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Using Music to Manage Anxiety: A Mixed Methods Intervention Study Between Two Lockdowns

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Abstract

Lockdowns were a central strategy for managing the outbreak of COVID-19, and Melbourne, Australia had some of the most extensive restrictions globally during 2021. As a result, university students were faced with isolated living and challenging learning experiences. This pilot study occurred during 2021, close to both university assignment due dates and end of semester examinations and some of the longest lockdowns. Seventy-one participants responded to recruitment materials describing using music playlists to manage anxiety and avoid negative thinking patterns during stressful times. They then participated in a 1-hour live, virtual workshop incorporating didactic teaching and practice activities. Pre and post measures of musical engagement, wellbeing and anxiety were used, with additional qualitative data collected at post regarding the workshop, application of ideas, and quantitative data measuring uses of music for emotion regulation. Analysis of quantitative

data did not reveal significant findings, but convergent analysis suggested patterns linking degree of anxiety with changed uses of music for regulation for some individuals. Participants described more intentional and informed uses of music that were less repetitive and more targeted. This was particularly apparent when rumination appeared to be prominent. Based on the results, the intervention seems most helpful as a psycho-educational tool, but the 1-hour workshop did not result in measurable changes for highly anxious participants.

Keywords
Music; anxiety; virtual program; university students; mixed methods

1. Introduction

1.1 The Context

Even prior to the COVID-19 pandemic, reports were emerging that suggested university students were experiencing higher levels of distress and anxiety than similar aged cohorts outside the university sector. An Australian report titled 'Under the Radar' [1] was fundamental in raising this concern and calling for increased recognition of the unique pressures experienced by university students. Initial data to support this proposal was based on a 2013 survey of 5000 students [2] at The University of Melbourne that used a Depression, Anxiety and Stress Scale, which authors compared to a broader population study published two years earlier. Both stress and anxiety were significantly higher in the university student population. In contrast, a subsequent Australian study [3] that used data from a longitudinal household-based panel study including 29,124 participant observations found very few differences between those in and those not in tertiary education.

Despite contradictory reports about whether young people in the university sector experience higher levels of stress, logic suggests that there are specific pressures within the university that are anxiety-inducing, such as assignments and examinations. This is supported by findings from a systematic review by Fernandez [4] that identified changes in the way students are taught and assessed as promising strategies to promote mental wellbeing. Changes to assessment practices was also a recommendation of a follow up study of Australian students in 2022 [5] which identified assessment stress as one of the main factors impacting student distress, defined as a combination of physical symptoms and emotional reactions (prompted by assessment tasks) that often impair a student's ability to perform well.

High levels of student distress have been demonstrated in a number of Australian studies. Sanci [6] found that 1 in 3 of the 14,880 student's surveyed reported experiencing stressors at The University of Melbourne, and comparison of self-report data with academic outcomes showed a clear association between poorer mental health and lower scores. This is less than a national tertiary wellbeing survey conducted by Headspace in 2016. Of the 3303 students across 40 Australian universities, this survey found that 67% of Bachelor degree students rated their mental health as only "fair" or "poor" and 65% reported high or very high psychological distress [7].

Certain student groups appear to be more at-risk of mental health challenges than others in the Australian university sector. Students attending regional universities, located in towns, cities or

areas that are geographically beyond Australia's major capital cities such as Melbourne, Sydney, Perth or Brisbane, have been described as experiencing more social isolation, relocation, and financial difficulties than capital city-based students [8]. These dislocation issues seem similar to concerns for international students who have been identified as having access to less social supports whilst simultaneously dealing with stressors of using a second language and experiencing discrimination [6]. A South African study [9] also highlighted how feelings of fear and being disrespected were linked with low levels of wellbeing for marginalised students. Bye and colleagues [10] have used the idea of social capital to critique the lack of recognition of the increasing diversity of Australian university students who might benefit from support to establish networks and connections that may result in higher support and sense of belonging. However, they also note that the relationship between social capital and wellbeing is not linear.

Research regarding tertiary student mental health were conducted prior to the global pandemic, and data is now emerging that confirms loneliness has increased in studies of university students who have experienced lockdowns in the USA [11], Egypt [12] and Germany [13]. An Australian study has also showed large numbers of students who describe themselves as feeling anxious, unmotivated and lethargic [14].

1.2 Programs

Some research has been conducted to investigate what supports and interventions might be helpful in managing stress and anxiety for university students. The field of psychology has a clear foundation for providing individual counselling both within and beyond the university sector. However, there is consensus that a broad mental health approach is required that addresses systemic and individual prevention of problems by removing structural barriers, alongside programs that support flourishing, resilience, and agency [15, 16]. As outlined in the 2020 *Australian University Mental Health Framework* [17], an overarching focus on collaborating with students in the co-design and planning of inclusive mental health services, involving peer-support initiatives and emphasising the student experience to support healthy learning environments is needed. Evidence is not yet strong, but a meta-analysis of yoga, meditation and mindfulness programs examined 24 RCTs with 1373 participants in tertiary education and demonstrated a growing body of research [18]. Another small-scale study [19] investigated novel programs such as internet-based programs that utilise web-based activities to provide low-intensity interventions for students across the continuum of wellbeing. These have proved popular, although not adequate for students with high mental health needs. This emphasis on what young people want has also been addressed in a New Zealand investigation [20] of what young university age people are seeking from support services. This included clear statements about wanting to remain in control of decisions about their mental health and being able to access services that are flexible enough to fit around their lives. When specifically describing counselling, they preferred friendly rather than hierarchical expert models, and wanted to talk freely and be heard.

