects we observed in our long-term surveys and found that those students who maintained and benefited from continuing with the happiness hacks were not already scoring higher at baseline. Therefore, the interaction we found supports the interpretation that continuing to take part in positive psychology practices (i.e. the happiness hacks) plays a role in maintaining improved mental well-being. Of course, we do not know why some students continue with the happiness hacks whereas others did not. There were no indicators of the demographic difference between the groups nor do we know the causal relationship. Are students who maintain happiness hacks happier as a result of these activities or do they maintain the activities because they are happier? Future studies should seek to discover whether there is a causal relationship and, if so, what are the mechanisms for maintaining these activities long-term and how these can be supported.

Our study also strengthens this growing area of research interest by adhering to pre-registration, making data openly available and looking at the longer-term benefits of psychoeducational courses. This is important because a recent systematic review of popular positive psychology interventions found that most studies did not adhere to pre-registration which undermined the credibility of the field (Folk & Dunn, 2023a), though it should be noted that the bulk of work was conducted at a time when such practices were not common (Folk & Dunn, 2023b). We agree that there needs to be rigorous methodological approaches when evaluating positive psychology.

Our finding that adhering to positive psychology interventions raises and maintains mental well-being is consistent with other long-term studies of healthy lifestyle behaviours such as dieting and physical exercise (for review see Fernández-Ballesteros et al., 2022). Although our study focuses specifically on the goal of sustaining happiness, our results support the idea that changing habits in the long term can result in sustained positive psychological outcomes.

Our results highlight the importance of finding strategies to maintain engagement in positive psychology interventions over time. One possible way to address the difficulties of maintaining positive habits is to develop positive psychology course programming that runs for the whole duration of the students' degree programme throughout the university. By themselves, however, psychoeducational courses are likely to be only minimally effective but rather they should be considered as a key piece of a multicomponent approach integrated with other university services (Abelson et al., 2022). Such a scheme would represent a considerable challenge that both universities and students might resist, but the alternative is to address the ever-increasing burden of higher use of student clinical well-being services. Currently, there are no studies that we are aware of that have demonstrated an impact of psychoeducational courses on students' use of professional well-being services, but the UK Department of Health and Social Care has published recommendations

that provision of well-being services "may ultimately reduce the healthcare burden" (Dept of Health, 2014). Future studies should seek to evaluate the cost–benefit analysis of introducing longer-term accredited well-being courses into higher education.

Our research could be built upon in future work by attempting to increase response rates to long-term follow-up surveys on the effect of psychoeducational courses on well-being. Despite extensive recruitment efforts, we did not reach our intended sample size. However, we still met conventional levels of power to detect our expected effects with the final sample. Additionally, we did not find evidence of substantial differences in either demographics or previous levels of well-being in participants who responded to the long-term follow-up survey versus those who did not. Whilst we believe our sample is therefore largely representative of the previous cohort, future work would benefit from additional recruitment strategies to ensure a higher response rate. We also note that our study is quantitative and that qualitative studies have provided additional understanding on how curriculum-embedded approaches impact student well-being and which might be the most effective (Upsher et al., 2022).

In conclusion, our study provides the first evidence that psychoeducational courses can have long-term positive benefits for student mental well-being for students who continue practising positive psychology interventions beyond the end of the course. Our work highlights the importance of developing tools to help students sustain the use of these practices long term.

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Author contributions Authors contributed equally to the study.

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Data Availability Data and analysis code are openly available on the University of Bristol Research Data Repository (link available on publication).

Declarations

Ethical approval and informed consent This research was approved by the University of Bristol School of Psychological Sciences Research Ethics Committee (approval code: 011020110763). Participants provided informed written consent as part of an online survey during data collection.

References

Abelson, S., Lipson, S. K., & Eisenberg, D. (2022). Mental health in college populations: A multidisciplinary review of what works, evidence gaps, and paths forward. In L. W. Perna (Ed.), *Higher education: Handbook of theory and research* (Vol. 37, pp. 1–107). Cham: Springer. https://doi.org/10.1007/978-3-030-66959-1_6-1

American College Health Association. American College Health Association-National College Health Assessment II: Undergraduate Student Executive Summary Fall. (2018). *Silver Spring*. MD.

