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Resilience in higher education settings during the COVID-19 pandemic

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Resilience in higher education settings during the COVID-19 pandemic: A scoping literature review with implications for policy and practice

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Resilience in higher education settings during the COVID-19 pandemic: A scoping literature review with implications for policy and practice

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Version dated 28 November, 2023

Abstract

With the onset of the COVID-19 pandemic, the construct of resilience has received growing attention in the higher education literature. The pandemic, acting as an external stressor, impacted multiple higher educational settings in 2020 during the period of lockdowns, when universities had to temporarily close on-campus activities and shift to online emergency responses. The objective of this scoping review is to explore how resilience was conceptualized in the higher education research literature during the initial emergency response phase of the pandemic, and how conceptual and research design choices in this early body of literature shaped policy recommendations aimed at enhancing resilience of individuals and support systems in higher education settings. This article, thus, contributes to the ongoing discussion in the academic and policy-relevant literature on how to better prepare universities as organizations and communities for a response not only during the emergency pandemic, but also beyond in post-pandemic higher education settings. In particular, the paper examines five related questions, as pertaining to the early literature on the university emergency response in higher education: 1) how, and at which levels (i.e. individual, community, organization, system) was resilience conceptualized, 2) what types of research questions on resilience were being explored in this literature (i.e. determinants of resilience, or impacts of resilience), 3) how, and via which instruments, resilience was measured, 4) which factors were found to be facilitative for resilience, and 5) which factors were found to be impacts of resilience. The article synthesizes the findings of the early literature on resilience in higher education during the pandemic emergency response, and discusses important areas for further academic research, highlighting the implications for relevant support policies and interventions.

Keywords: resilience, higher education, university emergency response, COVID-19, policy

JEL Classification: I20, I23

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Introduction

Resilience – as a capacity to bounce back and positively adapt, or even excel, in the face of external adversities is relevant to both individuals and groups, as well as organizations operating in different domains. With the required shift to online modes of education due to lockdowns and combined with multiple pressures that the pandemic created for students as well as educators, interest towards resilience has grown. Motivated by the need to rapidly respond in a crisis or emergency setting, as well as better prepare for other potential shocks, resilience is a construct that education systems will need to develop in future generations.

A number of studies in higher education settings report on multiple pressures for different student groups not only imposed by, but also exacerbated by pandemic stressors (for a review of psychological effects on higher education students, see Deng et al., 2021; Fang et al., 2022; Van de Velde et al., 2021; for the exploration of pressures on staff, see Hardman et al., 2022; McGaughney et al., 2022; Watermeyer et al., 2021a; Watermeyer et al., 2021b). This article provides a scoping review of the existing early literature on resilience in higher education settings during the COVID-19 pandemic first two years – the initial crisis response phase. In particular, the article explores 1) how, and at which level, resilience in higher education was conceptualized in the early literature on the university emergency response, 2) what types of research questions on resilience were explored in this body of literature (i.e. determinants of resilience, or impacts of resilience), 3) how, and via which instruments, resilience was measured, 4) which factors were found to be mediators of resilience, and 5) which factors impacted resilience. The objective of this study is to explore how resilience was conceptualized and researched in the first wave of the literature on the emergency response in higher education during the pandemic, and how conceptual and research design choices in this body of literature shaped and influenced policy recommendations aimed at enhancing resilience of individuals and support systems in higher education settings. The article contributes to the ongoing discussion in the academic and policy-relevant literature on how to better prepare universities as organizations and universities as communities for a response not only during the emergency pandemic setting, but also beyond the pandemic. By focusing specifically on studies published during the first two years of the pandemic – the phase of the remote emergency

education response – this article aims to synthesize the insights of the research on resilience in higher education settings in the initial crisis response phase. The larger objective is to identify policy recommendations relevant both for emergency settings, as well as post-pandemic, and outline promising venues for future academic research on the subject.

Conceptualization of resilience in the literature

Different strands of the contemporary literature conceptualize resilience as an individual characteristic, a process, an outcome, or both as a process and outcome. Scholars have focused on psychological resilience – defined in terms of well-being indicators (for a more detailed discussion on conceptualizations and measurements of psychological resilience, see Ahern et al., 2006; Cohen et al., 2011; Fletcher & Sarkar, 2013; Kimhi & Eshel, 2015; Pooley & Cohen, 2010; Windle et al., 2011) or academic resilience – defined in terms of positive academic outcomes despite being in a risk group (for the discussion on the operationalizations of academic resilience in the literature, see Rudd et al., 2021; Tudor & Spray, 2017; Volante & Klinger, 2022). Furthermore, the field is complicated by the differences in the conceptualization of resilience, depending on the level of analysis – whether it is based at the individual, group, or organizational level (Shafi et al., 2020; Wosnitza et al., 2018).

