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Article

The Road to Recovery: A Two-Year Longitudinal Analysis of Mental Health Among University Students During and After the COVID-19 Pandemic

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Abstract: Longitudinal research into the impact of Covid-19 on university student mental health beyond the pandemic is lacking. This study aims to address the gap in the literature by tracking the mental health of university students over a two-year period, spanning the Covid-19 pandemic and its aftermath. A two-year longitudinal study surveyed a sample of university students (n=302) three times between May 2020 and May 2022. Students' psychological distress, generalised anxiety, flourishing, and personal wellbeing were assessed at each time point. It was found that students' psychological distress levels spiked during the first year of the pandemic, but reverted back to baseline levels at two-year follow-up. While generalised anxiety gradually improved, both their psychological distress and generalised anxiety remained considerably worse than pre-pandemic norms. Students' flourishing scores remained very low, while their life satisfaction and state happiness improved slightly between May 2021 and May 2022. These findings clearly demonstrate that students' mental health is still in crisis, even after the Covid-19 pandemic. More needs to be done to support students beyond the pandemic generally, including this particularly unique cohort of students who endured unprecedented challenges for prolonged periods, and are now transitioning into the working world. Practical implications and recommendations are discussed.

Keywords: mental health; psychological wellbeing; university students; anxiety; psychological distress; flourishing; higher education; longitudinal research; COVID-19

1. Introduction

Pandemics have widespread impacts on global health, economies and societies, and are expected to become more frequent in the future. In order to better understand how recovery can be effectively managed, the latest Covid-19 pandemic can be used as a model to assess strategies and outcomes in the aftermath of such crises.

University students were among the most vulnerable to the consequences of the Covid-19 pandemic [1,2]. Social restrictions meant that students were deprived of their usual social support networks that are crucial for buffering the adversities associated with transitioning into, and managing university life [3]. The transition to remote learning and the lack of campus activities meant that students had limited interaction with peers and lost face-to-face contact with lecturers, heightening feelings of loneliness and exacerbating distress [4–8]. Unpredictability and a lack of clarity around assessment formats and academic expectations contributed to increased stress and anxiety [9,10]. These factors have created unique challenges that have significantly affected the mental health of university students, and as a result, research into the mental health impacts of the pandemic on university students was declared a top priority [11]. A substantial body of evidence has demonstrated the severe mental health impacts of the pandemic on university students, with increased stress, anxiety and depression, along with the exacerbation of pre-existing mental health conditions [12–18]. For instance, a recent systematic review and meta-analyses [19] showed a pooled

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proportion of generalised anxiety across 36 studies at a prevalence of 41%, suggesting that students are experiencing high rates of anxiety. Increasing poor mental health generated a significantly higher demand for mental health services [20], which meant many students did not get timely access to support and caused further distress [21–23].

The re-introduction of a typical campus environment in the post-pandemic period meant students could reconnect with peers and academic staff, providing crucial physical and emotion support. As academic life stabilised, students began to restore a sense of control and predictability in their lives, which impacted positively on their mental health [24,25]. Subsequently, some recent research has shown that the mental health of university students has started to improve [26]. For instance, Lemyre et al. (2024) carried out a longitudinal study of around 150 students across four universities in England, capturing data in April 2021 and November 2021. They found initial wellbeing was negatively impacted and that there was a significant improvement in students' wellbeing between April and November [26].

Nonetheless, longitudinal research on the impact of the Covid-19 pandemic on university student mental health post-pandemic, is significantly lacking. There still remains a crucial need to understand the trajectory of mental health impacts, providing a timeline of students' wellbeing during and after the pandemic. Therefore, more comprehensive research is needed to provide deeper insights into the lasting effects of the pandemic on students' mental wellbeing. It is important for universities, policymakers and mental health professionals to have a greater understanding of the complexities of students' mental health trajectories to inform support strategies and address the evolving needs of students. Therefore, the main aim of this study was to address the gap in the literature by assessing the mental health of university students during and after the Covid-19 pandemic. By tracking their mental health over a two-year period, it aimed to assess whether there were significant improvements in the wellbeing of university students following the Covid-19 pandemic. Considering the unprecedented nature of the Covid-19 pandemic and its multifaceted impact on university students, the authors hypothesised that there would be a significant improvement in the mental health of university students in the post-pandemic period.

2. Materials and Methods

Design

This was a longitudinal study that adopted a repeated measures online survey design, aiming to track the mental health of university students from the early stages of the Covid-19 pandemic to a post-pandemic era. Data was collected online at three time points. First, between the 14th - 16th May 2020 (Baseline), where those completing Baseline (n=1578) were invited to complete one year later (Year 1) between 14th May - 4th June 2021 (n=554). Those who completed the one year follow up, were invited to complete the survey again another one year later (Year 2), between 10th June – 24th June 2022 (n=302). Data was collected through Prolific, which is an online crowdsourcing platform that was specifically designed for use in a research context [27]. Certain features available to researchers such as pre-screening and whitelisting participants permits the collection of longitudinal data [28]. A timeline can be seen in the supplementary information, that offers context to the data collection periods in reference to what was happening in the UK for the general public, and university students specifically, around each time data was collected.

Participants

In order to be deemed eligible to participate, prolific users needed to be a university student, currently residing and studying in the UK. A total of 302 university students in the UK completed the two-year follow up survey online. Table 1 presents the demographic characteristics of the participant sample. Participants were mostly female (76.5%), with a mean age of 24.6. Of the 302 participants at Year 2, 89 were recent graduates and were no longer studying at university. We asked the 89 recent graduates what they were doing now they had left university. Mostly, they were in full-

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time employment (n = 63) or part-time employment (n = 8). Some were unemployed and looking for work (n = 9), unemployed but not looking for work (n = 4), or self-employed (n = 5).

Table 1. Demographic characteristics of the sample at Year 2.

Demographic characteristic		**Number of Participants (n)**	**Percentage of Sample (%)**
Gender	Female	231	76.5
	Male	68	22.5
	Non-Binary	3	1
Age	19-20	18	6
	21-22	94	31.2
	23-25	94	31.1
	26-30	31	10.2
	31-40	43	14.2
	41+	22	7.3
Year of Study	Foundation	2	.7
	First Year	10	3.3
	Second Year	38	12.6
	Third Year	81	26.8
	Fourth Year	39	12.9
	Masters	39	12.9
	PhD	5	1.7
	N/A – recent graduate	88	29.1

Measures

At each phase of data collection, participants were asked to complete a series of mental health related standardised measures.