Whilst counselling and direct mental health services have an important role to play in the university sector, so do other programs that might appeal to young people. A New Zealand study of key stakeholders to the university sector found that provision of wellbeing and suicide prevention programs were considered equally important to counselling services [21]. However, minimal research has been conducted in the efficacy of additional programs in the university sector to date,

although some reports are available. One Australian university [22] developed a program for medical students that included both curriculum-based programs to target student health and wellbeing, as well as individual skill-building programs such as mindfulness and mentoring. Another Australian university has more recently investigated the role of mindfulness-based programs for improving psychological wellbeing and study engagement in medical students. Results suggest improvements across mental health, perceived stress, study engagement, and mindfulness particularly occur when students engage in informal mindfulness practice compared to formal practice [23].

Programs that focus less on problems and more on building capacity to deal with stress have been highlighted in a range of reports and seem to appeal to students. Evidence is not yet strong, but a meta-analysis of yoga, meditation and mindfulness programs examined 24 RCTs with 1373 participants in tertiary education and demonstrated a growing body of research into these types of popular 'mind body' interventions [24]. Most studies were described as having a high risk of bias, since it is impossible to mask participants to their involvement in these interventions, and the meta-analysis findings were unclear, with calls for further research. Another small-scale study [17] investigated internet-based programs that utilise activities on the web to provide low-intensity interventions for students across the continuum of wellbeing. These have proved popular, although not adequate for students with high mental health needs.

Music listening for university student wellbeing has also been described in the literature, with one Australian study [25] investigating whether it was an effective coping strategy using an online cross-sectional survey of 475 first-year students. Results suggested that using music as a resource was complex, with mixed results. A total of 72.6% of domestic students and 59.2% of international students found it helpful, but greater music listening was associated with decreased well-being when it was used for emotional reasons. This is consistent with other research of young people identifying both healthy and unhealthy uses of music [26], and the risks of more ruminative music use for highly anxious or distressed students [27].

2. Materials and Methods

2.1 Project Aims

The study described here recognised both the popularity and the complexity of young people's relationship with music for emotional self-care. It investigated a program designed to increase awareness of how music listening can both support and hinder stress management. It aimed to improve university student's capability to manage their stress by using the construction of playlists intentionally designed to foster their own wellbeing using their preferred music. Musical engagement, life satisfaction, interest in life as well as anxiety and distress were all measured before and after the program. Additional qualitative data was collected at post regarding the workshop, application of ideas, and quantitative data measuring uses of music for emotion regulation. This was intended to provide sufficient data points to determine if the program was considered helpful and whether it was effective in reducing anxiety or increasing wellbeing.

2.2 Method

This pilot study used a convergent parallel mixed methods design. The convergence of data occurred at the point of analysis, after both types (QUAN and QUAL) had been collected simultaneously, and analysis placed equal weight on both components [28]. This is sometimes referred to as concurrent triangulation design [29].

2.3 Participants

Recruitment for the program occurred through a range of social media channels within a Melbourne-based university. However, the most successful avenue was through an announcement to students in a large elective subject that was coordinated by the first author. More participants signed up for the study (n = 71) than participated in the workshops (n = 36), and not all participants who attended the workshop completed the qualitative questions immediately following the workshop (n = 31) or the follow up questions at four weeks (n = 17) (see Table 1 for details). All participants provided informed consent prior to taking part in this study. The project was approved by the Human Research Ethics Committee, Office of Research Ethics and Integrity at the University of Melbourne (Approval number: 2021-21186-16999-4).

Table 1 Participation Rates.

2021	Workshop 1: 21st May#	Workshop 2: 2nd July	Workshop 3: 31st August*	Workshop 4: 4th October*#	**Total**
Completed any pretest	11	7	8	45	**71**
Attendance at workshop	8	4	4	20	**36**
Completed qual survey	8	4	4	15	**31**
Completed any posttest	4	2	5	6	**17**

Note. *Proximity to Melbourne lockdown dates: 28th May-10th June; 16th- 27th July; 5th August-21st October; #Proximity to the university assessment week dates: 31st May – 25th June; 25th October – 19th November.

The four workshops were conducted online between July and October 2021. Workshop 1 occurred immediately before the university assessment period and a lockdown, and Workshops 2 and 3 were at less stressful times of the academic year. The most heavily attended workshop was two weeks prior to the beginning of an assessment period and during a long lockdown, which may have motivated attendance.

