An analysis of how a collaborative teaching intervention can impact student mental health in a blended learning environment

Abstract

There is increasing evidence that students face i) mental health challenges, ii) these challenges have increased following the Covid-19 pandemic, and iii) isolation has had a negative impact on student mental health. However, few studies offer practical pedagogical solutions with strategies to enhance student mental wellbeing. In a blended learning environment, during the Covid pandemic, we develop a mental health teaching intervention that promotes collaborative learning (theory) and group cohesion to enhance student mental wellbeing. Using a mixed method approach, questionnaire data (85) provides empirical evidence that a collaborative learning mental health intervention has been successful in promoting student wellbeing. We also provide evidence that seeking help from professionals has an incrementally positive influence on student mental health. The results of this study can therefore be used to inform administrators and educators about student mental health care in normal times, as well as future disaster scenarios.

Keywords: *COVID-19, blended learning; student mental health; education policy; teaching intervention; collaborative learning*

1. Introduction

One of the most delicate challenges academics face is managing the balance between motivating students to achieve their highest potential, while being fully considerate of their mental health. As some academics have experienced, the consequences of not developing strategies to manage student mental health have

significant consequences. There is increasing evidence that student mental health is deteriorating (Chemers et al., 2001; Eisenberg et al., 2009; Hysenbegasi et al., 2005; Ishii et al. 2018; Gall et al., 2000; Goldman-Mellor et al., 2014; Grubic et al., 2021; Montgomery and Cote, 2003; Niederkrotenthaler et al., 2014). Following the Covid-19 pandemic, there is evidence that social challenges (Elmer et al., 2020; Khan, 2020; Wang et al., 2020), as well as academic challenges have expedited the student mental problem (Aristovnik et al. 2020; Adnan and Adwar, 2020, Bao, 2020; Browning et al., 2021; Cao et al., 2020; Handel et al 2020). Thus, given the profound impact mental health can have on students, families and society, policymakers must consider strategies to support student mental wellbeing in normal times, as well in preparation for future similar disaster situations.

Students suffer from various forms of stress during their university tenure, inferring pastoral care can improve student wellbeing (Johannessen, 2022). However, a framework for student pastoral care is underdeveloped internationally (Laws and Fiedler, 2012). Spears and Green (2022) suggest that challenges associated with Covid have highlighted the importance of pastoral care, implying that a collaborative learning approach with implicit pastoral care characteristics can improve student wellbeing. With this in mind, the purpose of this study is to ascertain whether: *'during the Covid-19 pandemic, in a blended learning environment, can the introduction of a collaborative learning intervention improve student mental health?* To address this research question two groups of students are identified. The first group receive a collaborative learning intervention designed to reduce negative mental health impacts over a 12-week semester. The second group receive a traditional teaching delivery over the same period. All students are 2nd year undergraduate (accounting) students at Sheffield Hallam University (UK), during the Covid-19 pandemic period (see section 3.2 for further detail).

The study has several motivations. First, Velavan and Meyer (2020) argue the Covid-19 pandemic has caused the largest and quickest change in pedagogy ever. Various studies report that the Covid-19 pandemic has had a detrimental influence on student mental health (Copeland et al., 2020; Conrad et al., 2021; Grubic et al., 2020; King, 2020; Komer, 2020). However, few studies offer suggestions about strategies to improve student mental health (Wasil et al., 2021). This study is therefore designed to provide information to educators about how managing the online environment has the potential to enhance student wellbeing. Specifically, i) we develop a mental health intervention based on collaborative learning theory in a blended learning (BL) environment. ii) We adopt a case study approach to report the effectiveness that the collaborative learning intervention can have on student mental health. iii) The study explains the effectiveness of the collaborative learning mental health intervention. Finally, iv) using a stratified sample, we also provide an overview of student mental health during the Covid-19 pandemic. In short, the study main motivation is to explain the impact our mental health intervention has had on students' mental wellbeing.

Second, studies show that isolation as a result of switching from face to face (F2F) to BL has negatively impacted student mental health (Wang et al., 2020). During the pandemic, Mali and Lim (2021) report that lower levels of engagement with peers and teachers has negatively impacted student experience. Prior to the pandemic, there have been arguments that academics should develop class material with mental wellbeing as an underlying consideration (Baik et al., 2019; Flynn 2015; Griebler et al., 2017; Lipson and Eisenberg, 2018; Thornley, 2019). Based on this assertion, collaborative learning theory is invoked as a framework to support student mental health. Our mental health intervention (discussed in section 2) is based on the premise that a lack of group interactions/cohesion is shown to have a negative effect on student experience/

wellbeing (Baber, 2021a, Baber, 2021b; McHone, 2020; Mali and Lim, 2021; Wang et al., 2020). Furthermore, the physiological benefits as well as the pedagogical advantages associated with collaborative learning have the potential to enhance student mental wellbeing (Cohen 1994; Dillenbourg, 1999; Gillies et al., 2008; Laal and Ghodsi, 2012; Resta and Laferrière, 2007; Van Leeuwen et al., 2013). Thus, we are motivated to provide practical and theoretical insights to academics about strategies to manage student mental health in a BL/online environment.