Psychological Distress (CORE-10)

Clinical Outcomes in Routine Evaluation (CORE-10) is a 10-item measure of psychological distress [29]. This scale is rated on a five-point frequency of occurrence basis, from "not at all" to "most or all of the time" in response to items such as "I have felt tense or anxious". The reliability and validity of this scale has been extensively tested and confirmed [30–32].

Generalised Anxiety (GAD-7)

The Generalised Anxiety Disorder (GAD-7) is a 7-item measure of generalised anxiety disorder and is often used as a screening tool and symptom severity measure for clinically significant anxiety disorders in outpatient settings [33]. This scale is rated on a four-point frequency of occurrence basis, from "not at all" to "nearly every day" in response to items such as "Worrying too much about different things". The GAD-7 has been shown to have good reliability and validity [15,34,35].

Flourishing (PERMA-Profiler)

The PERMA Profiler is a 23-item measure of flourishing [36]. Total PERMA score consists of five PERMA subscales: positive emotions, engagement, relationships, meaning and accomplishments, each being measured by three items. This scale also measures physical health, negative emotion using three items, with loneliness and overall happiness being single item scores. This scale is scored in the form of a rating scale. For example, Item 5 asks "How often do you feel joyful?" with anchors of 0 ("Never") and 10 ("Always"). This scale has good reliability and validity and has been successfully used by other researchers [37,38].

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Personal Wellbeing (ONS-4)

This is a short, 4-item measure of personal wellbeing, adapted from the ONS Annual Population Survey [39,40]. Each item of the ONS-4 focuses on a specific concept: life satisfaction, worthwhile life, happiness, and anxiety. For example, one item focused on life satisfaction asks "Overall, how satisfied are you with your life nowadays?" The ONS-4 is scored in the form of a rating scale from 0 ("Not at all") to 10 ("Completely"). All four questions are independent and so internal reliability cannot be calculated.

Procedure

The survey was compiled on Qualtrics and uploaded to Prolific, an online platform designed to recruit participants for online research. Participants were invited at Baseline if they were studying at university at the time. Participation in this research was voluntary and after participants read the study information and gave written informed consent to take part, they were asked to provide basic demographic information including age and gender. Participants were then asked to complete a series of questionnaires: CORE-10, PERMA-Profiler, GAD-7 and ONS-4. Participants were paid £1.25 for each time they completed the survey, taking approximately 10 minutes. Participants who were lost to follow-up phases of the research were traced and contacted once via Prolific, to offer the study information and an invitation to take part [41]. Ethical approval for the study was obtained in line with British Psychological Society guidelines.

Statistical Analysis

Sum scores were computed for the CORE-10, GAD-7, and PERMA with mean imputation for up to 10% missing data per instrument. The repeated measures outcomes were restructured from wide format to long format, and followed the nested structure whereby each participant (n = 300), had provide data for 3 time point. All analyses were performed using the open software Jamovi (version 2.1.3) [42].

Mixed-effect models accounting for fixed and random effects, were performed in the General Analyses for Linear Models in Jamovi (GAMLj) package version 2.4.8 [43]. These analyses accounted for both the overall trends over time and the individual variations.

Seven models (one per outcome) were computed, which included the repeated measure (Baseline, Year 1, and Year 2) as our fixed-factor predictor (time) and included correlated participant level random intercepts, using a restricted maximum-likelihood function with the bobyqa optimizer.

3. Results

Means and standard deviations for study variables across each of the time points are reported in Table 2. Mixed effect models for Flourishing, Distress and Generalised Anxiety are reported in Table A1 while ONS outcomes of Life Satisfaction, Life Worthwhile, Happiness, and Anxiety are reported in Table A2.

The mixed-effect models reported displayed approximately normally distributed, homoscedastic residuals. For all models, a small marginal R^2 relative to the condition R^2 suggests a large impact of individual differences and a small effect of the fixed factor. ICC for the models showed that the clustering for participants was substantial.

With respect to Flourishing, we observed a small yet significant negative effect of time, with reductions from baseline to 1 year and baseline to year 2. Distress increased significantly from baseline to year 1, but was not significantly different from baseline to year 2. Generalised anxiety at year 1 did not significantly differ from baseline but did significantly reduce from baseline to year 2. Similarly, both life Satisfaction and Happiness displayed no difference from baseline to year 1 but increased from baseline to year 2. Life worthwhile did not demonstrate any significant change overtime from baseline levels. However, Anxiety demonstrated significant reductions from baseline to year 1 and year 2.

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Table 2. Mean and standard deviation of UK students at each time point for psychological distress, generalised anxiety, flourishing and personal wellbeing.

	Baseline (*n*=300)		**Year 1 (*n*=297)**		**Year 2 (*n*=299)**	
	Mean	SD	Mean	SD	Mean	SD
Flourishing	95.60	23.73	92.29	26.37	92.96	27.03
Distress	13.69	7.26	15.30	5.64	13.76	5.72
Generalised Anxiety	7.44	5.30	7.06	5.03	6.25	5.06
Personal Wellbeing						
Life satisfaction	5.76	2.34	5.96	2.30	6.04	2.38
Life worthwhile	6.05	2.44	6.00	2.44	6.16	2.45
Happiness Yesterday	5.81	2.51	6.05	2.48	6.27	2.44
Anxiety Yesterday	5.56	2.95	4.44	2.96	3.89	2.87

4. Discussion

Findings indicate that psychological distress levels spiked during the first year of the pandemic (May 2020 to May 2021), likely due to the immediate impacts of lockdowns, remote learning, and uncertainty [44,45]. By the second year (May 2022), psychological distress levels returned to similar levels to that of the baseline (May 2020), aligning with recent research in a non-student sample [46]. This might be due to the fact that two years into the pandemic, the immediate impacts, including fear and uncertainty, were diminished [47], and people had adapted to changing academic and living conditions [48]. Greater familiarity with pandemic-related changes, and reduced perceived risks following public health measures, such as the vaccination rollout, might have encouraged a sense of control in people's lives and reduced feelings of distress [49].

Current findings also revealed that generalised anxiety levels remained stable during the first year, but that they started to improve in the second year, gaining support from recent research [50]. Similarly, Anxiety Yesterday (as measured by ONS4) demonstrated significant reductions from baseline to year 1 and further to year 2, indicating that both state and trait levels of anxiety were improved by May 2022. Anxiety levels were highest in May 2020, at a time when the Covid-19 pandemic was in its early stages with greater levels of fear and uncertainty [51,52]. As time went on, it is likely that students were becoming more familiar with the new living conditions, academic adjustments, and social restrictions, leading to a gradual reduction in their generalised anxiety levels [50,53].