Demographic data was collected across the cohort, but given the sporadic data collection, we chose only to analyse the details of those who had completed the qualitative data and the pretest demographic data (Table 2). In the whole cohort of students who participated in the workshops (n = 36), the majority of participants (69%) were female identifying (n = 25) with nine males and two not identifying within the gender binary. The majority of participants were local undergraduates (n = 27/75%), with nine postgraduate students, nine internationals (of which three were located overseas) and spread across a range of university faculties.

Table 2 Demographics of Participants who Attempted Qualitative Survey.[1]

Participant ID	Age (years)	Gender	Mode of study	Area of study	Workshop
001	43	Female	Postgraduate local student	Fine Arts and Music	1
003	19	Female	Undergraduate international student, currently overseas	Business and Economics	1
004	20	Female	Undergraduate local student	Business and Economics	1
006	34	Female	Postgraduate international student, currently in Australia	Arts	1
007	19	Female	Undergraduate local student	Business and Economics	1
008	20	Male	Undergraduate local student	Business and Economics	1
009	19	Female	Undergraduate international student, currently overseas	Arts	1
011	29	Female	Postgraduate local student	Fine Arts and Music	1
012	43	Female	Postgraduate local student	Science	2
014	25	Male	Postgraduate international student, currently in Australia	Science	2
015	38	Female	Undergraduate local student	Fine Arts and Music	2
017	24	Female	Postgraduate international student, currently in Australia	Architecture, Building and Planning	2
022	29	Prefer not to say	Postgraduate local student	Fine Arts and Music	3
023	18	Female	Undergraduate local student	Arts	3
026	21	Female	Undergraduate local student	Science	3
027	25	Female	Postgraduate local student	Fine Arts and Music	3
029	20	Female	Undergraduate local student	Arts	4
030	19	Female	Undergraduate local student	Science	4
031	21	Other	Undergraduate local student	Fine Arts and Music	4
037	19	Male	Undergraduate local student	Fine Arts and Music	4
042	21	Female	Undergraduate local student	Arts	4

[1] Participants who 'attempted' the survey include individuals who answered the majority of questions in the survey, but may not have completed it.

044	21	Female	Undergraduate local student	Science	4
046	18	Female	Undergraduate local student	Science	4
048	18	Female	Undergraduate international student, currently overseas	Medicine, Dentistry and Health Sciences	4
052	21	Male	Undergraduate local student	Science	4
053	22	Female	Postgraduate local student	Fine Arts and Music	4

2.4 Measures

The survey completed at pretest and posttest included three sections. Section 1 included demographic data (reported under Participants above). Section 2 included 26 statements about their reasons for using music. Students were asked to select a response to each statement that they felt best described them using a 5-point Likert scale from 'strongly disagree' to 'strongly agree'. These items were taken from the 'Music Use Motivations' module of the Music Use and Background Questionnaire (MUSEBAQ) [30] and were selected by the research team as being most in line with the workshop focus. The research team were cautious of overburdening students by using the full version of the MUSEBAQ which has 67 items. Section 3 included seven items assessing emotional wellbeing, anxiety and depression in the past month using a 10-point Likert scale from 'very strongly disagree' to 'very strongly agree'. The emotional wellbeing items were adapted from the Mental Health Continuum-Short Form [31]. A sample item from this scale is: "During the past month, I often feel satisfied with life", with higher scores indicating higher levels of emotional wellbeing. The anxiety and depression survey items were adapted from the Patient Health Questionnaire-4 [32] but were not intended to reflect a clinical diagnosis in this study. A sample item is "I often feel nervous, anxious or on edge", with higher scores indicating greater self-reported levels of distress. The qualitative survey consisted of seven questions (a mix of multiple choice and open ended) asking students to reflect on their experience in the workshop including whether the workshop met their expectations, made sense to them, how confident they felt about selecting music to listen to over the next four weeks and what they might do differently or more/less of in their music listening. It also asked students to write down the three most important things they learnt and would take away to implement from the workshop.

2.5 Intervention

The one-hour live, virtual workshops were scripted and facilitated by two of the authors who are qualified music therapists, registered with the Australian Music Therapy Association. There was little variation between the four intervention sessions, which were presented didactically by the main speaker, with key points being typed in the chat to reinforce messaging. Participants were invited to respond to questions using the chat function, but there was no verbal interaction between the speakers and the students. Some people had their cameras on, including the presenters, but most participants kept cameras off. The components of the program are tabled below (Table 3) with stories that illustrated key points being used to help make the messages personal, and music was used in the main experiential activity to consolidate learning. The main purpose was to raise

consciousness about music selection and listening, framed as 'Rookie Errors' to highlight the unconscious assumptions people have about how music effects them [33]. The three rookie errors were: the effect of music changes over time and in different situations; don't be random when you're trying to achieve a specific outcome; and, become aware of how music currently affects you (not how it used to make you feel).