Berger, E., Reupert, A., Allen, K.-A., & Campbell, T. C. H. (2022). A systematic review of the long-term benefits of school mental health and wellbeing interventions for students in Australia. *Frontiers in Education, 7*, 986391. https://doi.org/10.3389/feduc.2022.986391

Boniwell, I., & Tunariu, A. D. (2019). *Positive psychology: Theory, research and applications*. Open University Press.

Brysbaert, M. (2019). How many participants do we have to include in properly powered experiments? A tutorial of power analysis with reference tables. *Journal of Cognition, 2*, 1–38. https://doi.org/10.5334/joc.72

Dept of Health (2014). *Wellbeing. Why it matters to health policy*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/277566/Narrative__January_2014_.pdf. Accessed 18 Sept 2023

Fernández-Ballesteros, R., Valeriano-Lorenzo, E., Sánchez-Izquierdo, M., & Botella, J. (2022). Behavioral lifestyles and survival: A meta-analysis. *Frontiers in Psychology, 12*, 786491. https://doi.org/10.3389/fpsyg.2021.786491

Folk, D., & Dunn, E. (2023a). A systematic review of the strength of evidence for the most commonly recommended happiness strategies in mainstream media. *Nature Human Behavior, 7*, 1697–1707. https://doi.org/10.1038/s41562-023-01651-4

Folk, D., & Dunn, E. (2023b). How can people become aappier? A systematic review of preregistered experiments. *Annual Review of Psychology, 75*. https://doi.org/10.1146/annurev-psych-022423-030818

Frampton, N. & Smithies, D. (2022). *University mental health: Life in a pandemic*. Office for Students and Higher Education Council for Wales. https://www.studentminds.org.uk/lifeinapandemic.html#report. Accessed 18 Sept 2023

Hobbs, C., Armitage, J., Hood, B., & Jelbert, S. (2022a). A systematic review of the effect of university positive psychology courses on student psychological wellbeing. *Frontiers in Psychology., 13*, 1023140. https://doi.org/10.3389/fpsyg.2022.1023140

Hobbs, C., Jelbert, S., Santos, L. R., & Hood, B. (2022b). Evaluation of a credit-bearing online administered happiness course on undergraduates' mental well-being during the COVID-19 pandemic. *PLoS ONE, 17*(2), e0263514. https://doi.org/10.1371/journal.pone.0263514

Hood, B., Jelbert, S., & Santos, L. R. (2021). Benefits of a psychoeducational happiness course on university student mental well-being both before and during a COVID-19 lockdown. *Health Psychology Open, 8*, 2055102921999291.

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging, 26*, 655–672.

Lewis, J. & Bolton, P. (2023). Student mental health in England: Statistics, policy and guidance. Research Briefing. House of Commons Library. https://researchbriefings.files.parliament.uk/documents/CBP-8593/CBP-8593.pdf accessed Dec 18th. 2023.

Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: An experimental longitudinal intervention to boost well-being. *Emotion, 11*, 391–402.

Lyubormirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being? *Current Directions in Psychological Science, 22*, 57–62.

Pereira, S, Reay, K, Bottell, J, Walker, L, Dzikiti, C, Platt, C, et al. (2018). University Student Mental Health Survey 2018. Available: https://uploads-ssl.webflow.com/561110743bc7e45e78292140/5c7d4b5d314d163fecdc3706_Mental Health Report 2018.pdf

Schoeps, K., de la Barrera, U., & Montoya-Castilla, I. (2020). Impact of emotional development intervention program on subjective well-being of university students. *Higher Education, 79*, 711–729. https://doi.org/10.1007/s10734-019-00433-0

Seligman, M. E., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*, 410.

Shah, N., Cader, M., Andrews, W. P., et al. (2018). Responsiveness of the Short Warwick Edinburgh Mental Well-Being Scale (SWEMWBS): Evaluation a clinical sample. *Health and Quality of Life Outcomes, 16*, 239.

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 66*, 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Union Futures Project (2018). *Being well doing well*. Retrieved from https://alterline.co.uk/being-well-doing-well-19-20/. Accessed 18 Mar 2023

Upsher, R., Percy, Z., Cappiello, L., et al. (2022). Understanding how the university curriculum impacts student wellbeing: A qualitative study. *Higher Education*. https://doi.org/10.1007/s10734-022-00969-8