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Official URL: https://doi.org/10.37074/jalt.2023.6.2.18
DOI: https://doi.org/10.37074/jalt.2023.6.2.18
EPrint URI: https://eprints.glos.ac.uk/id/eprint/13016

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Vol.6 No.2 (2023)

Journal of Applied Learning & Teaching

ISSN : **2591-801X**

Content Available at : **http://journals.sfu.ca/jalt/index.php/jalt/index**

Learning in a Disrupted Environment: Exploring higher education student resilience using the Dynamic Interactive Model of Resilience

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Keywords

Disruption;
Dynamic Interactive Model of Resilience (DIMoR);
higher education;
online learning;
pandemic;
resilience;
UK.

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Article Info

Received 30 May 2023
Received in revised form 31 July 2023
Accepted 1 August 2023
Available online 4 August 2023

DOI: https://doi.org/10.37074/jalt.2023.6.2.18

Abstract

The coronavirus pandemic brought unprecedented circumstances, providing insights into how systems (people, institutions and societies) cope during a disruption. This paper reports research undertaken at one university in the South West of England, which adopted a mixed-methods approach to investigate how students responded to and coped with the impact of Covid-19 disruption and what they perceived as influencing their resilience.

Data were gathered from 434 students (undergraduate and postgraduate) using an online survey. Twenty of these students were subsequently interviewed individually. Data analysis used the lens provided by the Dynamic Interactive Model of Resilience (DIMoR) to explore the complexity of resilience and how it is shaped and impacted by internal and surrounding environments for any given system.

The research revealed the value of DIMoR as a tool for analysis and highlighted the dynamic, interactive and multifaceted nature of resilience as something that is influenced by multiple other systems rather than being a static quality within a system. A range of impacting risk/protective factors and vulnerabilities/invulnerabilities were identified, which are not either/or but fluctuate and exist to a greater or lesser degree depending on context and influences. The research also showed the shifting nature of surrounding systems that can become more or less proximal and influential depending on circumstance. Additionally, the study provided insight into the overriding importance of proximal relationships and the role lecturers/tutors can play in helping students to access university support services. Wider implications of the findings are discussed in relation to university processes and practices.

Introduction

The year 2020 saw major disruptions to life across the globe. Unexpectedly, societies were confronted by a new virus, Covid-19, with the World Health Organization (WHO) declaring a pandemic on 11 March 2020 (WHO, 2020). The pandemic brought with it unprecedented circumstances as societies wrestled with rising death tolls and over-stretched hospitals and health services, with leaders having to decide how to respond to keep populations safe.

A common approach, adopted by the UK, was to impose various levels of restriction on social activity ranging from physical distancing, to wearing masks, to complete lockdown, whereby individuals were expected to stay at home and refrain from any form of in-person social contact beyond familial support 'bubbles' (UK Gov, 2020). The restrictions had major ramifications for the economy (UK Parliament, 2021) as businesses or activities that involved direct personal contact, such as restaurants, hotels and gyms, were forced to close.

Educational institutions, being social systems, were not exempt from restrictions and found themselves having to adapt to changing circumstances and, for a substantial period, rapidly move all teaching online (World Economic Forum, 2020). This situation had the potential to threaten resilience at all levels – individual and collective. Systems are in a constant state of flux and accustomed to change, evolution and adaptation, but the pace of change on this occasion was unparalleled and brought new risks, challenges and threats (e.g., Laborde et al., 2020).

Many educators and students found the change and its pace difficult and experienced a need for support; however, others seemed to manage and thrive despite the challenges. Why some staff and students thrived, and others did not, and what sources of support were accessed, is important to comprehend if we are to learn from this experience and create environments that allow systems to develop resilience and the ability to withstand future shocks and disruptions.

To investigate this issue, we explore the impact of the disruption caused by the pandemic on the resilience of a university in England. The research was designed in three parts focusing on i) the student body, ii) the staff and iii) the university as a whole system. This particular paper reports on the research with reference to student resilience.

The research is framed by, and analysed using, the Dynamic Interactive Model of Resilience (DIMoR) (Ahmed Shafi et al., 2020a, 2020b). This model views resilience not as a fixed, static, within-system quality but as something that changes according to context and circumstance as systems interact with others encountered. It considers protective/risk factors and vulnerabilities/invulnerabilities and acknowledges surrounding ecological systems. The overarching purpose of the research was to explore how and to what extent student resilience was impacted during the disruptions caused by the pandemic, what helped students to cope, and to discover lessons for future practice.

The paper reviews literature around the themes of disruption, change, resilience, relationships and pedagogy in higher education (HE) and overviews the structure of and rationale behind DIMoR. It presents and discusses key findings and lessons learned and ends with a consideration of ramifications for future practice.

Literature review

Study selection

To support a systematic approach to reviewing the literature, inclusive of a wide scope of literature whilst ensuring pertinent studies were identified for inclusion, a Boolean database search was conducted on 20 May 2021 using PsycINFO, ERIC and Web of Science. The search focused on HE student response to the Coronavirus pandemic, HE student resilience and their mental health and well-being (MHWB) (for search strategy, see Appendix A). A total of 2,017 articles were initially identified, which was reduced to 145 articles through duplicate filtering and title screening. Article abstract screening using inclusion and exclusion criteria (see Appendix B) left 50 articles. Full-text screening using the criteria outlined in Appendix 2 eliminated a further 25 articles, and an additional article was added as a result of a paper-based search, leaving 26 articles. These articles were selected due to their identification of features (such as risk/protective factors, internal/external resources etc.) identified as pertinent within the DIMOR discussed below.

Disruption, change and adversity

Whilst recognising the unusual situation caused by the pandemic, Camfield et al. (2021) point out that disruptions and setbacks are a regular occurrence for HE students and, as such, it is the responsibility of universities to help mitigate the potentially damaging impact on student mental health and well-being (MHWB). The link between living through a crisis and the subsequent increase in feelings of stress and insecurity is well-recognised across a range of cultures (Gonzalez-Ramirez et al., 2021; Quintiliani et al., 2021; Wen et al., 2021) and is identified by Browning et al. (2021) as being particularly acute amongst HE students. The swift move to online-only learning has been identified as affecting student MHWB, leading to feelings of vulnerability, reduced confidence, self-regulation difficulties and a subsequent detrimental impact on resilience and ability to engage cognitively with challenges (Camfield et al., 2021; Conrad et al., 2021; Gonzalez-Ramirez et al., 2021; Quintiliani et al., 2021). The sudden change in typical day-to-day routines altered students' ability to seek and access support from their course teams (Camfield et al., 2021; Hagedorn et al., 2021), resulting in a negative impact on feelings of security (Conrad et al., 2021; Copeland et al., 2021) alongside self-efficacy and agency (Bourion-Bédès et al., 2021; Camfield et al., 2021). Compounding these factors, the typical age of undergraduate students is suggested by Wen et al. (2021) to render them more developmentally vulnerable to mental health difficulties.

The literature shows that there are strategies and approaches that can help mitigate sudden disruptive change, such as: engendering a sense of belonging (Camfield et al., 2021), creation and maintenance of routines (Rodgers et al., 2020) and a proactive approach to putting supportive systems in place prior to any significant disruption (Hagedorn et al., 2021). These approaches (amongst others) can be usefully conceptualised within the construct of a resilience theoretical framework.