Table 3 Intervention Structure.

Structure	Timing	Topic/s
Introductions and Acknowledgements	4 minutes	Acknowledging country, introducing speakers, recognising participants
First foundational concept	7 minutes	What does your music mean to you, using examples and an illustrative case
First learning	3 minutes	Recognising that the effect of music does not remain consistent and can change over time
Second foundational concept	3 minutes	Exercise to encourage recognition of what types of music people have been relying on
Second learning	4 minutes	Increasing intentionality by avoiding random and shuffle functions and being aware of order of songs
Experiential	5 minutes	Asking people to notice how they are feeling (energised, happy, hopeful) on a scale of 1-10 before listening to a piece of music and then after
Third learning	4 minutes	Being more aware of whether the effect of the music is what was expected/planned, illustrated with story
Third foundational concept	4 minutes	The value of beginning with mood matching and then sequencing songs to step towards desired state
Fourth learning	4 minutes	Explaining playlist construction to incorporate selection, purpose, sequence, and structure
Complete qualitative questions	5 minutes	Link provided to answer the questions online
Provision of online resources	2 minutes	A list of different places to access further information about music and wellbeing was provided
Summary and Closure	5 minutes	Listen consciously and be intentional in your music selection

3. Results

3.1 Data Analysis

3.1.1 Analysis of QUAN Wellbeing Data

Fifty-seven students completed the emotional wellbeing and distress measures at T1 (pre-workshop) with a total of twelve students providing both pre and post data (descriptive statistics provided in Table 4). The only significant findings at T1 were inverse correlations between emotional wellbeing and distress measures of depression, $r(55) = -0.57$, $p \leq 0.001$, and anxiety, $r(55) = -0.31$, $p = 0.018$. Participants who reported lower levels of emotional wellbeing were more likely to report greater levels of distress, as measured by their experiences of anxiety and depression symptoms. There was not enough power to undertake a statistical analysis of pre to post changes in these measures and no sizeable differences were noted. Steps of one degree in five were present, but consistent changes were not identified across the cohort.

Table 4 Summary of survey responses at both time points.

Measure and time-point	Mean	Standard Deviation	Minimum	Maximum
T1 Emotional Wellbeing	6.56	1.54	2.33	9.00
T2 Emotional Wellbeing	6.61	2.07	1.33	9.67
T1 Depression	5.43	1.71	1.50	9.50
T2 Depression	5.75	1.69	3.00	9.00
T1 Anxiety	7.70	1.92	3.00	10.00
T2 Anxiety	8.33	1.29	6.00	10.00
T1 Stress	6.86	1.81	2.50	10.00
T2 Stress	7.58	1.12	6.00	9.50
T1 MUSEBAQ-Emotion Regulation	3.97	0.63	2.33	5.00
T2 MUSEBAQ-Emotion Regulation	3.94	0.47	3.22	4.78
T1 MUSEBAQ-Music Identity & Expression	4.01	0.67	2.75	5.00
T2 MUSEBAQ-Music Identity & Expression	4.06	0.75	2.50	5.00
T1 MUSEBAQ-Cognitive Regulation	3.95	0.79	2.00	5.00
T2 MUSEBAQ-Cognitive Regulation	3.78	0.67	2.00	4.67
T1 MUSEBAQ-Musical Transcendence	4.00	0.53	2.90	5.00
T2 MUSEBAQ-Musical Transcendence	4.01	0.41	3.40	4.70

3.1.2 Analysis of QUAL Workshop Data

Overall, the QUAL data from 31 students confirmed the learning outcomes of the psychoeducational intervention, with all respondents articulating three learnings that were relevant to the workshop content and describing what they would do differently as a result. It is possible that the five people who attended the workshop but did not contribute the QUAL data found it less satisfactory, since data collection occurred in the final twelve minutes of the workshop. Therefore, this data can be assumed to represent those who did perceive value in the intervention.

The QUAL data was specific to students' learnings and any further analysis was limited to/focused on the nuanced ways in which they expressed their learning. After lengthy consideration of these qualities, two categories were constructed to capture the qualitative difference between types of answers – those that described how they intended to take action to do specific things differently; and those that articulated an enhanced awareness of how music might be helpful and unhelpful but did not describe what they were going to do differently. These are presented in Table 5.

Table 5 Categorization of Qualitative Data into Two Categories.