Additionally, increasing possibilities for social interaction, after such long periods in which this was restricted, were likely to have a positive impact on university students' anxiety, coinciding with research that highlights the strong association between positive social contact and reduced anxiety [54,55]. This coincides with Relational Regulation Theory [56] which posits that an individual's relationships with other people can help to regulate their emotions and help them cope with stressful events.

Nevertheless, even in May 2022, when we were seeing some significant improvements, students' generalised anxiety remained significantly higher than the pre-pandemic norm of 4.75 [57]. On top of this, their psychological distress was still around 3x higher than normative scores of 4.7 before the pandemic [29], suggesting the long-lasting impact of the pandemic on students' mental health [58,59]. For instance, a study carried out by King's College London using the data collected from the Student Academic Experiences Survey, revealed that over 15% of UK students were still reporting a mental health problem in 2023 [59]. It is likely that the prolonged stress from the pandemic, including academic and social challenges, financial instability, and uncertainty about the future, were collectively contributing towards sustained psychological distress and anxiety in students, even post-Covid-19.

Findings demonstrate that students' flourishing decreased over the two years, likely reflecting the prolonged stress and disruption caused by the pandemic [60]. More specifically, we know that

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students' distress and anxiety remained heightened in this post-pandemic era, whereby these prolonged mental health problems are likely hindering students' abilities to experience positive emotions. Dealing with academic adjustments, ongoing uncertainty and poor mental health is likely to be impacting on students' ability to engage in their usual academic and social activities [61]. At a point when students and recent graduates may have been struggling with re-transitioning to typical social and academic life, including a reported rise in social anxiety post-pandemic [62], this may be negatively impacting on students' relationships and social fulfilment. Additionally, as a consequence of the pandemic, students may be re-evaluating their priorities and feel a sense of uncertainty about the future and their career prospects [1,44], and could influence their perceptions of meaning in their lives. Finally, not only did students face cancelled and delayed graduation ceremonies, but the prominent lack of practical learning opportunities during the pandemic [63] may be negatively impacting on their skills and competence [64], which is likely to affect their sense of accomplishment [11]. Therefore, students have been unable to meet the criteria and demands to achieve flourishing mental health [65], as students' ability to experience positive emotions, engagement, relationships, meaning in life and accomplishments have been severely limited, if not withheld entirely due to the Covid-19 pandemic.

While both Life Satisfaction and Happiness Yesterday showed no difference between baseline to year 1, both had improved by year 2. Interestingly, students' scores of Happiness Yesterday appeared higher at May 2022 (M=6.27) than the pre-pandemic norm of 5.5 [40]. As a state measure of happiness, that is capturing students' immediate emotional states at a specific moment in time [66,67], their happiness felt yesterday at the time of data collection in May 2022 may have been particularly sensitive to environmental and societal changes occurring. For instance, the lifting of legal restrictions and the return to normal social and university life may have boosted their immediate emotional wellbeing, resulting in higher Happiness Yesterday scores, compared to both during the pandemic and pre-pandemic.

Current findings revealed that Life Worthwhileness did not demonstrate any significant change overtime from baseline levels. The psychological construct of life being worthwhile may, naturally, be more stable over time and less sensitive to temporary changes or external challenges [68]. While other measures, such as Happiness Yesterday and Anxiety Yesterday demonstrated significant changes over the duration of the pandemic, the fundamental aspects of what makes life worthwhile for students may have remained stable. For instance, despite the transition to distance learning, continuity of learning meant that students could still pursue their ongoing academic and personal goals, as their long-term goals of academic success and career progress were likely to remain constant.

4.1. Limitations

Self-report measures were used which are often confounded with social desirability [69], to which individuals of certain demographic or cultural backgrounds are more likely to provide socially desirable answers [70]. Nevertheless, psychological research is dominated by self-report measures and standardised measures were used that have had extensive reliability and validity testing. Also, a large proportion of the research samples were female. However, this was expected due to the unequal gender balance apparent in higher education [71] and the increased likelihood of females participating in online research [72]. The length of longitudinal research is associated with higher drop-out rates [73] and 'attrition bias' refers to the systematic differences between those who are retained and those who drop out of research [74]. In the current study, the attrition rate after two years was 80.8%, which is outwith the commonly reported (30-70%) attrition in longitudinal epidemiological studies [75]. There are a number of reasons for a relatively high attrition rate in the current research. University students were already an at-risk population for unhealthy lifestyle habits such as smoking and binge-drinking [76], which is known to impact attrition rates [77]. Over the course of the Covid-19 pandemic, these habits may have escalated as students were dealing with unemployment, loneliness and anxieties and may have been using alcohol and drugs as coping mechanisms [78]. On top of this, nearly half of working students lost their jobs temporarily or permanently over the course of Covid-19 [8] leaving many unemployed and financially unstable. As

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unemployment and financial difficulties are related to non-participation and poor retention, this was expected to have an impact [79]. Other social factors such as the existence of, and satisfaction with, social support networks can also predict attrition rates in longitudinal research [75], which we know have been severely impacted due to the Covid-19 pandemic [80]. Social distancing and lockdown measures severely restricted everyone's, including students, ability to exercise. In fact, physical activity levels in university students were shown to drastically decrease [81], which too is strongly associated with poor attrition rates [75]. Finally, previous research has shown that mental health problems predict non-response in longitudinal research [82], especially in university students [83]. Indeed, high levels of psychological distress [77,84], anxiety and depression [85] can predict attrition. In the current study, psychological distress and generalised anxiety scores were considerably high across all time points and were shown to be worse than the pre-pandemic norm, and so attrition was likely to be impacted.

4.2. Practical Implications and Recommendations

After more than four years since the beginning of the pandemic, it is crucial to understand how the mental wellbeing of university students fluctuated throughout the pandemic, and how they are faring in a post-pandemic context. We are only recently starting to understand the long-term psychological impacts of Covid-19 on university students. The current longitudinal study provided the ability to obtain a comprehensive picture of university students' mental health throughout an unprecedented global health pandemic**.** These findings show that students are still particularly vulnerable and need continued support extending beyond the pandemic. These findings can provide several practical implications and recommendations for further research, with regards to addressing the mental health of university student's post-pandemic. While there have been some signs of improvement, students' psychological distress and generalised anxiety are still elevated, and remain considerably worse than pre-pandemic norms. Also, students flourishing continued to gradually decline over the course of the pandemic, remaining low even after personal and academic life was beginning to return to that of a pre-pandemic state.