Resilience in the face of adversity – the Dynamic Interactive Model of Resilience (DIMoR)

Resilience has recently been understood as dynamic, emerging as a result of reciprocal interactions between systems whilst also being based on features within any given system, be that human, institutional or organisational (Ahmed Shafi et al., 2020). The importance of interpersonal relationships in helping students to manage change and adversity in a resilient way is well recognised (Conrad et al., 2021; Rodgers et al., 2020; Sun et al., 2020; Ye et al., 2020; Zhang et al., 2021). These aspects of resilience have been conceptualised within the Dynamic and Interactive Model of Resilience (DIMoR) (Ahmed Shafi et al., 2020a, 2020b) (see Figure 1 below). Within this model, reciprocal interactions are indicated not only on an interpersonal level but also within and between wider systems surrounding the individual, which is highlighted as key for developing resilience. Important within DIMoR is the concept of individual agency and its impact on interactions with other individuals and also within and between the systems in which these interactions take place, the reciprocity of all these interactions being fundamental. DIMoR echoes the perspective of Schlesselman et al. (2020), noting that individuals come from unique contexts and respond to stress and adversity in different ways. DIMoR recognises the dynamic and fluctuating nature of various factors that might influence resilience and highlights the role of protective factors in mitigating risk and adversity.

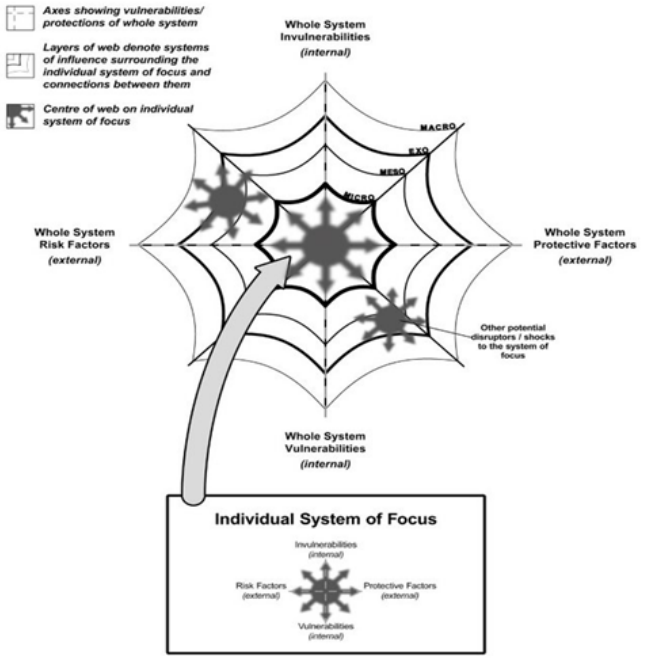

Figure 1. Using the DIMoR as a lens to help analyse optimum conditions for the emergence of resilience.

The DIMoR can help educators to interpret how a system, such as a university or its students, may respond to adversity by enabling us to 'see' the system as a dynamic, multiple and complex set of interactions of its different elements. For example, if Figure 1 was used to depict a university system around students, the web itself would represent the university to include its systems (e.g., cohort, course team, university support services, senior leadership team) and structures (e.g., policies, procedures, timetabling, online platforms etc). The risk-protective axes would refer to external risks such as the pandemic or finances or policy changes. Protective factors would refer to factors that act as mitigators to the risks, e.g., strong leadership, sound finances or robust policies and procedures. The vulnerabilities would include, for example, high staff turnover or low student retention, whereas invulnerabilities could be the university's strong identity or specialism. The students (and staff) are the orbs (or actors) within this system who both impact on it (e.g., staff illness) and are impacted by it due to being in the system. The individual system of focus, in this case, would be the students. Invulnerabilities might be robust physical and mental health and vulnerabilities existing health issues, whereas risk factors could be separation from family and friends and protective factors strong relationships, hobbies and exercise routines. Resilience is emergent and dependent on the range of dynamic interactions between the components of the system. As such, creating and fostering conditions for resilience to emerge is key to being resilient to adversities.

An example of the interaction between systems and the impact on individuals is portrayed by Rodgers et al. (2020), who argued that policy measures taken in light of Covid-19 became a barrier to accessing social support, resulting in students experiencing increased vulnerability in their self-regulation and ability to manage the changes that ensued. Quintiliani et al. (2021) also acknowledge the increased vulnerabilities of students as a result of the reduction in social support and suggest that the development of skills to support resilience can improve MHWB, thus acting as a protective factor against future challenges.

Recent research with a specific focus on HE students has established the importance of developing a range of protective factors to support the development of resilience (Holdsworth et al., 2018), including: support and intervention to promote positive thinking (Yang et al., 2020); social support (Zhang et al., 2021); clear and timely communication; a calm and safe learning environment (Holdsworth et al., 2018); experiencing a sense of community and contact with the course team (Hagedorn et al., 2021); adaptive coping strategies (Ye et al., 2020); exercise and hobbies (Bourion-Bédès et al., 2021) and opportunities to visit the outdoors (Browning et al., 2021). The importance of not only recognising these protective factors but also identifying potential risk factors is emphasised by Bourion-Bédès et al. (2021), suggesting that it is essential to develop targeted interventions and support based around a knowledge and understanding of protection and risks. Some of the possible risk factors identified for HE students include substance misuse (Bourion-Bédès et al., 2021) and other maladaptive coping strategies (Browning et al., 2021; Ye et al., 2020); demographic factors, such as being female

(Alemany-Arrebola et al., 2020; Bourion-Bédès et al., 2021) and in the 18-24-year-old age group (Browning et al., 2021); financial difficulties (Hagedorn et al., 2021); use of social media (Browning et al., 2021); and specifically in response to Covid-19, increased responsibilities within the home context (Wallace et al., 2021).

The themes above are not unique to our understanding of HE student resilience linked to the specific challenges presented by the Covid-19 pandemic. In a qualitative study conducted prior to the pandemic, Holdsworth et al. (2018) found that students perceived universities as having a role to play in nurturing their resilience, identifying the importance of relationships between peers and lecturers alongside a challenging and stimulating curriculum as key to developing student resilience. When considering these themes in light of HE student resilience more generally, Hagedorn et al. (2021) indicated that they often feature in the profile of students who drop out of HE. This finding adds substance to the need for a more proactive approach to supporting the development of student resilience to help mitigate future adversity.

Engagement with learning

One of the primary roles of a university is to provide opportunities for learning and development. However, there is an integral link between emotion and learning (Camfield et al., 2021) which has received comparatively little consideration within the HE literature (Gonzalez-Ramirez et al., 2021). The emotional distress caused by disruption and change, alongside a lack of opportunity for social interaction, has been found to lead to mental health disorders and difficulties in attending to learning (Copeland et al., 2021; Quintiliani et al., 2021). The relationship between skills in emotional regulation and both self-efficacy and engagement with learning is inexorable (Panayiotou et al., 2021), with a flexible, hopeful and optimistic mindset being key to coping and engaging (Browning et al., 2021; Copeland et al., 2021; Wallace et al., 2021; Wen et al., 2021; Yang et al., 2020; Ye et al., 2020). There is emerging evidence that first-year students are particularly vulnerable emotionally to the challenges brought about by disruption and change (Copeland et al., 2021; Gonzalez-Ramirez et al., 2021; Quintiliani et al., 2021). That said, engagement with learning grounded in positive relationships with course tutors and peers is protective for this student group and consequently has a positive impact on academic outcomes (Camfield et al., 2021). It is important to acknowledge that this need for belonging and connection is not unique to first-year students but a fundamental human need that permeates across the student population (Ye et al., 2020; Camfield et al., 2021), and there is evidence from Sun et al. (2021) that the movement to online studies as a result of the Covid-19 pandemic has had a negative impact on the sense of belonging amongst the student population.