Expressed intentionality	**Enhanced awareness**
Think critically about my music choices and especially the order of songs and my associations with them rather than just putting my playlist on shuffle	*Music can transport us to another time, but it is important to not let it veer us off to a negative place and ruminate on such experiences*
Listening to music that helps to uplift me, process what I am feeling, and then move me into a more productive/positive mindset	*Listening to the same negative songs over and over again*
I will start to avoid songs that illicit bad emotions and that hinder my ability to focus	*The effect of music changes over time, and that music that may have helped before may not anymore*
Thinking more about my personal connection to various songs and how they make me feel when choosing music, but also being more deliberate with my choices	*The deeper associations that you might not think about right away- not good, the bad and the ugly*
Choose what I listen to instead of playing a random playlist	*The meaning of music changes over time*
Be more aware of why I am listening to music-whether it be for enjoyment or for a distraction from stress	*The way we use music is not always consistent*
Be more intentional and put effort in my music playlist creation rather than randomly selecting 'good' songs for it.	*Make playlist with music of each state of feeling/emotion and have it gradually progress.*
To make a playlist we should choose a song for each state, think about the sequence of song, then think about the journey of that	*Having the same type of songs that makes me think about the unhappier aspects or moments in my life.*

sequence of songs. Gradually choose songs in sequence that steps you to a more positive way of thinking.	
Make sure that it reflects the intended mood, so if I'm feeling happy I put on an empowering song rather than a song that has a bad memory associated with	*Make playlists to help manage your well-being, from sad to empowered, from angry to optimistic!*
Using the iso principle within music listening to shift my mood.	*My reaction to music will be personal-based on my associations with the song etc.*
I will be more intentional when listening to music and make sure I create song lists for different purposes.	*Listen to more music, I finally realised that before when I study, while I playing some songs in the background, and sometimes I find that not useful at all. After today I realised that it is due to the songs selections, which are not suitable.*
Think critically about my music choices and especially the order of songs and my associations with them rather than just putting my playlist on shuffle	*Music can transport us to another time, but it is important to not let it veer us off to a negative place and ruminate on such experiences*

3.1.3 Convergent Analysis

Convergent analysis was then undertaken through a close examination of the QUAN data of those students that expressed intentionality in their responses. Since there were no significant changes from pre to post across the data set, we focused on the pretest data to identify what might be the motivating factors that primed these students for what seemed to indicate behaviour changes. This involved extracting both the demographic, wellbeing, and music use data at pretest. Analysis identified one primary pattern – nine of the 11 students rated themselves as highly happy/interested/satisfied with life at pretest (as seen by their average on these three scores rating 7/10 or above). Of these students, seven also rated themselves as experiencing high stress and anxiety. This combination of satisfaction and stress was then used to expand the data set for convergent analysis by drawing in all students who self-rated as high in positivity at pretest, which included a further seven students, of which six also rated themselves as highly stressed. This combination represented approximately half (16/31) the students who had completed QUAL data. Further analysis for other common features across the 16 students revealed only one other pattern – very high ratings of music as a comforting friend (average of 4.75/5). This remained consistently high at posttest (average of 4.64). Using music to get through difficult times was also high scoring (4.5) for this sub-group of students.

Demographically, 13 of the 16 students were female identifying and an equal number (n = 13) were domestic students which is proportionate with the gender and location of students who participated in the workshops overall (69% female and 75% domestic). Most students were studying courses in the Humanities (seven being from Fine Arts/Music; four from Arts; one from Business and Economics; one from Architecture, Building and Planning) with only three students from Science. The split between postgraduate students (n = 7/44%) and undergraduates (n = 9/56%) was not reflective of the proportion seen in the whole cohort of participants who attended the workshops

(75% undergraduates and 25% postgraduates). Out of the nine postgraduate students who participated in the workshops, seven of them fit into this category (78%).

4. Discussion

This project took place in the middle of a global pandemic that resulted in unprecedented lockdowns, diminishment of opportunities for young people to socialise with peers, and with high levels of anxiety across the community. In that community context, the university students who agreed to participate in the one-hour workshop were seeking ways to manage their wellbeing, which was seriously challenged. There are several interesting discussion points that emerge from this conflation of phenomena, but it is difficult to know whether these findings bear any relevance to similar interventions conducted during more 'COVID-normal' times.

The most striking feature of the analysis was that the combination of high happiness/satisfaction/interest in life combined with high stress appeared to prime participants most effectively to make changes to their music listening habits. This statement is based on convergent analysis of qualitative and quantitative data but is primarily driven by our interpretation of the qualitative data. Table 5 transparently demonstrates the basis of this interpretation and our perceived distinction between those who expressed *intentionality* in describing their intended approach to music listening following the workshops, as opposed to statements that seemed to demonstrate more *enhanced awareness* of how they might do so.

It seems feasible that those participants who Keyes [34] might describe as emotionally flourishing (despite the lack of potential for social encounters) would be more motivated to change their music listening habits. Our intervention focused on music listening strategies and did not address the cause of any existing challenges, beyond recognising the context of the global pandemic. This may have been particularly helpful for students who were seeking positive solutions to their immediate problems. In a provocative article, Fiorella [35] suggests that changing habits has received too little attention in the literature about student motivation, which has often fixated on the role of motivation and metacognition instead of focusing on more helpful actions. Our focus on forming more positive relationships with music that support effective study may have been just what the doctor ordered for those who were already primed for change.