4.2.1. Policy Implications

Clearly, universities need to adapt and improve the mental health services they have available to students, to help them cope with the lasting impacts. The university setting plays an important role in shaping the future of its students and is the perfect platform for health and mental health promotion. Further investments are needed to screen and monitor students' health and wellbeing to help with the identification of students who could benefit from health and wellbeing services. More inventive ways of supporting and protecting students' wellbeing are needed moving forward to re-define mental health services, including a re-think of how policies can support this. For example, greater efforts to consult with students themselves to co-produce in-person and digital programs that could complement the curriculum, improve engagement with, and relevance of services, and alleviate the strain on overwhelmed mental health services. Further, universities and funders need to invest more in projects that can help to strengthen in house services and improve student wellbeing.

Policymakers should consider the effectiveness of Positive Psychology Interventions (PPI) in mitigating mental health problems and protecting university students' well-being, whereby such approaches are integrated into mental health support services. Worsley et al. (2022) recently conducted a systematic literature review of other reviews, focusing on interventions designed to support the mental health and wellbeing of university students. The authors reviewed 27 reviews and concluded that the strongest or most effective interventions to improve student mental health were mindfulness-based interventions and cognitive-behavioural interventions [86]. A systematic review and meta-analysis of randomised controlled trials confirmed the impact of CBT-related interventions on positive mental health, and that they were sustained over time, indicating a significant effect at different follow-up periods [87]. Wang et al. (2023) systematically reviewed and performed a meta-analysis of research on the impacts of internet interventions on symptoms of common mental health problems and wellbeing in adolescents and university students. They

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reported small effects from internet interventions were found on stress, anxiety and depression, and that the effects were higher for interventions that were based on CBT principles [88]. A recent paper by Lister & Allman (2024) offers an evidence-based 'Online Educational Resource' toolkit, including 27 examples that can be used across the sector for how mental health can be embedded into the curriculum [89]. To help address the mental health problems of university students, policymakers must prioritise the implementation of accessible and inclusive well-being programs that are tailored to the unique and evolving needs of university students. Such well-being programs should aim for physical and psychological health promotion, with a focus on preventative approaches. Additionally, governmental responses should prioritise preventative measures aimed at reducing the incidence of mental health issues, as well as health risks such as suicide and self-harm among university students. Future research should continue to evaluate the effectiveness of different mental health interventions in this context, to help refine and adapt existing interventions, as well as develop new evidence-based practices that are specifically targeted to the needs of this unique group.

The sample of students in this research are a very specific cohort of university students that endured a number of unprecedented challenges. They needed to quickly adapt to new ways of living, learning, and coping during this important time in history. This is a cohort of students who had particularly unique personal and academic experiences, which are not only important to consider during the pandemic, but these impacts are likely to continue to be felt long after the pandemic. After all, nearly a third of the current sample at the two-year follow up were recent graduates, and they too were still experiencing considerably poor mental health. These recent graduates did not have the experiences that past generations of students would have had, and this will have impacted their competence and confidence in being successful in securing graduate employment [90]. Therefore, we need to consider the longer-term impacts beyond university, advocating for continued graduate support and further research into how their experiences during that time might have impacted on their life, personally, but also professionally, after university. These students spent a large portion of their university life, a crucial developmental period for many young adults [91], with severely restricted contact and interaction with peers, and limited opportunities to attend events, make friends, and seek social support. This could ultimately influence the way these individuals cope with stress and seek support in the future. It is also possible that relying less on peer support during such times could have embedded the value of mental health provision, at the institutional level. Indeed, a recent piece of research has shown that a quarter of students considered the mental health provision of a university as an important deciding factor about which university to attend, and half of graduates felt it was important to ensure their employer prioritised mental health provision when deciding where to work [92].

5. Conclusions

Improvements in psychological distress, both state and trait anxiety, and overall personal wellbeing suggest a positive trend towards mental health recovery post-pandemic in this unique cohort of university students. However, mental health scores are still poor, remaining considerably worse than the pre-pandemic norm. These findings demonstrate the desperate need for continued attention in addressing students' mental health challenges beyond the pandemic. The need for more mental health support for university students remains the same now, as it was during the Covid-19 pandemic. It also calls for continued support for this disproportionately impacted cohort in the post-pandemic era, as they transition into the graduate job market. The current findings will contribute towards a greater awareness of the short and long-term psychological impacts on student mental health, helping to inform and shape future mental health support strategies, and reducing risks in the event of a future global health pandemic.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the University of Bolton.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original data presented in the study are openly available in FigShare at DOI:10.6084/m9.figshare.26262254.

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Table A1. Mixed effect models of time on Flourishing, Psychological Distress and Generalised Anxiety.

	Flourishing (PERMA)					Distress (CORE-10)					Generalised Anxiety (GAD – 7)				
Fixed Effects		95% CI					95% CI					95% CI			
	Est	LL	UL	*t*	*p*	Est	LL	UL	*t*	*p*	Est	LL	UL	*t*	*p*
Intercept	93.59	90.99	96.20	70.44	<.001	14.24	13.66	14.83	47.79	<.001	6.92	6.42	7.42	27.34	<.001
Time 1 (Year 1 - Baseline)	-3.34	-5.62	-1.07	-2.88	.004	1.62	.93	2.32	4.57	<.001	-.37	-.90	.15	-1.39	.164
Time 2 (Year 2 - Baseline)	-2.69	-4.96	-.41	-2.32	.021	.11	-.59	.80	.30	.764	-1.19	-1.71	-.66	-4.44	<.001
Random Effects (intercept)	σ^2	ICC	**Model fit** AIC	R^2 marginal	R^2 conditional	σ^2	ICC	**Model fit** AIC	R^2 marginal	R^2 conditional	σ^2	ICC	**Model fit** AIC	R^2 marginal	R^2 conditional
Participant	462.24	0.70	7919.90	<0.01	0.70	20.34	0.52	5576.88	0.01	0.53	15.64	0.59	5174.96	0.01	0.60

Note: Est: Estimates, LL: Lower Limit, UL: Upper Limit, σ2: residual variance, ICC: intraclass correlation coefficient, AIC: Akaike information criterion, R^2 marginal: variance explained by the fixed effects over the total (expected) variance of the dependent variable, R^2 conditional: variance explained by the fixed and random effects over the total (expected) variance of the dependent variable

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Table A2. - Mixed effect models of time on Personal Wellbeing (ONS).