Impact of online studies

In their exploration of the move to online study in response to Covid-19, Gonzalez-Ramirez et al. (2021) found that the sense of belonging to a student's university community and course team diminished significantly, negatively impacting their MHWB. This finding was echoed within the study by Quintiliani et al. (2021), who established that the perceived stress of learning online had a detrimental impact on students' engagement and completion of their studies. The speed of transition to online learning also appeared to have a disruptive influence on the relational aspects of learning, leading to feelings likened to grief and loss (Camfield et al., 2021; Wallace et al., 2021), particularly concerning the reduction in opportunities for spontaneous interactions and questions during class.

The rapid shift to online delivery caused additional pedagogical issues for both lecturers and students alike, with students experiencing significant difficulties in terms of pace and efficiency of learning (Camfield et al., 2021); self-regulation (Gonzalez-Ramirez et al., 2021); attention and concentration (Quintiliani et al., 2021; Wallace et al., 2021) and access to technology (Gonzalez-Ramirez et al., 2021; Wallace et al., 2021), which all had a deleterious impact on their motivation and attainment (Gonzalez-Ramirez et al., 2021; Wallace et al., 2021). In addition, Millican et al. (2023) explained that many HE lecturers were insufficiently prepared for online learning and course materials had not been designed for this mode of delivery. Lecturers also had to reconsider and possibly adapt their pedagogy – a strong appreciation of which is, as Chu et al. (2021) note, essential to optimising learning and engagement. These pedagogical difficulties were also noted by students to create additional barriers to learning (Wallace et al., 2021). However, Gonzalez-Ramirez et al. (2021) offer us a note of caution in drawing overly causal attributions from these findings, suggesting instead that individual student characteristics (e.g., age and gender), and their immediate surrounding systems (e.g., paid employment and familial responsibilities), had more of an impact on their access to learning rather than the mode of teaching delivery. The literature has also pointed to positives for some students as a result of the movement to online learning, such as an increase in creativity and problem-solving abilities (Wallace et al., 2021) and a flexibility to maintain a healthy work-life balance (Schlesselman et al., 2020; Wallace et al., 2021). Despite these positives for some members of the student population, Wallace et al. (2021) still found that online learning created additional stress, and although some stress is needed to support motivation, too much can have a detrimental impact on self-efficacy and attainment.

Conditions to support developing resilience

To help protect against the emotional response to challenges arising from disruption and change, some university-wide approaches and support systems have been explored within the literature. Copeland et al. (2021) found that those students who were already accessing MHWB services from the university appeared less emotionally impacted by Covid-19 and consequently found engagement with learning easier.

The need for more formal support systems to help students develop the psychological flexibility and development of regulation skills to respond to future challenges is advocated by Panayiotou et al. (2021). Alongside this, there is also recognition of the significant positive impact of nurturing relationships between lecturers and students and of peer-to-peer support (Holdsworth et al., 2019; Sun et al., 2020; Millican et al., 2023). A relational approach to teaching and learning appears to have the strongest protective impact, particularly in light of the finding from Browning et al. (2021) that students typically do not take full advantage of university MHWB services.

It would therefore seem that there are a number of protective and risk factors alongside individual vulnerabilities and invulnerabilities influencing HE student resilience in the face of significant disruption and change. Some of these factors are internal to the student such as their mindset, self-regulatory skills and self-efficacy, whilst others are more external, such as their relationships with the course team and peers, and wider university systems and communication. The DIMoR offers us a resilience-based theoretical lens from which to explore the various influences that might create conditions to support the emergence of resilience in times of shock and disruption.

The specific research objectives for this study were to:

(1) Explore what university students perceived as influencing their resilience as they responded to the disruptions caused by the Covid-19 pandemic;

(2) Consider how the identified influences help in understanding student resilience in the context of the pandemic;

(3) Use this understanding to identify ways to create conditions to support the emergence of resilience in times of shock and disruption.

Methodology

We adopted an interpretivist research approach (Burbules et al., 2015), analysing data using the DIMoR framework. 'Epistemological vigilance' (Bourdieu et al., cited in Guzman-Valenzuela, 2016) was maintained by the research team through repeated reference to our position and perspectives. We focussed on a single case study higher education institution, a post-1992 university in the South West of England with a student cohort of approximately 7,915, comprising a gender split of 59.9% female and 39.9% male. We used mixed-methods sequential design, where the quantitative and qualitative data hold equal status (Leech & Onwuegbuzie, 2009) and were collected in two phases (Teddlie & Tashakkori, 2006). In addition to triangulation (Biesta, 2017), this approach provided complementary and developmental data in which the quantitative data informed the qualitative (Mertens, 2015). At each stage of the research, collaboration took place between the team members to ensure consistency and rigour and to enhance insight (Ciuhan & Iliescu, 2020).

Phase 1 of the research consisted of an online survey of students generating quantitative and qualitative data. The survey design was shaped by the research objectives, findings from the literature review and the lens of DIMoR, with the aim of identifying key factors to be followed up in the Phase 2 interviews. The majority of the survey questions used a closed-ended format to ascertain the frequency of key factors. These questions were supplemented by some open-ended responses to capture any missing factors. The number and complexity of questions were minimised following piloting with two students who referred to 'online fatigue'. At the end of the survey, a request was made for volunteers to take part in a follow-up individual online interview (Phase 2).

The survey was communicated to the entire student body using a banner placed on the university student login webpage. This was supplemented by prompts from individual Course Leaders, from course administrators and from Postgraduate Research Leads, and by using our own student and staff networks. Responses were incentivised through a random draw to win three £20 shopping vouchers. In total, 434 survey responses were received in the last six weeks of 2021. Demographics of the survey respondents are identified in Tables 1a to 1e.

Table 1a. Survey respondent demographics: Response to "What is your gender?"

Option	Count	%
Male	85	19.6%
Female	332	76.7%
Other	7	1.6%
Prefer not to say	9	2.1%

Table 1b. Survey respondent demographics: Response to "Are you a UK student or an international student?"

Option	Count	%
UK	413	96.3%
International	16	3.7%

Table 1c. Survey respondent demographics: Response to "What level course are you on?"

Option	Count	%
Foundation Year	4	0.9%
1st Year Undergraduate (Level 4)	16	3.7%
2nd Year Undergraduate (Level 5)	98	22.6%
3rd Year Undergraduate (Level 6)	105	24.2%
Post-graduate Master's (Level 7)	74	17.1%
Post-graduate Doctorate (Level 8)	4	0.9%

Table 1d. Survey respondent demographics: Response to "What is your age range?"