Thirdly, there are differing views regarding the adoption of BL in the extant literature. Some consider F2F to be superior to BL (Burgess, 2008; Concannon et al., 2005; Koskela et al., 2005; Lomer and Palmer, 2021; Marriott and Marriott, 2003; Robson and Greensmith, 2009; Selwyn, 2016). Others argue that whilst there are advantages associated with BL, the adoption of BL deliveries comes with risk (Mali and Lim, 2021; Sangster et al., 2020). However, increasingly, there are arguments that it is only a matter of time until BL will be established as a the new normal, because of various advantages associated with BL (Afacan, 2016; Baber, 2020; Benson and Kolsaker, 2015; Bernard et al. 2014; De Beer and Mason, 2009; Hall, 2006; Harris, 2009; Kirkpatrick, 2005; Liu et al. 2016; Marriott et al., 2004; McCabe and Connor, 2014; Spanjers et al. 2015). A lack of interactions can be a limiting factor in BL deliveries (Baber, 2020; 2021a, 2021b; Mchone, 2020). Thus, there is an increasing requirement to establish netiquette frameworks to implement robust BL deliveries (Mali and Lim, 2021). Thus, given the perceived pivot towards BL in the literature, this study can be insightful to policymakers and educators by providing evidence of how specially designed interventions can be integrated into a netiquette framework to enhance BL delivery.

Fourth, the mental health challenges faced by educators as a result of the Covid-19 pandemic are widely reported (Belkhir et al., 2019; de Boer, 2020; Greenberg and

Hibbert, 2020; Wade and Shan 2020). However, few studies report on the different anxieties students face during the Covid-19 pandemic, using various indicators such as (i) student attitudes, ii) mental health perceptions, iii) community perspective, iv) friendship perspective and v) isolation perspectives. Moreover, very little is understood about student mental health and the factors that have an intervening effect on mental wellbeing (Flynn 2015, Baik et al. 2019). Greenberg and Hibbert (2020) posit that academic tension exists because few studies report on how the pandemic has affected student emotions. Thus, we are motivated to address this knowledge gap by providing students with a platform to offer their voice about the most important issues that challenge their mental wellbeing during the pandemic.

Fifth, the mental health struggles of specific groups are shown to be different based on categorical characteristics such as gender, amongst other sociological factors (Auerbach et al., 2018; Eisenberg et al. in 2013). Whilst it is not the primary purpose of the study to provide empirical evidence that group X has a different perception regarding mental wellbeing compared to group Y, for completeness, the study provides empirical evidence of how different groups (a, gender; b, location of study (home/university accommodation; c, whether students have sought to speak with professionals about mental health; d, F2F/BL preference) are impacted by mental health challenges.

The study proceeds as follows. Section 2 reviews relevant literature to develop the study's hypothesis. Moreover, the collaborative mental health intervention is introduced. The research design is introduced in Section 3. In section 4, qualitative and quantitative results are provided. Section 5 discusses the implication of empirical results. Section 6 concludes.

2. Literature Review, teaching context and hypothesis development

2.1 Literature review

Following the Covid-19 pandemic, the move from F2F to BL has been unprecedented (Beech and Anseel, 2020, Lund et al., 2020). However, research on how changes from F2F to BL have influenced student mental health is limited. In the extant literature, three different assertions exist regarding the effectiveness of BL, which may influence student mental wellbeing. First, BL is considered limited because it has a negative effect on student engagement in technical subjects (Concannon et al., 2005; Robson and Greensmith, 2009; Selwyn, 2016). Part-time students are shown to prefer F2F learning (Burgess, 2008). Whilst student praise some aspects of BL, they are shown to prefer F2F (Koskela et al., 2005). Lomer and Palmer (2021) provide empirical evidence that when universities change from F2F to BL delivery, students consider BL to be less value for money. Furthermore, historical evidence shows that business students are not comfortable adopting BL (Marriott and Marriott, 2003). Numerous studies show that the challenges associated with online/BL delivery as a result of the Covid-19 Pandemic has had a negative effect on the mental wellbeing of academics (Belkhir et al., 2019; de Boer, 2020; Greenberg and Hibbert, 2020; Wade and Shan 2020). Thus, given that F2F is considered by many to be the preferred option by academics and students, post Covid, critics question whether resources should be invested in developing new BL deliveries.

Second, Sangster et al. (2020) argue that BL will play a more prominent role in higher education. However, developing online/BL deliveries comes with unobservable risks. To determine student preference for F2F / BL during the Covid-19 pandemic, Mali and Lim (2021) conduct a longitudinal study to demonstrate whether students consider BL to be superior to F2F. They find that students generally prefer F2F learning because

they do not feel comfortable engaging online. However, they find that students enjoy the flexibility associated with BL. The study also shows that over the period of the semester, student's attitudes towards BL/F2F delivery can change. They find that students enjoy some aspects of BL to a greater extent over the Covid-19 pandemic, due to the perceived threat associated with the pandemic. However, BL is also considered more negatively over the semester in some respects because; i) '*fewer interactions with the tutor is a potential reason for stress, as is the inability to engage with fellow students'*, ii) *Students have a higher preference/motivation for F2F because of a feeling of involvement.* iii) *The largest perception difference between F2F and BL is associated with group learning. Students feel that the inability to interact with their peers socially is the largest flaw associated with BL (p.14).* Taken together, the study infers that BL is preferred during Covid pandemic, but BL has limitations. For example, social interactions are a limiting factor in BL delivery. As an extension, we interpret based on collaborative learning theory, a reduction in social interactions is a BL by-product with the potential to have an incrementally negative effect student on mental health.