	Life Satisfaction					Life worthwhile					Happiness					Anxiety				
Fixed Effects		95% CI					95% CI					95% CI					95% CI			
	Est	LL	UL	*t*	*p*	Est	LL	UL	*t*	*p*	Est	LL	UL	*t*	*p*	Est	LL	UL	*t*	*p*
Intercept	5.92	5.69	6.14	51.13	<.001	6.07	5.83	6.31	49.23	<.001	6.04	5.82	6.26	54.03	<.001	4.63	4.44	4.82	47.31	<.001
Time 1 (Year 1 - Baseline)	.19	-.05	.43	1.59	.113	-.06	-.29	.18	-.48	.629	.23	-.07	.54	1.49	.136	-1.12	-1.59	-.65	-4.66	<.001
Time 2 (Year 2 - Baseline)	.27	.03	.51	2.21	.028	.10	-.14	.33	.83	.409	.46	.15	.76	2.96	.003	-1.67	-2.14	-1.20	-6.97	<.001
Random Effects (intercept)			**Model fit**					**Model fit**					**Model fit**					**Model fit**		
	σ^2	ICC	AIC	R^2 marginal	R^2 conditional	σ^2	ICC	AIC	R^2 marginal	R^2 conditional	σ^2	ICC	AIC	R^2 marginal	R^2 conditional	σ^2	ICC	AIC	R^2 marginal	R^2 conditional
Participant	3.27	0.60	3765.46	0.00	0.60	3.84	0.64	3778.08	0.00	0.64	2.55	0.42	4031.51	0.01	0.42	0.00	0.00	4470.42	0.05	0.05

Note: Est: Estimates, LL: Lower Limit, UL: Upper Limit, σ2: residual variance, ICC: intraclass correlation coefficient, AIC: Akaike information criterion, R^2 marginal: variance explained by the fixed effects over the total (expected) variance of the dependent variable, R^2 conditional: variance explained by the fixed and random effects over the total (expected) variance of the dependent variable

References

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References

1. Aristovnik, A., Keržič, D., Ravšelj, D., Tomaževič, N., & Umek, L. (2020). Impacts of the COVID-19 pandemic on life of higher education students: A global perspective. *Sustainability*, *12*(20), 8438. https://doi.org/10.3390/su12208438
2. Blustein, D. L., & Guarino, P. A. (2020). Work and unemployment in the time of COVID-19: The existential experience of loss and fear. *Journal of Humanistic Psychology*, *60*(5), 702–709. https://doi.org/10.1177/0022167820934229
3. Hwang, T. J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020). Loneliness and social isolation during the COVID-19 pandemic. *International Psychogeriatrics*, *32*(10), 1217–1220. https://doi.org/10.1017/S1041610220000988
4. Labrague, L. J., De los Santos, J. A. A., & Falguera, C. (2021). Social and emotional loneliness among college students during the COVID-19 pandemic: The predictive role of coping behaviours, social support, and personal resilience. *Perspectives in Psychiatric Care*, 57 (4), 1578-1584. https://doi.org/10.1111/ppc.12721
5. Lee, C. M., Cadigan, J. M., & Rhew, I. C. (2020). Increases in loneliness among young adults during the COVID-19 pandemic and association with increases in mental health problems. *Journal of Adolescent Health*, *67*(5), 714-717. https://doi.org/10.1016/j.jadohealth.2020.08.009
6. Alhamed A. A. (2023). The link among academic stress, sleep disturbances, depressive symptoms, academic performance, and the moderating role of resourcefulness in health professions students during COVID-19 pandemic. *Journal of Professional Nursing*, *46*, 83–91. https://doi.org/10.1016/j.profnurs.2023.02.010
7. Azmi, F. M., Khan, H. N., & Azmi, A. M. (2022). The impact of virtual learning on students' educational behavior and pervasiveness of depression among university students due to the COVID-19 pandemic. *Globalization and Health*, *18*(1), 70. https://doi.org/10.1186/s12992-022-00863-z
8. Barada, V., Doolan, K., Burić, I., Krolo, K., and Tonković, Ž. (2020). Student life during the COVID-19 pandemic lockdown: Europe-Wide Insights. University of Zadar. Available at http://ehea.info/Upload/BFUG_DE_UK_73_11_6_students_Covid_19_survey_results.pdf (Accessed 15 August 2023)
9. Ben Salah, A., DeAngelis, B. N., & Al'Absi, M. (2022). Uncertainty and psychological distress during COVID-19: What about protective factors?. *Current Psychology*, 42, 1-8. https://doi.org/10.1007/s12144-022-03244-2
10. Huang, Q., Wang, X., Ge, Y., & Cai, D. (2021). Relationship between self-efficacy, social rhythm, and mental health among college students: A 3-year longitudinal study. *Current Psychology*, 1-10.
11. Burns, D., Dagnall, N., & Holt, M. (2020). Assessing the impact of the COVID-19 pandemic on student wellbeing at universities in the United Kingdom: A conceptual analysis. *Frontiers in Education*, 5: 582882, https://doi: 10.3389/feduc.2020.582882
12. Allen, R., Kannangara, C. & Carson, J. (2023). Long-term mental health impacts of the Covid-19 Pandemic on university students in the UK: A longitudinal analysis over 12 months. *British Journal of Educational Studies*, 1-24. https://doi.org/10.1080/00071005.2023.2215857
13. Catling, J. C., Bayley, A., Begum, Z., Wardzinski, C., & Wood, A. (2022). Effects of the COVID-19 lockdown on mental health in a UK student sample. *BMC Psychology*, *10*(1), 1-7. https://doi.org/10.1186/s40359-022-00732-9
14. Heumann, E., Helmer, S. M., Busse, H., Negash, S., Horn, J., Pischke, C. R., Niephaus, Y., & Stock, C. (2023). Anxiety and depressive symptoms of German university students 20 months after the COVID-19 outbreak - A cross-sectional study. *Journal of Affective Disorders*, *320*, 568–575. https://doi.org/10.1016/j.jad.2022.09.158
15. Kannangara, C., Allen, R., Vyas, M., & Carson, J. (2021). Every cloud has a silver lining: Short-term psychological effects of COVID-19 on British university students. *British Journal of Educational Studies*, *71*(1), 29-50. https://doi.org/10.1080/00071005.2021.2009763
16. Kavanagh, B. E., O'Donohue, J. S., Ashton, M. M., Lotfaliany, M., McCallum, M., Wrobel, A. L., ... & Berk, L. (2022). Coping with COVID-19: Exploring coping strategies, distress, and post-traumatic growth during the COVID-19 pandemic in Australia. *Frontiers in Psychiatry*, 2406. https://doi.org/10.3389/fpsyt.2022.1025767
17. Li, Y., Wang, A., Wu, Y., Han, N., & Huang, H. (2021). Impact of the COVID-19 Pandemic on the mental health of college students: A systematic review and meta-analysis. *Frontiers in Psychology*, 12, 669119. https://doi.org/10.3389/fpsyg.2021.669119
18. Paton, L. W., Tiffin, P. A., Barkham, M., Bewick, B. M., Broglia, E., Edwards, L., ... & Heron, P. (2023). Mental health trajectories in university students across the COVID-19 pandemic: Findings from the Student Wellbeing at Northern England Universities prospective cohort study. *Frontiers in Public Health*, *11*, 1188690. https://doi.org/10.3389/fpubh.2023.1188690
19. Liyanage, S., Saqib, K., Khan, A. F., Thobani, T. R., Tang, W. C., Chiarot, C. B., AlShurman, B. A., & Butt, Z. A. (2021). Prevalence of anxiety in university students during the COVID-19 Pandemic: A systematic

review. *International Journal of Environmental Research and Public Health*, *19*(1), 62. https://doi.org/10.3390/ijerph19010062