Option	Count	%
18-21	229	52.5%
22-29	121	27.8%
30+	86	19.7%

Table 1e. Survey respondent demographics: Response to "How would you describe your ethnicity?"

Option	Count	%
White	400	92%
Asian	8	1.8%
Black	7	1.6%
Mixed race	12	2.8%
Other	8	1.8%

Following an initial review of the survey responses, interview questions and prompts were generated for the Phase 2 qualitative interviews. The aim of the interviews was to provide richer understanding of the areas identified within Phase 1. Piloting of the semi-structured interview schedule led to the adaptation of wording and prompts to ensure clarity and establish reliability across interviewers.

Via the online survey, 171 students volunteered for a follow-up interview. These students were sampled using a stratified demographic approach (Mertens, 2015) according to gender, ethnicity, age and level of study to reflect the University population as a whole and 20 participants were interviewed. The interviews were conducted by all members of the research team, using Microsoft Teams, and were recorded and transcribed.

The ethical approach was informed by BERA (2018) guidance, and ethical approval was provided through the researchers' University Research Ethics Panel. Further ethical concerns relating to student wellbeing were addressed through extensive signposting of University and wider support services at the end of the survey and interviews.

Data analysis

A case-oriented analysis approach (Onwuegbuzie et al., 2009) was used as a way of focusing on meanings using the lens of DIMoR. Quantitative data from the survey provided descriptive statistics, with a six-point Likert scale condensed to four responses for clarity of reporting (Table 2).

Table 2. Example of condensed Likert scale responses.

(4) Survey Likert scale options	Condensed responses
Helped a lot	Positive impact
Helped a bit	
Made no difference	Made no difference
Did not help much	Did not help
Made things worse	
Not applicable	Not applicable

The descriptive data were organised as column charts, representing the condensed responses. After an initial inspection of the data, patterns of interest were subject to inferential statistical analysis to test for the significance of apparent differences. Significance tests were conducted using non-parametric methods, namely a Kruskal-Wallis Rank Sum Test for an initial assessment of the significance of between-group differences and, wherever significance was found, this was followed by a Wilcoxon Rank Sum Test to locate significant pair-wise contrasts.

Analysis of the Phase 2 interview data used a constant comparative approach (Onwuegbuzie et al., 2011), with four stages of thematic analysis undertaken using NVivo to

enable effective collaboration across the research team. The first stage of analysis consisted of early theme development (Braun & Clarke, 2021) through an inductive approach. In stage two, the team cross-checked and refined the codebook, ensuring reliability through intercoder agreement (O'Connor & Joffe, 2020). The refined codebook was then used to deductively code the qualitative responses from the Phase 1 survey as a way of triangulating with the rich interview data. Stage three refined the codebook into broad themes and subthemes. In stage four, the DIMoR framework (Figure 1) was adopted as a lens to analyse the combined coded data to identify resilience factors, including dynamic risk-protective factors and vulnerabilities/invulnerabilities.

Results

Survey data

These results are organised according to the DIMoR's lens of protective and risk factors, vulnerability and invulnerability, across macro, exo, meso and micro systems.

Protective factors

From the survey prompts, the majority of students selected friends and family as the factors that most helped them cope with day-to-day life during the pandemic (Figure 2). Faith/religion and government support were the factors chosen by the smallest number of respondents. Having more time, spending time alone and accessing social media prompted polarised views. Open-ended 'other' responses included having a job and undertaking University studies, which delivered focus and routine and afforded students a sense of self-worth. Spending time outdoors and/or exercising and adopting mindful activities also helped students to cope.

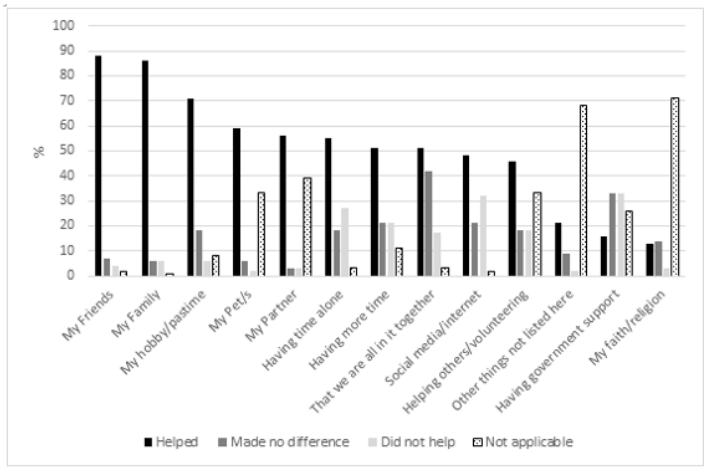

Figure 2. Responses to the question 'What things have helped you cope with your day-to-day life since the pandemic started?'

When prompted about who or what had helped them to get on with university study during the pandemic, most students selected lecturers and friends/family, followed by having face-to-face teaching when possible and contact with Personal Tutors and course mates (Figure 3).

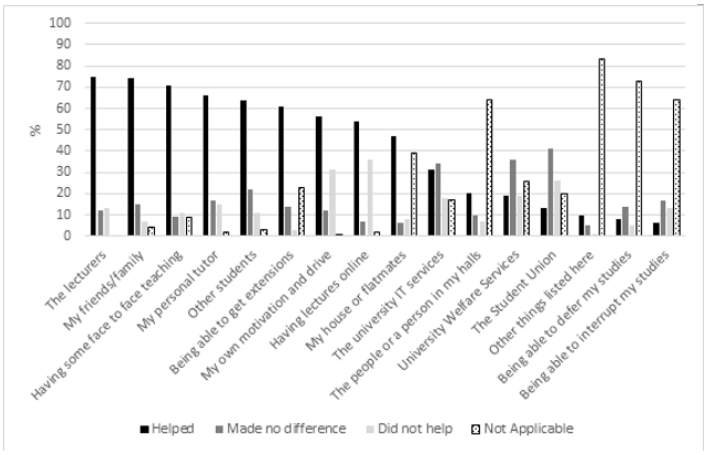

Figure 3. Responses to the question 'Thinking more specifically about University, who or what has helped you to get on with your studies during the pandemic?'

A Kruskal-Wallis Rank Sum Test revealed a statistically significant difference in response regarding having face-to-face teaching between students at different course levels ($p = 0.03$). Pairwise comparison, explored using a Wilcoxon Rank Sum Test, revealed that first-year students found access to face-to-face teaching significantly more helpful to their studies compared with second-year students ($p<0.05$). Motivation/drive was selected as supporting study by just over half the students, with Master's students more motivated compared with first-year ($p<0.001$), second-year ($p<0.0001$) and third-year students ($p<0.0001$). University processes and services were not generally identified as helpful beyond receiving extended time to complete assessments.

Students were also asked to respond to specific prompts about what had made studying easier during the pandemic. Only four of the 12 factors were rated by the students with any great frequency. Reduction in travel time to University was selected by 54% of students, and changes in the time available to do things by 36%. These factors made studying significantly easier for Master's students compared with first-year students ($p=0.006$). The opportunity for informal contact with lecturers (selected by 28% of students) and online learning (selected by 24%) also facilitated studying. From open-ended survey comments, access to campus facilities was also noted, including 24/7 library services, student information points, studios and laboratories.