In the field of education, resilience literature and associated studies began to increasingly emerge in 2010s with a gradual increase in published studies since then. Not surprisingly, there has been a sharp spike in the number of studies focusing on resilience during the pandemic. The literature has largely focused on resilience of students (Borazon and Chuang, 2023). It is also worth noting that prior to the pandemic, there has been a growing number of studies on resilience in higher education settings. For example, Brewer et al. (2019) examined the resilience of higher education students in a scoping literature review, while Casey et al. (2022) and Parker (2018) focused on the psychological resilience of doctoral students.

With respect to the emergent resilience literature in higher education settings during and post-pandemic, a traditional focus on individuals as the unit of analysis is undoubtedly still a key focal point: it is important to learn about the factors contributing to individual-level resilience outcomes demonstrated during the pandemic by students, early career researchers,

as well as university staff members. However, equally important, and perhaps, even more crucial, is the focus on resilience at the level of groups and organizational units within higher education settings – as a process. This includes the anticipation stage covering preparedness of organizations for emergency response settings, as well as the adaptation stage focusing on group processes during various shocks, such as positive organization- and peer-facilitated strategies instead of individual coping mechanisms. Finally, the post-shock stage includes strategies fostering creative potential for innovations enhancing resilience in the long-term crisis prevention.

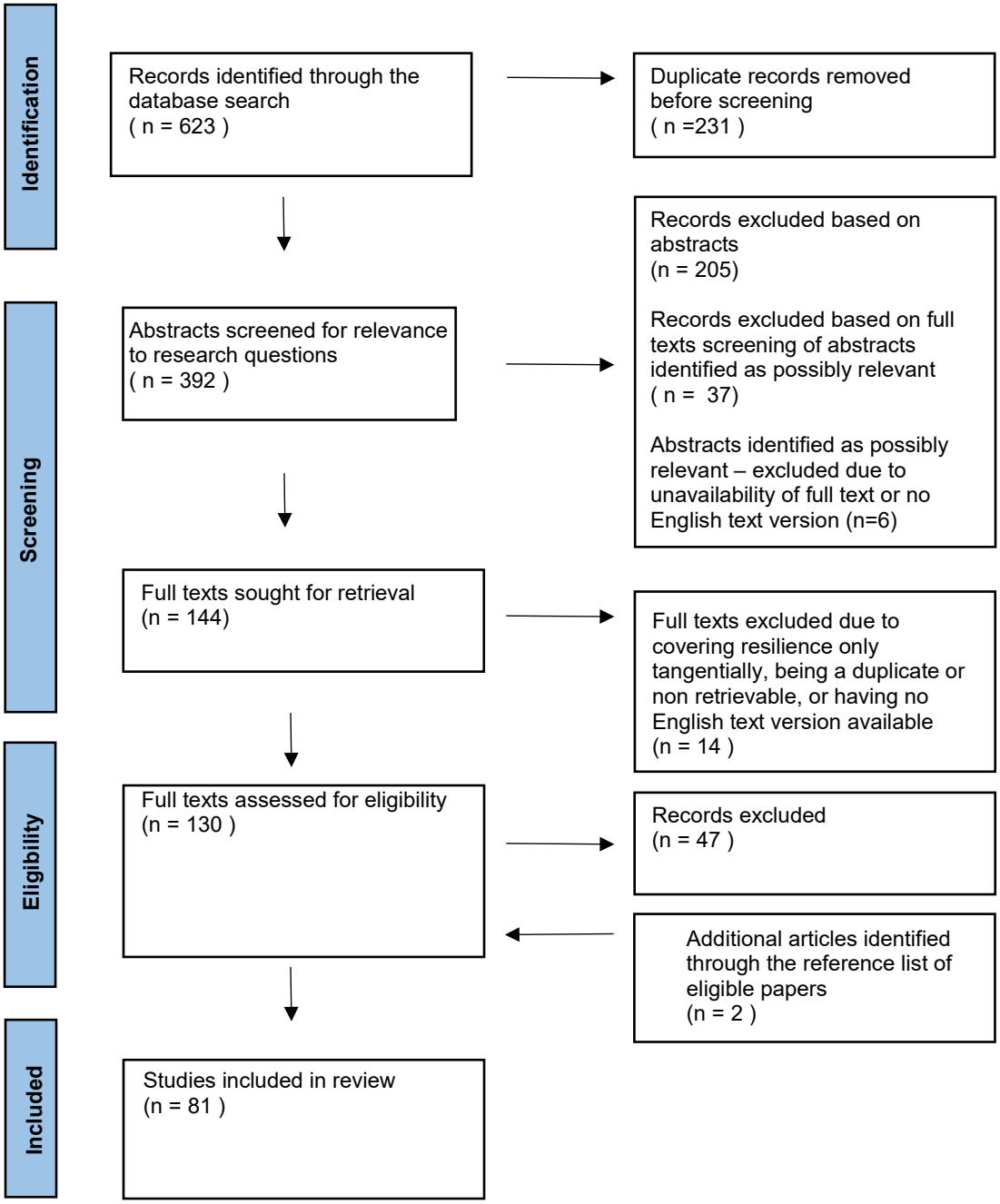
Methodological approach

The scoping literature review followed the PRISMA approach (Page et al., 2021). The initial search was conducted on 27 March 2022 and pooled a list of article abstracts from academic peer-reviewed journals, which included terms 'resilience' AND 'COVID' AND 'education.' The review focused on the time period of the emergency remote education response in the first two years of the pandemic (studies included were published between 2020 and up to 27 March 2022). The period chosen was specifically to identify first reflections and insights on the initial pandemic time period response in the first stages of crisis management. In the studies included, resilience was either a primary focus of the research questions in the study, or a prominent theme discussed. Empirical articles, conceptual work, as well as reflective pieces with empirical examples from the Covid-19 emergency responses were included, with the purpose to survey a broader range of discussions emerging in the field. We conducted systematic searches in the Web of Science (271 records identified), Scopus (311 records identified), and ERIC EBSCOhost (41 records identified) databases. All duplicate records were removed, resulting in 392 articles which were included in the screening stage. In the screening stage, one of the researchers in the team went through all abstracts to scan whether the articles fit the criteria for inclusion. Where this was not possible to determine from the abstract, the full text of the article was scanned. After this procedure, and in line with the focus of the review, we excluded articles which focused on non-higher education settings (such as elementary and secondary schools), and articles which focused on resilience in sectors other