Third, many argue that the pandemic has been an opportunity to develop new BL teaching materials and approaches (Betts, 2020; Baber, 2020). Others argue that following the pandemic, BL can be considered the new normal (Yang and Huang, 2020). In the extant literature, various advantages are shown to be associated with BL. BL is considered interactive, tailored to different learning styles and can provide higher volumes of material (Afacan, 2016; De Beer and Mason, 2009; Hall, 2006; Harris, 2009; Kirkpatrick, 2005). There is evidence that virtual learning can increase motivation and engagement (Marriott et al., 2004). BL can be adapted to meet the requirements of students (Benson and Kolsaker and 2015; McCabe and Connor, 2014). Moreover, various meta-analysis studies report that BL has either a small (Bernard et al., 2014; Spanjers et

al., 2015) or large (Liu et al., 2016) positive effect on student performance. Increasingly, BL is being accepted as a mainstream teaching methodology. Moreover, *ceteris paribus* whilst BL is perceived as having numerous advantages, there is evidence to show that compared to F2F, BL does not have a negative impact on student mental health (Furnes et al., 2018; Ma'arop and Embi, 2016).

As a result of a public change in attitude towards mental health, it is only recently the mental health issue has been given the consideration it deserves. University administration recognizes that more resources are required to assist with students with mental health issues (Gabster and van Daalen, 2020; Nash and Churchill, 2020; Monahan et al., 2020). Students are considered high risk groups in terms of mental health disorders (Chemers et al., 2001; Eisenberg et al., 2009; Hysenbegasi et al., 2005; Ishii et al. 2018; Gall et al., 2000; Goldman-Mellor et al., 2014; Montgomery and Cote, 2003; Niederkrotenthaler et al., 2014). Grubic et al. (2021) reports that suicide has been the second leading cause of death among college students. Before the pandemic, there is evidence that student mental health is deteriorating at an increasingly rapid rate (American College Health Association 2015; Macaskill, 2013; Thorley 2017). Thus, the student mental health literature can be interpreted in two ways. First, student mental health is deteriorating due to unobservable societal effects. Second, the student mental health problem has always existed. However, it is only recently that the issue has become mainstream. Regardless of which is more likely, the literature can be extended by research that aims to enhance the mental wellbeing of students. More importantly, such studies have the potential to be life changing for students, as well as their teachers.

It is widely reported that student mental health has deteriorated during the Covid-19 pandemic (Aristovnik et al. 2020; Adnan and Adwar, 2020, Bao, 2020; Browning et al., 2021; Cao et al., 2020; Copeland et al.,2020; Conrad et al., 2021; Elmer et al., 2020;

Grubic et al., 2020; Handel et al 2020; Khan, 2020; King, 2020; Komer, 2020; The YoungMinds' Association, 2020; Wang et al., 2020). The literature is broadly divided into two sections. First, there is evidence that a lack of social interactions due to factors associated with isolation has led to a decrease in student mental health. (Pan 2020,). Khan (2020) reports that changes to student routines have had a negative effect on student mental health. Elmer et al. (2020) reports that concerns about future employment have negatively impacted mental health. Secondly, there is also evidence that the adoption of BL has had a negative impact on student mental health (Handel et al 2020, Adnan and Adwar 2020, Bao 2020). Cao et al. (2020) report that an inability to access online learning spaces are associated with a reduction in student mental health. Aristovnik (2021) reports that the change to BL was overwhelming to students, thus, negatively impacted mental health. Grubic et al. (2021) surmise that the pandemic has potentially created an unprecedented mental health burden on students, which, already faced mental health challenges. Taken together, the literature provides evidence that student mental health is deteriorating. However, few studies provide practical solutions to improve student mental health. This study aims to fill this gap in by providing insights about how a collaborative learning intervention (in a BL environment) to promote mental health, can enhance student mental wellbeing.

2.2 Teaching Context

This study's primary consideration is whether the introduction of collaborative learning intervention can impact student mental health. Thus, to distinguish the student sample that received the collaborative learning mental health intervention, and the sample that did not, two groups are identified.

Collaborative learning (CL) intervention sample

The CL sample contains students that exclusively received the CL intervention over the 12-week semester. The CL intervention is designed as follows:

1. Prior to the first online lecture, an online forum was established so that students could engage with peers. Students were required to introduce themselves in a 1 hour session, that was not schedules in their timetable. The forum was introduced as a social space for students to interact. The purpose of establishing this online forum was to develop group cohesion by mimicking social interactions that take place before and after lectures.
2. During the semester, many individual tasks/activities were replaced by group tasks to integrate collaborative learning more prominently into BL delivery. The purpose of replacing individual tasks with group task was to invoke collaborative learning (theory).
3. The online forum remained open as a space where students could interact about challenges relating to Covid-19. The forum was also a location where students could make connections and discuss topics (not) relating to lecture material to strengthen the collaborative learning environment.