Although habits do take time to change [36], musicians are very familiar with the need for repetition [37]. The high number of creative arts students (n = 6/43%) represented in our high happiness/satisfaction/interest in life cohort who described changing their habits (n = 14) may also have significantly more experience in this because it is the key knowing from artistic practice. In addition, the most successful recruitment strategy for the study was through a large elective subject about music and health, which frequently attracts students from across the university with a history of playing an instrument (based on class discussions). Although we did not collect data about musicianship for this study, this would be an interesting correlation to explore in future studies of whether students are willing to change their music listening habits to better support their wellbeing. We did collect data on students existing uses of music to regulate their mood or emotions, and there were no significant correlations between this and any other factors. The questions that we used to elicit this data came from validated tools that are sensitive to this phenomenon [30]. This might be further evidence of a more artistic interest in music that is separate from their interest in wellbeing, which might be related to the number of participants studying the arts.

On the other hand, students who entered the study reporting less life satisfaction did not demonstrate the same inclination to change their patterns of music listening, even though they did show awareness of how this might be helpful. This may be a distinction between traits linked more closely to stress and/or anxiety (which were shared across both groups) and those more indicative of distress and/or depression. Consideration of anhedonia may be relevant in this distinction, since it is a diagnostic feature of depression, which has recently [38] been expanded to include effort and motivation, instead of a more limited conceptualisation that privileges pleasure in life. People struggling with motivation can recognise the value of an action, or habit, but find it much more difficult to transform their behaviour. This may be what was reflected in the qualitatively distinct nuances we perceived between the two groups of students-the ability to put thoughts around music listening into action.

This finding does corroborate previous research linking ruminative thinking patterns to continued reliance on unhelpful music listening habits [39-41]. It offers a new distinction, by demonstrating that being stressed but satisfied is less likely to result in unhelpful listening habits but being stressed *and* distressed might suggest an increased likelihood of unhealthy listening habits. The resulting challenge is to identify the most useful ways to support distressed young people to reflect on how they might be supporting rumination with repetitive music listening. The one-hour workshop model saw limited success for some participants in the project. Although it was not possible to ascertain significance of pre-post changes from the quantitative data in this small study, there were a number of reports of one degree of improvement, even though some students already scored high in the pretesting and poor follow up data overall was problematic. It does seem clear that those who were more distressed might need an intervention that is more individually tailored. In fact, we have previously seen significant improvements in wellbeing using the K10 distress measure with young people who were recruited through an early intervention program with high levels of distress [27]. In addition to significant improvements, those young people described meaningful changes in their music listening habits, prompted by approximately two individual sessions focused on the same intervention that informed this study – playlist construction.

However, it is inappropriate to generalise from this research data and further studies are necessary. We recommend in-depth interviewing rather than gathering descriptions from pre-determined questions. In this study we were able to see whether the learning outcomes were achieved, but not to understand the processes behind that. We did attempt to solicit interview data, but students were not forthcoming when we invited them to participate in an interview. The study was limited by an array of data collection challenges, particularly missing data. This likely reflected the students' interest in the possible benefits of the intervention, but insufficient care for the quality of the research, which could have been emphasised more convincingly. Furthermore, these data collection challenges could also reflect the uncertain circumstances students were experiencing at the time of this research. However, we did not collect data about why people chose to join the project and recommend that this would be useful in future studies. In particular, to know whether it was the idea of managing their own wellbeing more broadly that was the impetus for their engagement in this study, or specifically using music for their own wellbeing needs. This has implications for more nuanced understandings of these findings.

5. Conclusions and Recommendations

There is good evidence from other studies that music can be used to decrease anxiety [42, 43], particularly using music therapy approaches that meet the needs of individuals by offering tailored musical programs for their needs. In contrast, this pilot study examined a brief, virtual, live but scripted, group psychoeducational intervention that focused on increasing awareness of how music listening can be helpful and unhelpful. Instead of working with individual situations, we guided participants together through a process of considering what their music means to them in a way that was more like an experiential teaching environment than a therapy context, based on the first authors experience in both. As a pilot, this project was influenced by a range of unique conditions that resulted in a novel intervention and each of these should be considered carefully if repeated. The single session format did not allow for development of knowledge over time but was designed to meet the efficiency demands and learning capabilities of stressed university students. The scripting of the intervention enabled all the psychoeducation material to be covered in a short time but did not allow for interaction beyond the chat function. The virtual format meant that a teleprompter strategy could be used to make the presentation appear dynamic, and it also meant that participants could engage from their own homes using basic online meeting technologies. Music listening added enjoyment to the experience and is particularly amenable to online engagement compared to live music making which experiences sound delays. It is unclear what combination of these factors supported or hindered the experience for participants, and since lockdowns made life unpredictable and live meetings impossible, it was accepted by all involved. Any future investigations using the ideas from this pilot would likely involve adjustments to suit the differing conditions and should not adopt all dimensions as requisite.