20. Lisiecka, A., Chimicz, D., & Lewicka-Zelent, A. (2023). Mental health support in Higher Education during the COVID-19 Pandemic: A case study and recommendations for practice. *International Journal of Environmental Research and Public Health*, *20*(6), 4969. https://doi.org/10.3390/ijerph20064969
21. Moghimi, E., Stephenson, C., Gutierrez, G., Jagayat, J., Layzell, G., Patel, C., McCart, A., Gibney, C., Langstaff, C., Ayonrinde, O., Khalid-Khan, S., Milev, R., Snelgrove-Clarke, E., Soares, C., Omrani, M., & Alavi, N. (2023). Mental health challenges, treatment experiences, and care needs of post-secondary students: A cross-sectional mixed-methods study. *BMC Public Health*, *23*(1), 655. https://doi.org/10.1186/s12889-023-15452-x
22. Park, S. Y., Andalibi, N., Zou, Y., Ambulkar, S., & Huh-Yoo, J. (2020). Understanding students' mental wellbeing challenges on a university campus: Interview study. *JMIR Formative Research*, *4*(3), e15962. https://doi.org/10.2196/15962
23. Salimi, N., Gere, B., Talley, W., & Iriogbe, B. (2021). College students mental health challenges: Concerns and considerations in the COVID-19 pandemic. *Journal of College Student Psychotherapy*, 1-13. https://doi.org/10.1080/87568225.2021.1890298
24. Brailovskaia, J., & Margraf, J. (2023). Less sense of control, more anxiety, and addictive social media use: Cohort trends in German university freshmen between 2019 and 2021. *Current Research in Behavioral Sciences*, *4*, 100088. https://doi.org/10.1016/j.crbeha.2022.100088
25. He, M., Zhan, X., Liu, C., Li, L., Zhao, X., Ren, L., ... & Luo, X. (2023). The relationship between self-control and mental health problems among Chinese university students. *Frontiers in Public Health*, *11*. https://doi.org/10.3389/fpubh.2023.1224427
26. Lemyre, A., Chrisinger, B. W., Palmer-Cooper, E., & Messina, J. P. (2024). Mental wellbeing among higher education students in England during the pandemic: A longitudinal study of COVID-19 experiences, social connectedness and greenspace use. *British Educational Research Journal*, *50*(3), 1281-1307.
27. Kothe E. J., & Ling M. (2019). Retention of participants recruited to a multi-year longitudinal study via Prolific. *PsyArXiv*. https://doi.org/10.31234/osf.io/5yv2u
28. Palan, S., & Schitter, C. (2018). Prolific. ac—A subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, *17*, 22-27. https://doi.org/10.1016/j.jbef.2017.12.004
29. Barkham, M., Bewick, B., Mullin, T., Gilbody, S., Connell, J., Cahill, J., & Evans, C. (2013). The CORE-10: A short measure of psychological distress for routine use in the psychological therapies. *Counselling and Psychotherapy Research*, 13(1), 3-13. https://doi.org/10.1080/14733145.2012.729069
30. Allen, R., Kannangara, C., Vyas, M., & Carson, J. (2023). European university students' mental health during COVID-19: Exploring attitudes towards COVID-19 and governmental response. *Current Psychology*, *42*(23), 20165-20178. https://doi.org/10.1007/s12144-022-02854-0
31. Coates, R., Ayers, S., de Visser, R., & Thornton, A. (2020). Evaluation of the CORE-10 to assess psychological distress in pregnancy. *Journal of Reproductive and Infant Psychology*, *38*(3), 311-323. https://doi.org/10.1080/02646838.2019.1702631
32. La Tona, A., Tagini, S., Brugnera, A., Poletti, B., Aiello, E. N., Lo Coco, G., Del Piccolo, L., & Compare, A. (2023). Italian validation of the *Clinical Outcomes in Routine Evaluation-10* (CORE-10): A short measure for routine outcome monitoring in clinical practice. *Research in Psychotherapy (Milano)*, *26*(1), 671. https://doi.org/10.4081/ripppo.2023.671
33. Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, 166 (10), 1092-1097. https://doi.org/10.1001/archinte.166.10.1092
34. Dhira, T. A., Rahman, M. A., Sarker, A. R., & Mehareen, J. (2021). Validity and reliability of the Generalized Anxiety Disorder-7 (GAD-7) among university students of Bangladesh. *PloS One*, *16*(12), e0261590. https://doi.org/10.1371/journal.pone.0261590
35. Tiirikainen, K., Haravuori, H., Ranta, K., Kaltiala-Heino, R., & Marttunen, M. (2019). Psychometric properties of the 7-item Generalized Anxiety Disorder Scale (GAD-7) in a large representative sample of Finnish adolescents. *Psychiatry Research*, *272*, 30-35. https://doi.org/10.1016/j.psychres.2018.12.004
36. Butler, J. & Kern, M. (2016) The PERMA-Profiler: A brief multidimensional measure of flourishing. *International Journal of Wellbeing*, 6 (3), 1–48.
37. Ascenso, S., Perkins, R., & Williamson, A. (2018). Resounding meaning: A PERMA wellbeing profile of classical musicians. *Frontiers in Psychology*, 9, 1895. https://doi.org/10.3389/fpsyg.2018.01895
38. Wammerl, M., Jaunig, J., Mairunteregger, T., & Streit, P. (2019). The German version of the PERMA-Profiler: Evidence for construct and convergent validity of the PERMA theory of wellbeing in German speaking countries. *Journal of Wellbeing Assessment*, *3*, 75-96. https://doi.org/10.1007/s41543-019-00021-0
39. Michaelson, J. Mahony, S. & Schifferes, J. (2012) *Measuring wellbeing: A guide for practitioners.* New Economics Foundation: London.