Traditional teaching (TT) environment sample

The TT sample received TT instruction exclusively over the 12-week semester. In the TT environment, a lecture starts at the allocated time, without any activities to enhance group cohesion. The transmission communication model is adopted as the primary communication process, where the lecturer is the source of information, and

students are considered information receivers. As a result, higher levels of academic content can be transfer to TT students, compared to the CL group.

2.3 Hypothesis development

Based on Thornley's (2019) suggestion that course content should consider student mental health and wellbeing, we integrate a CL mental health intervention into our BL delivery. The theory that underpins the student mental health intervention is collaborative (group) learning theory. Collaborative learning theory is selected as a basis for the intervention because there is evidence that isolation has had a negative impact on student mental health during the Covid-19 pandemic (Mali and Lim, 2021; Wang et al., 2020). Thus, we consider collaborative learning theory as a felicitous framework to explain how social interactions can have a positive effect on student mental wellbeing.

Collaborative learning has the potential to enhance student mental wellbeing for two reasons. First, during the covid pandemic, the absence of group social interactions in BL deliveries is considered a limitation (McHone, 2020; Mali and Lim, 2021). In the absence of social group interactions, there have been increasingly calls for academics to develop structured netiquette frameworks that place an emphasis on group interactions (Baber, 2021a, Baber, 2021b). There is also evidence that well-designed netiquette frameworks that focus on student interaction can enhance student experience, reduce feelings of isolation and have a positive impact on student engagement (Mali and Lim, 2021). As explained in the literature review, based on evidence that a lack of group interactions can have a negative effect on student experience and wellbeing, (Baber, 2021a, Baber, 2021b; McHone, 2020; Mali and Lim, 2021; Wang et al., 2020), we hypothesize that group cohesion can have a positive impact students' mental health.

Second, collaborative learning theory infers that democratic peer debates can accommodate various learning styles (Ashwin, 2015). Through peer engagement, students are expected to become more effective learners through group participation (Cohen 1994). Meta-analysis using collaborative learning studies shows that collaborative/group learning is superior to individual learning (Kyndt et al., 2013). There are various advantages associated with collaborative learning. Collaborative learning is considered beneficial to students due to advantages associated with personal interactions (Gillies et al., 2008; Van Leeuwen et al., 2013). Student interactions are considered to be a process where joint knowledge is established (Roschelle, 1992). It is widely accepted that the physiological benefits associated with collaborative learning have a positive effect on student performance and are considered favourable by students (Dillenbourg, 1999; Gillies et al., 2008; Laal and Ghodsi, 2012; Resta and Laferrière, 2007; Van Leeuwen et al., 2013). Thus, because collaborative learning in embedded into our BL teaching intervention, psychological benefits associated with group learning are likely to improve student mental health.

Taken together, we surmise that establishing the above CL intervention has the potential to reduce student mental health challenges for various challenges including i) specific mental health perceptions, ii) general attitudes, iii) community perspective, iv) friendship perspective, v) isolation perspective, and the vi) engagement perspectives. Based on the above, the following hypothesis is introduced:

(H.1.): The introduction of a CL intervention in a BL environment will improve student mental health, during the Covid-19 pandemic.

3. Research Design

3.1 Methodology

A mixed-method, case study research approach is adopted. All data is collected via an opt-in questionnaire (see appendix 1 for question details). Whilst there are some limitations to questionnaire data collection, it is considered an established research method in behavioural science (Bowling, 2005). Ordinal data such as CL/TT criteria, gender, location of study and whether or not a student has been a part of a media group are collected using binary (0/1) variables. To whom students have spoken too about mental health issues is recorded as a dummy variable that takes the value of 1 for each variable categorized in Table 1, 0 otherwise. On a Likert scale basis, a value of 5 represents strongly agree. The value of 1 represents strongly disagree. We have adopted the Likert scale method to collect student perceptions about student preference and mental health before and after the Covid-19 pandemic because the methodology is established in countless studies. Questions 12 provides students the opportunity to report narrative. This section is used to provide qualitative insights.

To compare whether student's mental health and perceptions about teaching/learning have changed as a result of the Covid-19 pandemic, mean difference t-test are used to compare students attitudes before and after the Covid pandemic. Mean difference t tests are used to compare the difference for totals and for each group as a result of the ordinal rankings listed in Table 1. We use mean difference t tests because they are proven to be a robust methodological approach for quasi-experiment designs (Cook et al., 2002; Gujarati, 2021; Lim and Mali, 2021; Mali and Lim, 2021, 2022; Roberts et al., 2022). Based on raw value differences, as well as statistical significance differences,

statements can be made to make inferences about how the Covid pandemic has influenced student mental health.