When asked what had worked well with online learning, having the right device was a requirement to study effectively (selected by 67% of students). Having online lectures (65%) also worked well for students in supporting their learning, significantly more so for Master's students compared with first-year ($p=0.004$) and third-year ($p=0.004$) students.

Risk factors

From the survey prompts, almost all students selected not being able to see/talk to people as factors that had made their day-to-day living more difficult during the pandemic (Figure 4). Anxiety about the immediate future, lack of normality, and the need to constantly change plans were

factors selected by over three-quarters of respondents. Inferential statistical analysis returned significant differences in the responses to these factors according to gender, with females expressing greater anxiety about them than males (p=0.02 or higher). Approximately half of the students expressed concern about finances impacting day-to-day life, often linked to getting or keeping a job, and there was also mention of personal health, looking after relatives, not being able to get hold of people and fear of the coronavirus.

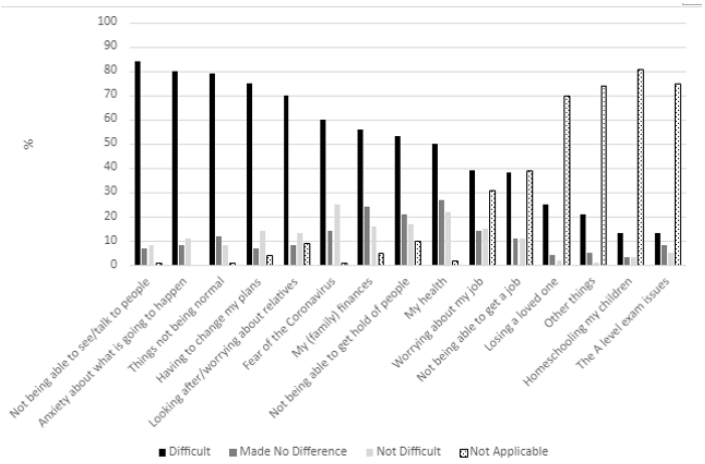

Figure 4. Responses to the question, 'What things have made your day-to-day living more difficult since the pandemic started?'

When students were asked to identify the most significant impact on their day-to-day life arising from the pandemic, the dominant theme that emerged once again was a lack of ability to socialise with friends and relatives and to give and receive embodied physical contact. Numerous students noted a breakdown in their routine and felt a lack of control, which led them to experience a loss of motivation, anxiety and poor mental health. Some students commented that the pandemic had amplified pre-existing anxieties. Such students linked these negative mental states with difficulty coping.

Government handling of the pandemic was chosen by almost three-quarters of students as negatively impacting their studies at university. Some referred to a lack of clarity in communication by the Government, whilst others reported a lack of trust in the ability of the Government to lead the country through the pandemic. News of global crises and events was selected by 68% of the students, with media reporting increasing anxiety and feelings of helplessness. The only other notable factor (selected by 37% of students) impacting negatively on studies was wider community issues, including family responsibilities such as caring and having to shield to protect the health, along with the difficulty of securing food from supermarkets in the early days of the pandemic.

When the students responded to prompts about what had made their studying harder as a result of the pandemic, the most common response was a lack of socialising opportunities (selected by 76% of students). The second most frequently selected factor was falling short in expectations of the overall university experience (selected by 69% of students). Juggling online study and home life was also chosen by 67% of students, but significantly less so for first-year students compared with second-years (p=0.04) and third-years (p=0.03).

Online learning was selected by 67% of students as a factor making their studies harder. Pairwise comparison revealed that first-year (p=0.01), second-year (p=0.03) and third-year students (p=0.00) felt more negatively affected by online learning in comparison to Master's students. Students commented about poor connectivity, slow internet speeds and lack of devices. They found working online difficult due to screen fatigue and feeling disengaged/demotivated as they worked from home or student accommodation, sometimes with distractions, unable to see the faces of their course mates who tended to turn off their cameras during sessions. A final factor, which half the students selected as making their studies harder during the pandemic, was the lack of opportunity for informal contact with lecturers.

Vulnerabilities/invulnerabilities

When things did not go well with their studies, students talked with their peers/housemates more than any other response (Figure 5). Contacting their lecturer or Personal Tutor came above speaking with a family member. Over half the students said they got anxious, and many said they felt low when things did not go well for them. Whilst a minority of students noted they had accessed University welfare services, cross-tabulation revealed these were also the students who had reached out to academic staff, peers and family members.

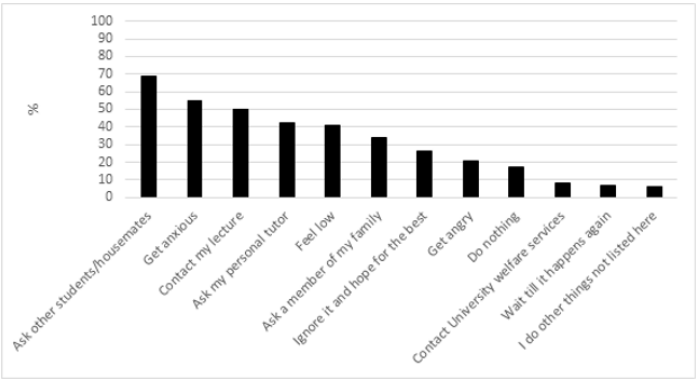

Figure 5. Responses to the question, 'When things did not go very well, what did you do?'

Students were positive about the future in the Autumn of 2020. Almost three-quarters of them believed things would be better for them in a year's time, with a further 21% saying things would be about the same and only 6% saying things would be a little or much worse. The responses from the Master's students were more positive, whilst those from the second years were the most negative of the undergraduate years. The optimism of the students was based on the hope of vaccination rollout, allowing restrictions to be relaxed and opportunities for socialising and attending lectures on campus to return. For final year students there was hope of graduation and the opportunity to gain employment.

Interview and qualitative survey data

Inductive analysis of the interview data and the qualitative comments from the survey yielded 15 main themes. Table 3 lists these themes, with exemplar quotes drawn from the data. DIMoR's contextual systems (based on the Bronfenbrenner ecosystem) were used to group the themes in terms of how proximal and distal they were to the individual.

Table 3. Exemplified themes drawn from the qualitative data.