The research management was also impacted by the global anxiety created by the global pandemic as well as lockdown conditions. The data collection process was impacted by unexpected forces such as long lockdowns and the quality of the data collected was not ideal. A total of 53 students participated across four groups and high levels of stress were evident at baseline. A convergent analysis was undertaken but the lack of additional interview data meant the QUAL data was more limited than anticipated and the poor adherence to follow up QUAN measures was similarly disruptive. It was interesting to consider that the results suggested those participants who seemed most likely to adjust their music listening habits were stressed, but simultaneously happy, satisfied and interested in life. The idea that these conditions primed them to consider changes that seemed helpful for managing their anxiety about studies is interesting and may inform future considerations about what types of psychoeducation and therapy might be helpful for people in different states of languishing and flourishing.

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Author Contributions

Katrina McFerran and TanChyuan Chin were the lead researchers who designed and coordinated the project. McFerran also led the qualitative analysis and the draft of the article and Chin led the

quantitative analysis. Carmen Cheong-Clinch was a facilitator for 3 of the 4 groups and conducted the final qualitative categorisation and write up and Jennifer Bibb coordinated the data collection and contributed to write up.

Competing Interests

The authors have declared that no competing interests exist.

References

1. Browne V, Munro J, Cass J. Under the radar: The mental health of Australian university students. J Aust N Z Stud Serv Assoc. 2017; 25: 2617.
2. Larcombe W, Finch S, Sore R, Murray CM, Kentish S, Mulder RA, et al. Prevalence and socio-demographic correlates of psychological distress among students at an Australian university. Stud High Educ. 2016; 41: 1074-1091.
3. Burns RA, Crisp DA. The long-term mental health of Australia's tertiary students. Soc Psychiatry Psychiatr Epidemiol. 2020; 55: 1223-1230. doi: 10.1007/s00127-019-01806-7.
4. Fernandez A, Howse E, Rubio-Valera M, Thorncraft K, Noone J, Luu X, et al. Setting-based interventions to promote mental health at the university: A systematic review. Int J Public Health. 2016; 61: 797-807.
5. Larcombe W, Baik C, Finch S. Exploring course experiences that predict psychological distress and mental wellbeing in Australian undergraduate and graduate coursework students. High Educ Res Dev. 2022; 41: 420-435. doi: 10.1080/07294360.2020.1865284.
6. Sanci L, Williams I, Russell M, Chondros P, Duncan AM, Tarzia L, et al. Towards a health promoting university: Descriptive findings on health, wellbeing and academic performance amongst university students in Australia. BMC Public Health. 2022; 22: 2430. doi: 10.1186/s12889-022-14690-9.
7. Headspace. National tertiary student wellbeing survey. Australia: Headspace; 2016. Available from: https://headspace.org.au/assets/Uploads/headspace-NUS-Publication-Digital.pdf.
8. Courtney J. The UNIfy program: Providing additional support to students with mental health issues in a university context. J Aust N Z Stud Serv Assoc. 2019; 27: 62-66.
9. Chigeza S, De Kock JH, Roos V, Wissing MP. The subjective well-being of first-year tertiary students during an induction programme. Africa Educ Rev. 2017; 14: 20-35.
10. Bye LA, Muller F, Oprescu F. The impact of social capital on student wellbeing and university life satisfaction: A semester-long repeated measures study. High Educ Res Dev. 2020; 39: 898-912.
11. Birmingham WC, Wadsworth LL, Lassetter JH, Graff TC, Lauren E, Hung M. COVID-19 lockdown: Impact on college students' lives. J Am Coll Health. 2021. doi: 10.1080/07448481.2021.1909041.
12. El-Monshed AH, El-Adl AA, Ali AS, Loutfy A. University students under lockdown, the psychosocial effects and coping strategies during COVID-19 pandemic: A cross sectional study in Egypt. J Am Coll Health. 2021; 70: 679-690.
13. Werner AM, Tibubos AN, Mülder LM, Reichel JL, Schäfer M, Heller S, et al. The impact of lockdown stress and loneliness during the COVID-19 pandemic on mental health among university students in Germany. Sci Rep. 2021; 11: 22637.