The primary purpose of the study is to show that TT/CL teaching environments/intervention can influence student mental health (i-vi, see first hypothesis). However, the literature reports that group membership ((Auerbach et al., 2018; Eisenberg et al. in 2013. Thus, potentially a) gender b) location of study (home/university accommodation c) whether students have sought to speak with professionals about mental health; and d)) can have an incremental influence on mental health. Therefore, to add granularity to empirical findings, additional analysis is conducted based on group characteristics (a-d).

3.2 Sample selection

All students/participants/respondents are 2nd year accounting students at Sheffield Hallam University. Sheffield Hallam University is a well-established post-92 university in the U.K. The entry requirements for the students are BBC at A-level. The Teaching Excellence Framework has been an external driver for British academic institutions to develop value adding teaching methods (Cleaver et al., 2014; Quinn, 2020). As a result, numerous British universities have incorporated BL into academic programmes to enhance student experience (Blackmore and Kandiko, 2012; Lim and Mali, 2021; Sharpe and Beetham, 2010; UCL, 2017). However, the extent to which the switch from F2F to BL influences student mental health is to a large extent a question left unanswered. Therefore, the use of a British sample can provide insights to British practitioners, and academics in similar developed countries. The data collection process was conducted as follows. An email was sent to the population of 131 students enrolled

on the BsC Accounting and Finance degree. Moreover, a google form link where students could complete the questionnaire was referenced in lectures, starting on the 7/12/2020. The google questionnaire was open between the 7/12/2020-20/12/2020. This period was during the height of the third wave in the UK. Out of a potential 131 students, the sample consists of 85 students.

Student administration divide the population of 131 students into 4 seminar cohorts randomly, based on surnames. Randomly allocating students into cohorts (via surname) reduces the potential that endogenous effects such as disposable wealth or intelligence (amongst others) influences the group (Hill et al., 2018). Random sampling also increases the potential that that a sample is more indicative of the wider population, hence reduces bias (Campbell & Stanley, 1963; Cook, 1991; Mali and Lim, 2021). As a result of randomly allocating student groups via surnames, the CL intervention can be considered the intervening variable that influences student mental health. 4 different academics delivered academic content to the same students for 12 weeks. 2 academics integrate the CL intervention into their teaching delivery, based on personal preference. 2 academics continue using the TT approach, the approach used in previous deliveries. Students are identified as being CL/TT based on the first question (Appendix 1), "Which seminar group do you belong to" (name of lecturer).

4. Qualitative evidence and empirical results

4.1 Descriptive Statistics

The results of descriptive statistics are listed in Table 1. Furthermore, abbreviations for variables used in this analysis (Tables 2-7) are introduced. Of the total 85 participants, 39 belong to the CL intervention sample, 46 belong to the TT sample. 27

(32%) of the respondents are male, 58 (68%) are female. The disparity between male and female participant responses implies that there is a disparity between the propensity of male and female students to discuss mental health issues. 54% of students are studying at home, 46% study at university accommodation. In terms of having conversations about mental health, 22% of student have spoken to no one, 61% have spoken to a friend or relative, 27% have spoken to a professional (GP, academic adviser or student support officer) and 16% have spoken to both. We do not find that students have a large preference difference for online teaching or face to face teaching. 41% (59%) of questionnaire participants are (not) a member of a social media group sample. Moreover, 40% (60%) believe that the social media and other interactions facilitated by the university can have a positive effect on mental health. Raw data overwhelmingly infers those social interactions impact student mental health.

<Insert Table 1 roughly here>

In Table 2, Likert scale values provide details about student mental health perceptions. The value of 1 represents strongly disagree, the value of 5 represents strongly agree. The 'Total' sample agree that 'The Covid-19 environment negatively impacted my University experience this year, relative to previous years' (4.5). There is evidence that 'Mental health deterioration has impacted my studies' during the Covid pandemic for all groups (average score 3.96). However, interestingly, for the CL sample (3.21), there is evidence that student mental health deterioration has had a lower impact on their studies, relative to the TT sample (4.23), providing evidence in support of H1.

Overall, there is no evidence that the university experience has had a negative influence on my (student) mental health when Covid-19 is not an issue (2.63). However, there is clear evidence that students that talk to GP/academic advisers or student support

more strongly agree 3.41-3.85. The results imply that students with mental health challenges have sought the guidance of professionals. Again, students that feel that their mental health have affected their studies seek the guidance of professionals 4.27-4.38. Furthermore, across the board, students have concerns about securing a graduate job specifically due to the impact of Covid 4.21. Again, the results show that students with the greatest concerns seek support from friends, family and professionals 4.67, consistent with evidence that the job market in the U.K. is becoming more competitive (Lim and Mali, 2022, 2023).