than education (i.e. literature discussing resilience in public health and resilience of entrepreneurs was excluded). We also excluded non-retrievable literature and articles that were unavailable in English. The screening resulted in 130 articles which were eligible for review, that were read and coded by the research team. Based on the research questions of the study, the research team developed a summary table, following a deductive coding scheme (for the coding scheme details, see Appendix 1). During this research stage, we continued to exclude articles which discussed resilience only tangentially. The final corpus of articles for the review included 81 articles (for the list with the overview, see Appendix 2).

[figure 1 near here]

Figure 1. PRISMA Flow Diagram "Resilience in Higher Education, 2020-2022".



Results

Resilience and the levels of analysis

The reviewed studies varied in terms of their main focus and methodological approach, including conceptual analyses (14 studies), literature reviews (2 studies), and qualitative (22 studies) or quantitative empirical studies (33 studies). In terms of the target group, 45 studies focused on university students only, and 5 studies covered resilience of both students and faculty. The resilience of university teaching staff was the sole focus of 13 studies. Only a few studies focused on resilience of programs (3), universities as organizations (4), or educational systems understood sometimes as programs or universities (7). Eleven studies included a multilevel analysis.

Resilience was examined mostly in the context of individual resilience – with most studies focusing on students rather than academic staff. With the exception of Duffy et al. (2021) who also considered resilience of librarians together with the resilience of students and faculty, we did not encounter studies focusing on resilience of university supporting non-academic staff. Resilience at the levels of programs, organizations, or systems was also addressed in the literature, though this literature was scarce. These studies explored resilience of organizations or communities, programs, and the definition of 'education systems' varied, with some focusing on organizations as systems, and others – considering programs as systems. Northern American samples composed a larger portion of the reviewed literature (for a detailed overview, please consult Appendix 3 table).

At the individual level, the reviewed studies mainly examined determinants of resilience, or the impacts of resilience on various aspects of psychological well-being. A minority of studies also focused on the experiences or well-being outcomes of specific target groups, with resilience identified as a theme in qualitative data segments, or a theme prominent in policy recommendations. Several studies focused on the evaluation of specific interventions designed to enhance resilience (Luton et al., 2021; Teimourtash and Teimourtash, 2021; Yang Yowler et al., 2021; Zuniga et al, 2021). Studies concentrating on resilience at the level of organizations, programs, curricula, or education systems primarily addressed the determinants of resilience

more so than the impacts of resilience (see Appendices 5 and 6).