40. Office for National Statistics (2018). *Personal wellbeing user guidance.* Available at: ONS.gov.uk/peoplepopulationandcommunity/methodologies/personalwellbeingsurveyuserguide [Accessed 16.01.2024]
41. Teague, S., Youssef, G. J., Macdonald, J. A., Sciberras, E., Shatte, A., Fuller-Tyszkiewicz, M., ... & Hutchinson, D. (2018). Retention strategies in longitudinal cohort studies: A systematic review and meta-analysis. *BMC Medical Research methodology*, *18*(1), 1-22. https://doi.org/10.1186/s12874-018-0586-7
42. The Jamovi Project (2022). *Jamovi (Version 2.1.3.) [Computer Software].* Available online at: https://www.jamovi.org
43. Gallucci, M. (2020). *GAMLj suite for Jamovi*. Available online at: https://github.com/gamlj/ gamlj
44. Browning, M. H., Larson, L. R., Sharaievska, I., Rigolon, A., McAnirlin, O., Mullenbach, L., ... and Alvarez, H. O. (2021). Psychological impacts from COVID-19 among university students: Risk factors across seven states in the United States. *PloS One*, 16(1), e0245327.
45. Hughes, J. W., Vander Horst, A., Gibson, G. C., Cleveland, K. A., Wawrosch, C., Hunt, C., Granot, M., & Woolverton, C. J. (2023). Psychological distress of college students during the COVID-19 pandemic. *Journal of American College Health*, *71*(4), 981–983. https://doi.org/10.1080/07448481.2021.1920953
46. Reutter, M., Hutterer, K., Gründahl, M., Gall, D., Dannlowski, U., Domschke, K., Leehr, E. J., Lonsdorf, T. B., Lueken, U., Reif, A., Schiele, M. A., Zwanzger, P., Pauli, P., Hein, G., & Gamer, M. (2024). Mental health improvement after the COVID-19 pandemic in individuals with psychological distress. *Scientific Reports*, *14*(1), 5685. https://doi.org/10.1038/s41598-024-55839-3
47. Quigley, M., Whiteford, S., Cameron, G., Zuj, D. V., & Dymond, S. (2023). Longitudinal assessment of COVID-19 fear and psychological wellbeing in the United Kingdom. *Journal of Health Psychology*, *28*(8), 726-738.
48. Dehghani, M., Hakimi, H., Talebi, M., Rezaee, H., Mousazadeh, N., Ahmadinia, H., & Almasi, S. (2023). The relationship between fear of Covid-19 and obsessive-compulsive disorder. *BMC Psychology*, *11*(1), 133. https://doi.org/10.1186/s40359-023-01112-7
49. Perez-Arce, F., Angrisani, M., Bennett, D., Darling, J., Kapteyn, A., & Thomas, K. (2021). COVID-19 vaccines and mental distress. *PloS One*, *16*(9), e0256406. https://doi.org/10.1371/journal.pone.0256406
50. Amendola, S., von Wyl, A., Volken, T., Zysset, A., Huber, M., & Dratva, J. (2021). A longitudinal study on generalized anxiety among university students during the first wave of the COVID-19 pandemic in Switzerland. *Frontiers in Psychology*, *12*.
51. Chen, T., & Lucock, M. (2022). The mental health of university students during the COVID-19 pandemic: An online survey in the UK. *PloS One*, 17(1), e0262562. https://doi.org/10.1371/journal.pone.0262562
52. Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of Medical Internet Research*, *22*(9), e21279. https://doi.org/10.2196/21279
53. Bao, Y., Sun, Y., Meng, S., Shi, J. & Lu, L. (2020). 2019-nCoV epidemic: Address mental health care to empower society. *The Lancet*, 395 (10224), e37–e38. https://doi:10.1016/S0140-6736(20)30309-3
54. Huang, A., Liu, L., Wang, X., Chen, J., Liang, S., Peng, X., ... & Zhao, J. (2023). Intolerance of uncertainty and anxiety among college students during the re-emergence of COVID-19: Mediation effects of cognitive emotion regulation and moderation effects of family function. *Journal of Affective Disorders*, *327*, 378-384. https://doi.org/10.1016/j.jad.2023.01.110
55. Margraf, J., Zhang, X. C., Lavallee, K. L., & Schneider, S. (2020). Longitudinal prediction of positive and negative mental health in Germany, Russia, and China. *PloS One*, *15*(6), e0234997.
56. Lakey, B., & Orehek, E. (2011). Relational regulation theory: A new approach to explain the link between perceived social support and mental health. *Psychological Review, 118*(3), 482–495. https://doi.org/10.1037/a0023477
57. Jordan, P., Shedden-Mora, M. C., Löwe, B. & van Wouwe, J. P. (2017). Psychometric analysis of the Generalized Anxiety Disorder scale (GAD-7) in primary care using modern item response theory. *PloS One*, 12 (8), e0182162. https://doi:10.1371/journal. pone.0182162
58. Kohls, E., Guenthner, L., Baldofski, S., Brock, T., Schuhr, J., & Rummel-Kluge, C. (2023). Two years COVID-19 pandemic: Development of university students' mental health 2020–2022. *Frontiers in Psychiatry*, *14*, 1122256. https://doi.org/10.3389/fpsyt.2023.1122256
59. Sanders, M. (2023, September). *Student Mental Health in 2023. Who is struggling and how the situation is changing.* King's College London. Available online at: https://www.kcl.ac.uk/policy-institute/assets/student-mental-health-in-2023.pdf
60. Graham, M. A., & Eloff, I. (2022). Comparing mental health, wellbeing and flourishing in undergraduate students pre-and during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, *19*(12), 7438.
61. Csikszentmihalyi, M. (2020). *Finding flow: The psychology of engagement with everyday life*. Hachette UK.