4.2 Mean difference comparison tests

Table 3 provides details about a community perspective before and during the Covid-19 pandemic. Before the Covid pandemic, virtually all students agreed that, before Covid-19, they felt a part of the course and University community (average score 3.91). However, as a result of the Covid-19 pandemic, students slightly disagree they feel part of the course and University community (2.35), a difference of -1.56. Mean difference tests show that regardless of whether students are; male (Δ -1.41, t value 5.37***) or female (Δ -1.62, t value 10.22***); study at home (Δ-1.54, t value 8.15***) or at university accommodation (-1.56, t value 8.10***); or are members of a social media group (Δ -1.41, t value 7.17***) or not (Δ -1.61, t value 8.97***), there is a statically significant reduction in the feeling of community for all groups. However, raw values infer that female, and students that have not engaged in social media have been affected more negatively compared to males and students that are not a part of a social media group. By comparison, whilst the CL and TT sample both feel less a part of the academic community during the pandemic, the effect of the pandemic on the CL sample is lower (Δ -1.00, t value 4.82***), compared to the TT sample (Δ -2.01, , t value 16.36***) (and many other

aforementioned groups), again providing support for the assertion that the CL intervention mitigates student mental health challenges, associated with the community perspective.

In Table 4, the friendship perspective is introduced. The results show that students agree they have been able to maintain course friendships prior to Covid-19 regardless of student partitioning (4.00). However, students neither disagree nor agree that they have been able to maintain course friendships during the Covid-19 pandemic (2.88). The raw values show that students that talked to no one were less able to retain course friendships before Covid (4.00/Total - 3.44/No_one = -0.56). Moreover, the No_one group's average score is still 0.31 lower than the remained of the sample during the Covid-19 pandemic. Interestingly, the BOTH group that have spoken to both friends and family and professional strongly agree that they have been able to retain group friendships before the pandemic (1.28). The No_one group is least likely to retain friendships (2.47). The results infer that students that do not make efforts to have conversations with peers can face isolation problems.

In terms of the friendship perspective, again, we find that the Covid-19 pandemic has had a more negative influence on female students (Δ -1.22, t value 8.15***) compared to males (Δ -2.92, t value 2.84**). Moreover, we find that during the Covid-19 pandemic, students that are involved in social media groups (3.11) feel less isolated compared to students that are involved with social media (2.75), at a difference of Δ0.36. As for the main analysis, the friendship perception change for the CL is statistically different at the 10% level (Δ -0.69). Whilst the change for the TT group is double (1.49), inferring the CL intervention can promote friendship, compared to TT delivery, and other groups. The results provide further support for H1.

<Insert Table 3-4 roughly here>

In Table 5, the mental health perspective is directly addressed. For all groups, the Covid pandemic has had a negative impact on student mental health (4.33). Without considering the Covid-19 pandemic, students have a neutral opinion about whether the university experience has had a negative impact on their mental health (3.07). However, we find that the Covid-19 pandemic has had a greater influence on female students (Δ -1.48, t value 7.89***) compared to male students (Δ -0.80, t value 1.92*). Students who lived in student accommodation (Δ -1.57, t value 7.19***) felt that the Covid pandemic had a greater effect on their mental health (Δ -1.01, t value 4.33***). The social media groups interaction has had a positive effect on student mental health (Δ -1.01, t value 3.20***) compared to those that did not (Δ -1.24, t value 5.98***). Also, it is clear that students that seek out the help of friends and family as well as academic professionals have had their mental health affected more prominently by the Covid pandemic compared to the values of the entire sample (-2.21 minus -1.26 = 0.91). Again, for the study's main analysis, students that receive the CL intervention are shown to have lower mental health impacts (Δ -0.83, t value 1.95*), compared to the students that receive the TT delivery (Δ -1.54, t value 7.37***). Moreover, the -0.83 change is the lowest, compared to other groups.

Table 6 demonstrates whether students feel more/less isolated as a result of the Covid pandemic. Again, overall, results demonstrate that students feel more isolated as a result of the Covid-19 pandemic (4.42). However, two of the highest differences between responses are as a result of study location and whether students are members of a social media group. Students that were situated in student accommodation (Δ -2.25, t value 4.50***) felt far more isolated compared to students that studied from home (Δ -

1.55, t value 6.57***). Furthermore, students that were members of a social media group (Δ -1.12, t value 7.65***) felt far less isolated than students that were a part of a social media group (Δ -2.12, t value 5.63***). As for the main analysis, the CL sample (Δ -1.08, t value 3.03***) that received the intervention felt less isolated compared the TT sample (Δ -1.69, t value 7.89***). Again, CL sample becomes less isolated than the majority of other groups, providing consistent evidence in support of H1.

<Insert Table 5-7 roughly here>

In Table 7, whether or not students feel more/less engaged as a result of Covid is empirically captured. Overall, the results show that On-line teaching has made students feel uncomfortable to engage in (talk or chat) / attend seminars (Δ -1.71, t value 6.11***), compared to face-to-face seminars. The results show that male students (Δ -1.71, t value 6.11***) feel a larger difference in engagement compared to females (Δ -1.30, t value 5.53***). Moreover, students that have engaged in social media perceive that the Covid-19 pandemic has had a lower negative effect on engagement (Δ -1.25, t value 4.14***), compared to students that have not engaged with social media (Δ -1.66, t value 7.34***). Again, we find evidence that the CL intervention has been more effective in maintaining student engagement (Δ -0.83, t value 1.95*), relative to the TT sample (Δ -1.79, t value 8.02***), and the remainder of the aforementioned categories.