Measurement of resilience

In the reviewed studies, there was neither uniform definition, nor uniform measurement of resilience. Studies conceptualizing and operationalizing resilience at the individual level mostly focused on psychological aspects, connected to adaptive processes. Commonly used instruments in the literature were the Brief Resilience Scale (Smith et al., 2008) and the Connor-Davidson Resilience Scale (2003), but other less common measures have also been used (for a more detailed overview, see Appendix table 4). A few studies referred to academic resilience, which captures specifically the components related to academic performance. For example, the academic adversity index – Academic Risk and Resilience Scale (ARRS) in Martin (2013) and the 30-item academic resilience scale (AR-30) in Cassidy (2016) were discussed as existing instruments of measuring this type of resilience. The former is an instrument that includes measures such as failing a grade, suspension from school, and learning disability, and the latter focuses on emotional, affective, and behavioral reactions to academic stress. A sub-sample of studies focused on digital resilience – understood as adaptability specifically to digital environments and e-learning (Eri et al., 2021; Kornacki and Pietrzak, 2021) – also a focus of a more recent literature review by Van de Laar et al. (2023).

In Servant-Miklos (2022), interestingly, resilience was discussed in terms of a tension between understanding resilience as personal productivity at the expense of stress versus a focus on others at the expense of personal productivity, yet with less anxiety and more adaptation. Along similar lines, Baumber et al. (2021), discussed the implications of demonstrating short-term resilience in a crisis as a factor potentially constraining for the capacity to be resilient in case of future disturbances. This long-term negative dynamic can occur both due to the depletion of reserves, as well as potentially increased institutional pressures with the expectation of previously demonstrated performance. In other studies from our sample, resilience was indirectly assessed via resilience-enhancing strategies in the educational curriculum (Martin et al., 2021), library support interventions (Duffy et al., 2021), or a training intervention (Luton et al., 2021).

Our analysis also identified a number of studies discussing a difference or tension between conceptualizations of resilience at different levels of analysis. For example, a few studies discussed individual-level resilience as being incompatible with collective-level resilience (Baumber et al., 2021; Ebersöhn, 2020; Mahon and Mahon, 2021; Schwartzman, 2020; Sexson and Wilson, 2021). This incompatibility can occur when the locus of action and responsibility is placed primarily on the individual rather than supportive systems around the individual. In some cases, it may be more than just an incompatibility, further undermining the resilience occurring at other levels. For example, the resilience of self-focused individuals may inadvertently undermine resilience at the collective level. Another example would be resilience of programs in digital environments undermining resilience of minority groups who may lose educational content in favor of universalization of programs. Resilience understood as financial resilience of organizations may undermine resilience of individuals working in this organization.

Alternatively, resilience was discussed as a strategy. For example, Stapleton and Meier (2021) discussed resilience in the context of 'resilience for' and 'resilience as' (in line with Sriskandarajah et al., 2010). In their study, 'resilience for' improved systemic resilience (food security in the study's context) via collaborative learning fostering community resilience, and 'resilience as' fostered resilience at the individual level, improving mental well-being, capacity to learn from mistakes and become resourceful. Other discussions of resilience as strategy included examples from Appolloni et al. (2021) on distance education being continued beyond the pandemic response, or from Ibrahim et al. (2021) on exposed vulnerabilities in the business education schools' models in the context of the pandemic in Africa, and suggestions of resilience-enhancing strategies, providing access and inclusion of less privileged student groups.

A fewer number of studies that focused on resilience at programmatic, organizational, or educational system levels also differed in the way resilience was conceptualized, which undoubtedly had implications for the measurement choices. Baumber et al. (2021), for example, assessed resilience of teaching systems indirectly via a case study of teaching response in the emergency remote education, as well as a measure of student satisfaction with the measures taken. Baharin et al. (2021) measured organizational resilience of higher education institutions via several survey items on capacity to react quickly in a situation of uncertainty and