14. Dodd RH, Dadaczynski K, Okan O, McCaffery KJ, Pickles K. Psychological wellbeing and academic experience of university students in Australia during COVID-19. Int J Environ Res Public Health. 2021; 18: 866.
15. Egan H, O'hara M, Cook A, Mantzios M. Mindfulness, self-compassion, resiliency and wellbeing in higher education: A recipe to increase academic performance. J Furth High Educ. 2022; 46: 301-311.
16. Worsley JD, Pennington A, Corcoran R. Supporting mental health and wellbeing of university and college students: A systematic review of review-level evidence of interventions. PLoS One. 2022; 17: e0266725.
17. Orygen. Australian University Mental. Health Framework report. Melbourne: Orygen; 2020.
18. Breedvelt JJF, Amanvermez Y, Harrer M, Karyotaki E, Gilbody S, Bockting CLH, et al. The effects of meditation, yoga, and mindfulness on depression, anxiety, and stress in tertiary education students: A meta-analysis. Front Psychiatry. 2019; 10: 193.
19. Stallman HM, Kavanagh DJ. Development of an internet intervention to promote wellbeing in college students. Aust Psychol. 2018; 53: 60-67.
20. Gibson K, Cartwright C, Kerrisk K, Campbell J, Seymour F. What young people want: A qualitative study of adolescents priorities for engagement across psychological services. J Child Fam Stud. 2016; 25: 1057-1065. doi: 10.1007/s10826-015-0292-6.
21. Limpus W, Carlyon T. Considering how tertiary education providers can best support the mental health and wellbeing of their students. J Aust N Z Stud Serv Assoc. 2019; 27:188-200. doi: 10.30688/janzssa.2019.08.
22. Sloan H, Clayman D. 'Just What the Doctor Ordered': Promoting wellbeing with medical students. J Aust N Z Stud Serv Assoc. 2018; 26: 3295.
23. Kakoschke N, Hassed C, Chambers R, Lee K. The importance of formal versus informal mindfulness practice for enhancing psychological wellbeing and study engagement in a medical student cohort with a 5-week mindfulness-based lifestyle program. PLoS One. 2021; 16: e0258999.
24. Josefien J. F. Breedvelt, Yagmur Amanvermez, Mathias Harrer, et al. The Effects of Meditation, Yoga, and Mindfulness on Depression, Anxiety, and Stress in Tertiary Education Students: A Meta-Analysis. *Frontiers in Psychiatry*. 2019;10. doi:10.3389/fpsyt.2019.00193
25. Vidas D, Nelson NL, Dingle GA. Music listening as a coping resource in domestic and international university students. Psychol Music. 2022; 50. doi: 10.1177/030573562110669.
26. Saarikallio S, McFerran KS, Gold C. Development and validation of the Healthy-Unhealthy Music Scale (HUMS). Child Adolesc Ment Health. 2015; 20: 210-217.
27. McFerran KS, Hense C, Koike A, Rickwood D. Intentional music use to reduce psychological distress in adolescents accessing primary mental health care. Clin Child Psychol Psychiatry. 2018; 23: 567-581.
28. Creswell JW, Plano Clark VL. Designing and conducting mixed methods research. 2nd ed. Los Angeles: Sage Publications; 2011.
29. Edmonds WA, Kennedy TD. An applied guide to research designs: Quantitative, qualitative, and mixed methods. Sage Publications; 2017. pp. 181-188.
30. Chin TC, Coutinho E, Scherer KR, Rickard NS. MUSEBAQ: A modular tool for music research to assess musicianship, musical capacity, music preferences, and motivations for music use. Music Percept. 2018; 35: 376-399.

31. Lamers SM, Westerhof GJ, Bohlmeijer ET, ten Klooster PM, Keyes CL. Evaluating the psychometric properties of the mental health continuum-short form (MHC-SF). J Clin Psychol. 2011; 67: 99-110.
32. Kroenke K, Spitzer RL, Williams JB, Löwe B. An ultra-brief screening scale for anxiety and depression: The PHQ–4. Psychosomatics. 2009; 50: 613-621.
33. Schäfer T, Sedlmeier P, Städtler C, Huron D. The psychological functions of music listening. Front Psychol. 2013; 4: 511.
34. Keyes CL. Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. Am Psychol. 2007; 62: 95-108.
35. Fiorella L. The science of habit and its implications for student learning and well-being. Educ Psychol Rev. 2020; 32: 603-625.
36. Lally P, Van Jaarsveld CH, Potts HW, Wardle J. How are habits formed: Modelling habit formation in the real world. Eur J Soc Psychol. 2010; 40: 998-1009.
37. Margulis EH. Repetition and emotive communication in music versus speech. Front Psychol. 2013; 4: 167.
38. Rizvi SJ, Pizzagalli DA, Sproule BA, Kennedy SH. Assessing anhedonia in depression: Potentials and pitfalls. Neurosci Biobehav Rev. 2016; 65: 21-35.
39. Garrido S, Eerola T, McFerran K. Group rumination: Social interactions around music in people with depression. Front Psychol. 2017; 8: 490.
40. Garrido S, Schubert E. Adaptive and maladaptive attraction to negative emotions in music. Music Sci. 2013; 17: 147-166.
41. Stewart J, Garrido S, Hense C, McFerran K. Music use for mood regulation: Self-awareness and conscious listening choices in young people with tendencies to depression. Front Psychol. 2019; 10: 1199.
42. de Witte M, Spruit A, van Hooren S, Moonen X, Stams G-J. Effects of music interventions on stress-related outcomes: a systematic review and two meta-analyses. Health Psychol Rev. 2020; 14: 294-324.
43. Harney C, Johnson J, Bailes F, Havelka J. Is music listening an effective intervention for reducing anxiety? A systematic review and meta-analysis of controlled studies. Music Sci. 2022. doi: 10.1177/10298649211046979.