4.3 Support for H.1

For accessibility, and those without an interest in interpreting empirical results, we provide a succinct explanation of the above empirical findings.

i) Students that have participated in the mental health intervention (CL sample) have higher mental health wellbeing than those that do not participate in the intervention.

ii) Students feel more isolated because of Covid-19. However, students that have participated in the CL intervention feel less isolated compared to students that did not.

iii) Students feel less engaged because of the Covid-19 pandemic, but those who took part in the CL intervention did not.

iv) All students felt more a part of the course and university community before Covid-19. However, the negative effect on female students is lower as the result of the CL intervention.

v) Individuals who took part in CL intervention (or sought help from professionals) are more likely to retain friendships compared to students who do not.

4.4 Results based on group membership

i) For all i) specific mental health perceptions, ii) general attitudes, iii) community perspective, iv) friendship perspective, v) isolation perspective, and the vi) engagement perspective, all students have been impacted negatively as a result of the covid pandemic.

ii) Very few male students were comfortable replying to the questionnaire, compared to female students. 22% of students don't discuss mental health with anyone. 16% seek the help of peers and professionals.

iii) On average, university experience does not have a negative effect on mental health. However, for those students that faced the largest mental health

challenges, they sought the help of professionals, which has had a positive impact on their mental health.

iv) For all students, there is strong evidence that securing a job after the Covid-19 pandemic concerns students. Again, those with the highest concerns seek the advice of professionals, which has had a positive impact on their mental health.

v) Covid-19 has had a negative influence on student mental health across the board. However, based on our sample, the Covid-19 pandemic has had a greater influence on female students, and students who live in student accommodation.

vi) There is clear evidence that students that have spoken to no one about their mental health challenges have greater mental health challenges, compared to those that have not.

4.5 Qualitative data

Next, qualitative data from question 12 is introduced to qualify empirical results. Out of the sample of 85 students, 60 provide a narrative response to question 12. 34 students belong to the TT sample, 26 belong to the CT sample. For the interested reader, all student responses are included in Appendix 2. As shown in Table 8, six themes are introduced (isolation/lack of support, Covid/restrictions, emotional, future plans, other and support available) to add granularity to explain how the CL intervention may differently influence the mental well-being of CT and TT samples.

When asked: *if your mental health has deteriorated, why do you think this is?* (Q.12), 32 TT students (97%) directly refer to 'isolation/lack of support' as the theme

that has led to mental health deterioration. There is overwhelming evidence that a lack of social interactions (support) is the most common factor influencing mental wellbeing for the TT sample. On the other hand, the factors that influence the CT sample are more complex. Only 12% of CT students report that 'isolation/lack of support' has caused mental health deterioration. The theme that is deemed as having the most significant effect on the mental health for the CT sample is Covid restrictions (27%). However, interestingly, of the 26 CT students, 3 (12%) explicitly state that the support required is available. Taken together, qualitative evidence supports empirical findings. More specifically, a strong argument can be made that the introduction of a teaching intervention focused on collaborative learning has reduced perceptions of 'isolation/lack of support', hence positively impacted CT student mental health. On the other hand, in the absence of the CL intervention, 'isolation/lack of support' can be considered as having a direct, negative impact on TT student's mental wellbeing. The above provides further evidence in support of *H.1.*

6. Discussion

This study makes several contributions to the literature and practice. Frist, numerous studies show that student mental health has deteriorated as a result of the Covid-19 pandemic (Aristovnik et al., 2020; Adnan and Adwar, 2020, Bao, 2020; Browning et al., 2021; Cao et al., 2020; Copeland et al., 2020; Conrad et al., 2021; Elmer et al., 2020; Grubic et al., 2020; Handel et al., 2020; Khan, 2020; King, 2020; Komer, 2020; The YoungMinds' Association, 2020; Wang et al., 2020). Wasil et al. (2021) surmise that a lack of research designed to improve student mental health is an academic caveat. To address this knowledge gap, this study provides empirical and qualitative evidence that integrating a CL intervention into BL environments can improve student mental

wellbeing. The study supports the assertion of Royal College of Psychiatrists (2011), that universities should establish internet-based interventions as to improve their mental health. Given that student mental health is shown to be deteriorating prior to the Covid-19 pandemic (Chemers et al., 2001; Eisenberg et al., 2009; Hysenbegasi et al., 2005; Ishii et al. 2018; Gall et al., 2000; Goldman-Mellor et al., 2014; Montgomery and Cote, 2003; Niederkrotenthaler et al., 2014), we would encourage practitioners to consider developing strategies to enhance student wellbeing, because in our experience, a small intervention can have a significant impact on students.