62. Kindred, R., & Bates, G. W. (2023). The influence of the COVID-19 Pandemic on social anxiety: A systematic review. *International Journal of Environmental Research and Public Health*, *20*(3), 2362. https://doi.org/10.3390/ijerph20032362
63. Idris, F., Zulkipli, I. N., Abdul-Mumin, K. H., Ahmad, S. R., Mitha, S., Rahman, H. A., ... & Naing, L. (2021). Academic experiences, physical and mental health impact of COVID-19 pandemic on students and lecturers in health care education. *BMC Medical Education*, *21*, 1-13.
64. Puljak, L., Čivljak, M., Haramina, A., Mališa, S., Čavić, D., Klinec, D., ... & Ivanišević, K. (2020). Attitudes and concerns of undergraduate university health sciences students in Croatia regarding complete switch to e-learning during COVID-19 pandemic: A survey. *BMC Medical Education*, *20*, 1-11.
65. Seligman, M. E. (2012). *Flourish: A visionary new understanding of happiness and wellbeing*. Simon and Schuster.
66. Stones, M. J., Hadjistavropoulos, T., Tuuko, H., & Kozma, A. (1995). Happiness has traitlike and statelike properties: A reply to Veenhoven. *Social Indicators Research*, *36*, 129-144.
67. Veenhoven, R. (1998). Two state-trait discussions on happiness: A reply to Stones et al. *Social Indicators Research*, 211-225.
68. Baumeister, R. F., Vohs, K. D., Aaker, J. L., & Garbinsky, E. N. (2016). Some key differences between a happy life and a meaningful life. In Leontiev, D. *Positive psychology in search for meaning* (pp. 49-60). Routledge. https://doi.org/10.4324/9781315751450
69. Larson, R. B. (2019). Controlling social desirability bias. *International Journal of Market Research*, 61 (5), 534–547. https://doi:10.1177/1470785318805305
70. Johnson, T. P., & Van de Vijver, F. J. (2003). Social desirability in cross-cultural research. *Cross-cultural Survey Methods*, *325*, 195-204.
71. du Toit, A., Thomson, R., & Page, A. (2022). A systematic review and meta-analysis of longitudinal studies of the antecedents and consequences of wellbeing among university students. *International Journal of Wellbeing*, 12(2).
72. Mulder, J., & de Bruijne, M. (2019). Willingness of online respondents to participate in alternative modes of data collection. *Survey Practice*, *12*(1), 8356.
73. Schaffer, H. R. (1996). *Social development*. Blackwell Publishing.
74. Nunan, D., Aronson, J., & Bankhead, C. (2018). Catalogue of bias: Attrition bias. *BMJ Evidence-Based Medicine*, *23*(1), 21-22.
75. Gustavson, K., von Soest, T., Karevold, E., & Røysamb, E. (2012). Attrition and generalizability in longitudinal studies: Findings from a 15-year population-based study and a Monte Carlo simulation study. *BMC Public Health*, *12*, 1-11.
76. Morton, F., & Tighe, B. (2011). Prevalence of, and factors influencing, binge drinking in young adult university undergraduate students. *Journal of Human Nutrition and Dietetics*, *24*(3), 296-267.
77. Torvik, F. A., Rognmo, K., & Tambs, K. (2012). Alcohol use and mental distress as predictors of non-response in a general population health survey: The HUNT study. *Social Psychiatry and Psychiatric Epidemiology*, *47*, 805-816.
78. Salerno, J. P., Shrader, C. H., Algarin, A. B., Lee, J. Y., & Fish, J. N. (2021). Changes in alcohol use since the onset of COVID-19 are associated with psychological distress among sexual and gender minority university students in the U.S. *Drug and Alcohol Dependence*, *221*, 108594. https://doi.org/10.1016/j.drugalcdep.2021.108594
79. Abdullah, N., Kamaruddin, M. A., Goh, Y. X., Othman, R., Dauni, A., Jalal, N. A., ... & Jamal, R. (2021). Participant's attrition in a longitudinal study: The Malaysian cohort study experience. *International Journal of Environmental Research and Public Health*, *18*(14), 7216.
80. Elmer, T., Mepham, K., & Stadtfeld, C. (2020). Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *Plos One*, 15(7), e0236337.
81. López-Valenciano, A., Suárez-Iglesias, D., Sanchez-Lastra, M. A., & Ayán, C. (2021). Impact of COVID-19 pandemic on university students' physical activity levels: An early systematic review. *Frontiers in Psychology*, 3787.
82. Tambs, K., Rønning, T., Prescott, C. A., Kendler, K. S., Reichborn-Kjennerud, T., Torgersen, S., & Harris, J. R. (2009). The Norwegian Institute of Public Health twin study of mental health: Examining recruitment and attrition bias. *Twin Research and Human Genetics*, *12*(2), 158–168. https://doi.org/10.1375/twin.12.2.158
83. Murai, H., & Nakayama, T. (2008). A one-year follow-up study on predictors of temporary leaves and drop-outs among students at a women's junior college. *Journal of Epidemiology*, *18*(1), 26-36.
84. Allott, K., Chanen, A., & Yuen, H. P. (2006). Attrition bias in longitudinal research involving adolescent psychiatric outpatients. *The Journal of Nervous and Mental Disease*, *194*(12), 958-961.
85. Bjerkeset, O., Nordahl, H. M., Larsson, S., Dahl, A. A., & Linaker, O. (2008). A 4-year follow-up study of syndromal and sub-syndromal anxiety and depression symptoms in the general population: The HUNT study. *Social Psychiatry and Psychiatric Epidemiology*, *43*(3), 192–199. https://doi.org/10.1007/s00127-007-0289-6

86. Worsley, J. D., Pennington, A., & Corcoran, R. (2022). Supporting mental health and wellbeing of university and college students: A systematic review of review-level evidence of interventions. *PloS One*, *17*(7), e0266725. https://doi.org/10.1371/journal.pone.0266725
87. Winzer, R., Lindberg, L., Guldbrandsson, K., & Sidorchuk, A. (2018). Effects of mental health interventions for students in higher education are sustainable over time: A systematic review and meta-analysis of randomized controlled trials. *PeerJ*, *6*, e4598. https://doi.org/10.7717/peerj.4598
88. Wang, Q., Zhang, W., & An, S. (2023). A systematic review and meta-analysis of Internet-based self-help interventions for mental health among adolescents and college students. *Internet Interventions*, *34*, 100690. https://doi.org/10.1016/j.invent.2023.100690
89. Lister, K., & Allman, Z. (2024). Embedding mental wellbeing in the curriculum: A collaborative definition and suite of examples in practice. *Frontiers in Education*, 8, 1157614. https://doi.org/10.3389/feduc.2023.1157614
90. Moores, E., and P. Reddy. (2012). "No regrets? Measuring the career benefits of a psychology placement year." *Assessment and Evaluation in Higher Education* 37, (5): 535–54. https://doi.org/10.1080/02602938.2011.553668.
91. Duffy A. (2023). University student mental health: An important window of opportunity for prevention and early intervention. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, *68*(7), 495–498. https://doi.org/10.1177/07067437231183747
92. Cibyl. (2022). *Student Mental Health Study 2022.* Available online: https://www.cibyl.com/cibyl-insights/student-mental-health-study-2022 (Accessed 24.03.2024)