Main themes	Quotes from data	DIMoR system
Relationships	'I missed seeing the people that I care about and interacting with them in a human way. The feelings of loneliness I felt through the pandemic were really difficult to deal with' 'You can still feel Covid kind of just tearing it apart slowly because you can't meet face-to-face'	(Micro system)
Reaction to change and uncertainty	'The most difficult thing is that nothing is normal. I can't go and do the things I would normally do or see the people I want to see. I feel incredibly anxious, like I've absorbed everybody's fears' 'I feel slightly more vulnerable. There's a level of me that's a creature of habit. And having things thrown up in the air like that, half way through' 'I have had to sort of cling on to the things that are the same, or as close as they can be, um, as markers sort of in my week, as it were'	
Health (mental and physical)	'Because of the stress of the corona virus my depression deepened and I developed suicidal thoughts'	
Hope and optimism	'I am excited for … my studies over the next year. I'm looking forward to getting back in face to face.' 'You have to be optimistic that things will be better. Life will improve and I cannot wait to see what the world has in store next for me'	
Exercise and hobbies	'When gyms and swimming pools and things like that were open, I was using those a lot because it was helping my mental health'	
Motivation	'Online teaching doesn't compare. I lose motivation easily when sat in one room all day. Staring at a screen for six hours a day is difficult mentally and physically' 'And I know that to an extent, as I say, it's self-led and by third year, you should be able to motivate yourself, but the reality of it is there are some people that don't' 'I think that, like personal motivation, has like, it's definitely been a real difficult area for me like. …. I'm not very good at coping without like, variety kind of thing'	
Access to resources/ facilities	'I feel that higher education students were kind of forgotten in terms of having laptops and iPads and things to be able to do their studies. ... It was just assumed that as a student you had access to these things'	(Meso system)
Learning online	Online lectures has meant I can manage my time more effectively and complete tasks at home around lectures' 'Trying to remain focused and have quiet time at home to study in a busy household whilst managing my children is quite hard'	
University policy and communications	'I think the way that got announced [no detriment policy] affected quite a lot … because it came out … like 6:00 o'clock on a Friday or Thursday. So suddenly we had all this information thrown onto us and nobody could reply or answer to us'	
Boundaries and routine	'I spend too much time in the same space where I rest and now do work. It blurs the line between them and makes it harder to relax or be productive'	
University support services	'The welfare services were able to help with having the correct equipment at home … that could help with my disabilities'	
Government policy and communication	'Unclear, unhelpful and non-committal government guidance has made the situation drastically worse than it needed to have been'	(Exo and macro systems)
Media	'I'm certainly conscious that a large proportion of society thinks we're [students] to blame to an extent'	
Work and career opportunities	'I know that not only now is affected, but my future work will be affected'	
Finances	'Losing my job but … I'm still struggling and can't focus on my studies'	

Further analysis using the DIMoR

The DIMoR was used to enable a deeper analysis of the main themes from both the survey and interview data. This revealed that many factors were viewed as protection or risks and vulnerabilities or invulnerabilities depending on the individual context, as illustrated in Table 4. DIMoR helps illustrate the complexity of the themes and how they can shift according to time and circumstance. It should be noted that not all themes had data supporting this dynamic interactive nature.

Table 4. The main themes organised as risk and protective factors.

As a risk	Factor	As protection
Poor, weak, or lack of	⟵ Relationships ⟶	Strong, supportive
Lack of	⟵ Exercise & hobbies ⟶	Participation in
Insecure	⟵ Finances ⟶	Secure
Lack of access to facilities, resources or personnel	⟵ Access to resources ⟶	Good access to facilities, resources and personnel
Technical difficulties, screen time, inappropriate technology	⟵ Learning online ⟶	Appropriate technology, well-staged, effective pedagogy
Poor, lack of, lack of clarity	⟵ Government & University policies and communication ⟶	Timely, effective
Blurred, difficult to separate, lack of, disrupted	⟵ Boundaries & routines ⟶	Clear, distinct time and space delineation, consistent
Reduced, unavailable, or inefficient	⟵ University support services ⟶	Sufficient, available, effective
Reduced, unavailable, or perceived as so	⟵ Work/career opportunities ⟶	Available, or perceived as so
As a vulnerability	**Vulnerabilities/invulnerabilities**	**As an invulnerability**
Poor adaptability, reluctant to change	⟵ Reaction to change ⟶	Adaptability, acceptance, action orientation
Poor	⟵ Health: mental & physical ⟶	Robust
Lack of, pessimistic, sense of loss, negative mindset	⟵ Hope ⟶	Present, optimistic, forward looking, positive mindset
Weak	⟵ Motivation ⟶	Strong

The DIMoR framework reveals how each theme, depending on its influence and conditions over time, can move across the risk and protective spectrum, thereby illustrating the dynamic and interactive nature of resilience. Taking financial issues as an example, our data showed that this could be

both a risk factor if the individual or their close one lost their job or business, but equally, the surveyed students indicated that it could be a protective factor, for example, when the government furlough scheme was introduced designed to support employees in helping them cope during the pandemic:

> I'm on furlough at the moment, which is really useful – to not have to work but getting paid kind of thing, as then I can concentrate more on my actual uni work.

Similarly, relationships with those in the microsystem (family, partner, children) were presented as a source of support, but, at the same time, the intensity of interactions under lockdown conditions meant that it could become a risk factor. This could then be connected to the vulnerabilities of the individuals, for example, if they reported difficulty in managing change or a disruption to routine. The quote below illustrates how the multiple responsibilities of family and work, which may normally have been managed, were disrupted by the pandemic and impacted academic study:

> Juggling University assignments and caring for my mum and my brother, and trying to maintain what social life you can have during Covid, it's a lot. And it's a lot to the point that I have had to get extensions on every one of my assignments this year.

This reflects how many students found the opportunity for self-certified extensions especially helpful.

The DIMoR also demonstrated how factors that may traditionally have been positioned in individuals' exosystems or macrosystems generated influence not just distally but proximally. For example, one of the main themes in Table 3 refers to the broader issues created by the government (often situated in the exo/macrosystem in Western democratic contexts), which have imposed restrictions on peoples' social lives, employment and their day-to-day living. This demonstrates the dynamic nature of the web-like (proximal and distal) systems, where their boundaries become more porous and their influences bleed across levels during periods of disruption. The survey data demonstrated how students generally responded negatively to this increased proximity of government policy, indicating that government decisions and the news impacted on their daily life:

> Whenever we hear that Boris Johnson is making some sort of announcement, we all just collectively groan because we're like, 'God, what is it now'. It's like living in a constant state of dread.

Furthermore, the sudden transition to online learning presented a clear risk to many students but for some students and at certain times, online learning was considered positive. Online learning not only posed challenges and opened up a range of perceived risks for students, especially when all delivery was online but it was also considered practical and flexible given, for example, childcare or other commitments. This further layer of analysis allows a more granular understanding of the impact of Covid-19 disruption on students and what supported or hindered them. Such analysis can help ascertain additional support that could be offered to develop the resilience of students during disruption and to help develop resilient conditions for a more optimal learning environment.

In summary, the qualitative and quantitative data combined illustrate how participants' assessment of risk or protective factors was complex. Using DIMoR as an overarching lens ensured that the analysis of resilience recognised the influence of these external factors in an inter- and intra-connected way.

Discussion

The qualitative data support the findings of the quantitative data and offer a richness of experience through the interview excerpts. All data sources confirmed much of the extant literature (largely from the US and quantitative in nature) (see Table 5 for those themes where this is the case). The strongest protective factors identified by students were proximal, falling within the students' microsystem, reflecting the importance of close connections in supporting positive mental health and facilitating the continuance of study. This echoes the findings of Sun et al. (2020) around negating symptoms of depression. The students attested to gaining less support from more remote connections within their exosystem.

Table 5. A summary of key themes which confirm extant literature.