Second, Mali and Lim (2021) report that during the pandemic, students feel that a lack of engagement with peers and educators has led feeling of dissatisfaction. Furthermore, there is evidence that a lack of group interactions/cohesion is shown to have a negative effect on student experience (Baber, 2021a, Baber, 2021b; McHone, 2020; Mali and Lim, 2021). We surmise that our mental health intervention directly addresses the engagement/interactions/cohesion issue. Specifically, we report evidence that invoking a strategy based on collaborative (group) learning theory and group cohesion reduces student mental health challenges. Our study shows that more group work assignments and replicating the social interactions that occur prior/after lectures has a profound impact on student mental health. Thus, by invoking collaborative learning and group learning, we provide a theoretical basis to offer educators a basis to enhance student mental health. The study also extends the collaborative/group learning literature by providing evidence that as well as pedagogical advantages associated with collaborative learning (Cohen 1994; Dillenbourg, 1999; Gillies et al., 2008; Laal and Ghodsi, 2012; Resta and Laferrière, 2007; Van Leeuwen et al., 2013), there are also profound psychological benefits.

Third, following the Teaching Excellence Framework initiative, numerous British universities now incorporate BL into teaching deliveries (Blackmore and Kandiko, 2012; Lim and Mali, 2021; Sharpe and Beetham, 2010; UCL, 2017). However, no previous study reports the incremental effect that the sudden adoption of BL (as a result of Covid) can have on student mental wellbeing in a British context. Furthermore, internationally, there is a growing inference that BL can be considered the new normal (Afacan, 2016; Benson and Kolsaker and 2015; Bernard et al. 2014; De Beer and Mason, 2009; Hall, 2006; Kirkpatrick, 2005; Liu et al. 2016; Mali and Lim, 2021; Marriott et al., 2004; McCabe and Connor, 2014; Sangster et al., 2020; Spanjers et al. 2015). Therefore, the study provides policy insights. Many argue that the Covid pandemic has been an opportunity to adapt to new teaching deliveries (Bar, 2020; 2021a, 2021b; Mchone, 2020). However, others argue that the change from F2F to BL is not well received by students in normal times (Lomer and Palmer, 2021) or during the pandemic (Wang et al., 2020). Thus, whilst many consider BL to be the new normal, its adoption has practical challenges. Our results show that adopting a netiquette framework, via a teaching intervention can lead to a situation where student experience is enhanced in a BL environment, consistent with previous studies (Baber, 2020; Mali and Lim, 2021). From a policymaking perspective, this study provides evidence that when BL is adopted in normal times or in future disaster scenarios, (British) academic institutions should consider developing netiquette frameworks to enhance student experience. To discover whether the CL intervention can have an equal effect in academic institutions internationally, future studies may replicate our approach using a comparative analysis basis.

Fourth, there is increasing impetus to understand how group membership and student backgrounds can influence student mental health (Auerbach et al., 2018; Baik et

al. 2019; Eisenberg et al., 2013; Flynn 2015; Greenberg and Hibbert, 2020). Whilst it is not the primary focus of this paper to develop a theoretical framework to explain how group membership influences student mental health, we report highlights for educators and future studies. Results from our sample show that i) male students are less likely to participate in mental health research. ii) The students that talk to no one about their mental health challenges have lower mental wellbeing compared to students that spoke to professionals. iii) the study also provides evidence that female students in university accommodation have lower mental health wellbeing compared to the remainder of the sample. Taken together, the results show that there may be some groups more at risk of mental health challenges. We offer the following solution to the aforementioned challenge. With effective training, mental health counselling is shown to be a cost-effective method of enhancing student mental wellbeing (Brammer and Clark 2020; Davies et al., 2014; Ebert et al., 2017; Harrer et al., 2019; Waller et al., 2014). However, how university administrators develop strategies to target groups that are vulnerable to mental health challenges is beyond the scope of this paper. We leave it to future studies to consider how students that are vulnerable to mental health challenges can be identified and supported by academic institutions.

Finally, limitations are listed. A large random sample is taken from the population of 2nd year undergraduate BsC Accounting students. We consider that this sample can provide insights about the population of similar student groups. However, we cannot guarantee the sample is representative of a larger international population. Due to ethical concerns associated with collecting student mental health data from more than a single institution, we are unable to extend our sample. Whilst our sample can be considered relatively small, we consider that a case-study approach provides unique

insights. To generalize our findings, future studies may consider adopting a meta-analysis approach. Furthermore, empirical results are provided using simple *t* tests, not regression analysis. We conduct simple *t* tests for parsimony because the majority of our control variables are dummy variables. Because *t* tests are a commonly used approach for quasi-experiments, using imbalanced data (Gujarati, 2021; Lim and Mali, 2021; Mali and Lim, 2021, 2022; Cook et al., 2002), we consider the approach suitable.

6. Conclusion

In conclusion, the study demonstrates that the introduction of a CL intervention can have a positive effect on student mental health. Future studies may investigate the impact of a CL intervention on academic performance and student satisfaction, to determine whether other unobservable benefits exist. The study demonstrates that female respondents have greater mental health challenges, relative to males. Moreover, the impact on Covid has a lower mental health impact on students that sought professional help, compared to students that did not. The study therefore infers that university administration may develop a policy to target counselling to specific groups, to mitigate mental health challenges. Finally, the study provides evidence of the benefits of CL. The study therefore extends the CL and BL literatures. As many consider BL to be the new normal, future studies may develop quasi-experiments to compare TT and CL environments, to demonstrate whether universities should integrate CL into netiquette frameworks to enhance student experience.

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