Theme	Key Literature
Relationships	Camfield et al. (2021); Quintiliani et al. (2021); Zhang et al. (2021); Hagedorn et al. (2021); Ye et al. (2020); Holdsworth et al. (2019); Sun et al. (2020); Conrad et al. (2021); Rodgers et al. (2020)
Pragmatics of studying	Gonzalez-Ramirez et al. (2021); Wallace et al. (2021); Chu et al. (2021)
Health (Mental and Physical)	Camfield et al. (2021); Bourion-Bedes et al. (2021); Copeland et al. (2021); Gonzalez-Ramirez et al. (2021); Quintiliani et al. (2021); Wallace et al. (2021); Conrad et al. (2021); Rodgers et al. (2020); Panayiotou et al. (2021)
Online learning	Camfield et al. (2021); Conrad et al. (2021); Gonzalez-Ramirez et al. (2021); Quintiliani et al. (2021); Wallace et al. (2021); Chu et al. (2021)
Change and uncertainty	Copeland et al. (2021); Quintiliani et al. (2021);
Policy and communications: government and university	Rodgers et al. (2020); Holdsworth et al. (2018);
Hope and optimism	Browning et al. (2021); Copeland et al. (2021); Wallace et al. (2021); Yang et al. (2020); Ye et al. (2020)
Boundaries and routines	Rodgers et al. (2020); Wallace et al. (2021); Schlesselman et al. (2020); Camfield et al. (2021); Hagedorn et al. (2021)
Exercise and hobbies	Bourion-Bedes et al. (2021); Browning et al. (2021)
Finances	Hagedorn (2021)
Motivation	Camfield et al. (2021); Gonzalez-Ramirez et al. (2021); Wallace et al. (2021)
University support structures	Camfield et al. (2021); Hagedorn et al. (2021); Copeland et al. (2021); Panayiotou et al. (2021); Yang et al. (2020)

Having more time and putting this time to use through hobbies, relaxation and prevailing (online or immediate physical) social networks were positive for some students, reinforcing the protective factors identified by Bourion-Bédès et al. (2021). For other students, however, free time was detrimental as they felt more isolated and became anxious. These tended to be the same students who attested to getting anxious or feeling low when things did not go well for them. This cyclical relationship between mental ill-health and isolation, alongside existing mental health difficulties, was also identified by Browning et al. (2021) and adds additional credence to the importance of understanding existing risk factors in order to put protective factors in place.

In relation to studying, our findings build on the recommendations from Camfield et al. (2021) around the need for 'empathetic responsiveness' from academics in order to provide a flexible approach to meeting students' learning needs as a protective factor of provision. This is particularly so for first-year undergraduates who preferred face-to-face learning on campus with access to facilities and the ability to discuss issues with peers. A particular and new finding was the extent to which Master's students maintained motivation and appreciated online delivery more so than undergraduate students. This may reflect the notion that age is a factor in resilience (Wen et al., 2021), given that Master's students' ages are proportionately higher than those of undergraduate students (see Universities UK, 2019). This may also demonstrate how the flexibility of online learning was conducive to the additional responsibilities that older students tended to have. Findings from this study and that of Bourion-Bédès et al. (2021) highlight the particular impact on females.

Distal factors in the students' macrosystem, such as government and media handling of the pandemic, became more proximal, distracting students from their studies and increased their mental health issues. Juggling online study and home life, and learning via a screen for hours each day without social learning opportunities, demotivated students (particularly undergraduates) and generated a sense of loss as their experiences of university fell short of their expectations. Overall, in common with conclusions by Gonzalez-Ramirez et al. (2021), this loss generated disengagement and a negative impact on motivation. However, the data also show that these risk factors could also be protective, depending on the individual and their own conditions and circumstances.

Our findings support the argument of Gonzalez-Ramirez et al. (2021) that learning is disrupted by local, national or global crises, which can cause personal and academic impact at a range of levels. However, our findings extend the work of, for example, Rodgers et al. (2020), highlighting that the extent of the impact of these factors depends on a range of things, including how proximal or distal they are and how the factors interact with each other and the individual. Of particular importance is the support provided by family and from others with whom students have a close relationship (agreeing with Conrad et al. 2021). In addition, our findings demonstrate how relationships and their intensity during periods of lockdown can exacerbate the inability to cope, and this is particularly so for those with additional caring responsibilities, such as for some Master's students. At the same time, Master's students overall coped better with online provision whilst students at other levels did less so. Though other researchers have highlighted the vulnerability of first year students (Copeland et al., 2021; Gonzalez-Ramirez et al., 2021; Quintiliani et al., 2021), no other studies have found specific differences between levels (e.g. Camfield et al., 2021).

Also novel, and not reflected in the literature, is the extent to which students expressed concern about work and career prospects in light of the risks around the uncertainty caused by the pandemic. Previous literature, such as the more general findings from Holdsworth et al. (2018), indicating the protection of a positive link between the resilience of university students and successful transition from university to workplace, points to this in a much more general way. However, this research has a more nuanced perspective, illustrating the potentially far-reaching consequences that students perceived the pandemic to have.

The added layer of DIMoR as an analytical framework enabled us to see how resilience, in a situation such as that created by the pandemic, is shaped by a wide range of fluctuating and dynamic factors. These interact with the various systems that individuals are situated within, thereby building on the perspective of Schlesselman et al. (2020) that unique contexts impact how individuals respond. This further builds on the point made by Gonzalez-Ramirez et al. (2021) that the extent of the impact of online learning (whether positive or negative) was very much dependent on both individual and broader systems, such as whether students had caring responsibilities, challenging living arrangements, mental health difficulties and so on. This means that we are able to take a more nuanced approach to understanding the impact of the swift move to online learning.

In summary, our results and analysis using DIMoR present a complex picture of student perceptions of their resilience in the context of Covid-19. This enables a deeper understanding of what a higher education sector could do to best support its students during times of disruption or adversity. The findings build upon research on the resilience of HE students and reinforce the need for universities to take a more proactive role in student support during times of major disruption. The data show that students in our study were not very likely to seek support from the university, and where they did, it was where they already had close, supportive relationships with course teams. This reinforces and extends the point made by Hagedorn et al. (2021), who emphasised the vulnerability of the already vulnerable student. Furthermore, students tended to use the university's more 'automated' services, such as uncertified extensions for assignments, which could be organised online without the need for staff contact. Our research suggests that the proximal support provided by personal tutors or lecturers also acts as a lever to access the wider university support services.

Implications for practice in HE

The DIMoR has practical utility in helping stakeholders to understand how institutions such as universities can play a role in fostering conditions to support the resilience of students and how this needs to be deliberate, targeted and granular enough to respond to the diversity of the student body and the broader systems in which the institutions are situated. In doing so, there is a great opportunity for universities (as a proximal microsystem for students) to do more than be the provider of learning opportunities and to become a key place which helps develop resilient individuals and hence resilient communities and societies.

Importantly, this UK study demonstrates that the relationship between risk and protective factors is not binary, and it is important to consider both the nature of the learner and the system in which they are situated in order to understand and then develop the appropriate conditions within which resilience can emerge. Significantly, this research demonstrates the importance of proximal relationships that create a sense of belonging and provide the gateway to accessing wider (university) support systems to better cope during times of disruption so that students can not only survive but thrive in periods of disruption. Focusing on fostering these 'gateways' to wider university services is perhaps a key recommendation for universities.

Placing the results that have emerged from this research onto DIMoR (Figure 6) serves as a reminder of the complexities and fragility of resilience and how it depends on multiple interacting factors.

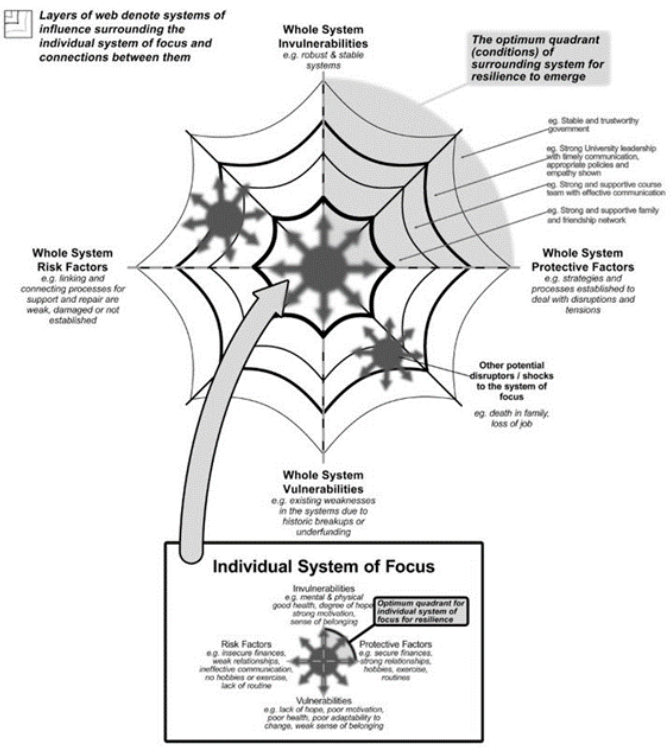

Figure 6. Using the DIMoR as a lens to help analyse optimum conditions for the emergence of resilience in students at times of disruption shows the interplay between the system of focus and surrounding systems.

It illustrates the need to look not only at the students themselves and their individual vulnerabilities and protections, but also at the system in which they sit and its own vulnerabilities and protections. In addition, it reinforces the role that various surrounding influences may play.

If universities want to be environments in which the resilience of students will be supported, then Figure 6 helps to define the conditions that they need to create. We have demonstrated that many system factors can be experienced as both risk and protective by students. As such, institutional managers need to critically examine practices that present risk and identify how they can be adapted to be more protective. This means making interventions that promote student capabilities and impact positively on the wider institutional environment. A culture that nurtures the invulnerabilities of students and provides structures that, for example, support the development of robust mental and physical health and help to develop student independence and action orientation. Universities must also nurture a sense of hope for the future, alongside providing protection against risk by, for example, ensuring that financial support and advice is readily available, and communication is timely and effective. The DIMoR highlights the protective nature of relationships, revealing the importance for universities and course teams to facilitate the development of strong bonds between students, but also between tutors and support staff and students so they can effectively guide students to the support service they need. What is clear is that the simple availability of support services is not going to lead to students accessing them automatically, but they are more likely to do so through their proximal support network. In the case of universities, that is likely to be the lecturers or personal tutors.

Conclusion

Whilst our research was conducted as a case study in a single university, there are nevertheless three main findings that are worthy of wider consideration, particularly given that this is one of the few qualitative studies in this area. These are:

(1) Times of disruption, such as that caused by a pandemic, can affect students' resilience which can then have a detrimental impact on their ability to study;

(2) Factors caused by disruption will not be experienced equally by everyone and can fluctuate depending on individual and context, between protective/risk, vulnerability/ invulnerability and proximal/distal. However, there are concrete steps that universities can take to help support student resilience;

(3) The DIMoR model is a useful framework for analysis, enabling a holistic view acknowledging the interactive, dynamic and contextual nature of resilience and the role of individual agency.

Given the uncertainty of our future and the possibility of further shocks and disruptions to the Higher Education system, these findings might prove useful when considering future university culture and making budgetary and policy decisions.

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Appendices

Appendix A: Search strategy.

Topic: Resilience of HE students in responding to the pandemic and the resulting ongoing changes to practice.

Key concepts*	**Coronavirus**	**Setting**	**Students**	**Mental health/ wellbeing**	**Transition to distance learning**	**Ongoing changes to practice**	**Other (life) factors**	**Differences between lockdowns**
Alternative terms / synonyms	Coronavirus Covid-19 Pandemic Corona Covid lockdown	University College HE Higher Education	Student* University Student* Higher Education Student* HE Student*	"mental* illness*" Wellbeing "Mental* health*" "anxiety" "stress" "trauma" "work life balance" "wellbeing"	Equipment/ access to technology "digital literacy"/ competence/ confidence "distance learning" "remote learning" "online learning" Or "online learn*" "online lectures" Or "online lectur*" "online provision" "face-to-face learning"/ "face-to-face" "learn* engage*" Curriculum/ targets "IT support"	"Changes to practice" "blended learning" New normal Recovery New pedagogy/ curriculum Future Implications "best practice" planning "build back better"	Family concerns Family illness worry bereavement Separation/ isolation Parental duties Home schooling Shielding Caring Financial Carer responsibilities	First (UK) lockdown Second lockdown First wave Second wave Third wave Etc Vaccination New strains New variants
Search terms with operators	Coronavirus OR "Covid-19" OR Pandemic OR Corona OR Covid OR lockdown	University OR College OR HE OR "Higher Education"	Student* OR University Student* OR Higher Education Student* OR HE Student*	"mental* illness*" OR Wellbeing OR "Mental* health*" OR "anxiety" OR "stress" OR "trauma" OR "work life balance"	Technolog* OR Equip* OR "access to technology" OR "digital literacy" OR "digital competence" OR "digital confidence" OR "distance learning" OR "remote learning" OR "online learning" OR "online lectures" OR "online provision" OR "face-to-face learning" OR "face-to-face" OR "learn* engage*" OR curriculum OR target*	"Change* to practice" OR "blended learning" OR "new approaches" OR "New normal" OR Recovery OR pedagog* OR curricul* OR Future OR Implication* OR "best practice*" OR planning OR "build* back better"	Famil* OR "Family concern*" OR "Family illness*" OR worr* OR bereave* OR Separat* OR isolate* OR Parent* OR "Home school*" OR child* OR shield* OR caring OR carer OR finance*	"First (UK) lockdown" OR "Second lockdown" OR "First wave" OR "Second wave" OR "Third wave" OR "wave" OR Vaccin* OR strain* OR variant*

Appendix B: Inclusion criteria.

TYPES OF…	INCLUSION CRITERIA	EXCLUSION CRITERIA	RATIONALE
Topic	Resilience, risk and protective factors identified which are linked to COVID-19 pandemic	Impacts on undergraduate students not linked to COVID-19 pandemic	The study is concentrated on the impact of COVID-19 pandemic in relation to emerging resilience
Article	Peer reviewed journal articles: Empirical studies; conceptual papers based on a clear methodology; meta-analyses	Books; conceptual papers without a clear methodology	Academic focus to concepts
Journal	Fields of Social Sciences, Psychology and Education, Higher Education	Other fields	These fields are most pertinent to a study of University students
Context	University settings	Schools or tertiary education	Current study based in a University
Participants	General population of HE students	Specific groups within HE (i.e. those with disabilities)	Focus of study on HE population as a whole
Time Period	Since 2020	Pre-2020	Time period during and post pandemic
Geographical content	Written in English	Not written in English	Ensure that understanding is maintained as English is the authors first language.

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