crisis response. Nandy et al. (2021) suggested auditing areas of weaknesses in a model of crisis prevention and management, noting that the approach can include a scoring mechanism to identify the areas to be prioritized in response. A similar focus on crisis response model incorporating prevention, preparedness, response,and recovery stages, was in King et al. (2022). Alternatively, Guthrie et al. (2022) examined resilience from a financial management perspective and highlighted the risks associated with a lack of forward-looking planning for long-term resilience, over-reliance on cost cutting measures and on revenues from the international students in the university funding models, which are not sustainable in the long run. Another approach to measuring organizational resilience was followed by Bento et al. (2021), who measured organizational resilience via interviews with university lecturers, following a coding scheme deductively developed based on Folke's framework of central aspects to socio-ecological resilience (2006). Von Lautz-Causanet (2022) discussed resilience in the context of designing long-term scalable solutions in educational systems, and Mavu et al. (2020) – in the context of continuity, undisrupted by the pandemic program.

The determinants of resilience

In discussing the factors which were identified in the literature as enhancing resilience, we followed the approach in Brewer et al. (2019) by separating determinants into 1) intrapersonal and protective factors, 2) interpersonal resources and strategies, and 3) contextual determinants (for a detailed overview of the mechanisms in the literature we reviewed, see Appendix 6 table). The interpersonal factors mainly concerned psychological aspects related to adaptation capacity of individuals and their ability to emotionally self-regulate. Some of the specific coping mechanisms that positively influenced individual resilience were positive re-evaluation, time management and self-organization, emotional intelligence, lower rejection sensitivity and emotional self-regulation, and the creation of supportive routines.

Within interpersonal factors influencing resilience, there was a very prominent focus on supportive communication and relational aspects. This included the support from academic faculty members, peers, as well as non-academic support staff. Supportive communication was even more important in the context of the online emergency when only online interactions

were available during the pandemic restrictions. Most studies focused on interactions in the context of emergency remote education response or blended settings. However, there were also four studies in our sample which considered interactions in non-online settings– these included an in-person immersive educational experience in the midst of pandemic restrictions (Butler, 2022), support practices in non-online settings (Muller et al., 2021), resilience of students taking the same course in online vis-à-vis face-to-face settings during the pandemic (Teimourtash and Teimourtash, 2021), and students resuming education offline (Zhang et al., 2021).

In terms of specific mechanisms supporting online interactions, bidirectional lines of communication and open lines of feedback and discussion helped build a supportive and trusting environment. These mechanisms discussed in the context of interpersonal factors were resilience-enhancing factors in studies focusing on resilience at different levels of analysis – identified not only in the studies exploring resilience at the individual level, but also considering it at the community, organizational, or systems' levels.

The most frequently highlighted contextual factors influencing resilience at the systemic level were policies and reserves serving as buffers and aimed to and directed specifically to support of at-risk groups. Among those were groups for whom the pandemic created additional coping burdens based on their contextual circumstances, or the pandemic exacerbated difficulties that already existed. For the latter groups, preventative policies to address systemic injustices were discussed as particularly important. Some of the groups identified in various studies here included those with care responsibilities or an extra job, students in earlier or later phases of study,[4] or students/staff experiencing a prior existing inequity (i.e. students with lack of IT access, minority students and/or staff, especially with intersecting identities, staff on temporary contracts, early career researchers with restricted access to field sites, or education-track academics).

The literature also addressed risk groups, reviewing risks at different levels of analysis – individual, community, organizational, and systemic. Some examples of work in this area

[4] Evidence on this is, however, inconclusive, potentially because different mechanisms are at play – a lack of support systems for early year students, and additional stress burdens for students delayed in their later phases of study.

included Deng and Sun (2022) discussing prevention strategies, aimed to target systemic issues of inequity in the educational system. More specifically, the study considered the needs of underserved students in the educational system, and also made suggestions on specific policies that ameliorate barriers to e-learning that were further exacerbated by the pandemic. Muller et al. (2021) in their work, similarly, pointed out the need to address systemic issues affecting inequity in educational structures. In another study, Federico et al. (2022) suggested a focus on groups most likely to be affected by burnout symptoms and discussed inclusion of extra mentorship opportunities for at-risk groups. Forycka et al. (2022) argued for the need to pay specific attention to resilience-enhancing interventions for the first year and last-year students. They also discussed different approaches to planning the content for these programs, to respond to the various needs of students in different stages of their program. Others presented models of crisis prevention and management, as a way to identify areas of weakness that need to be prioritized in the institutional policy response (King et al., 2022; Nandy et al., 2021). Another prominent theme underscored the importance of continuity of education in crisis response by means of emergency remote education, and preparedness for online and/or blended modalities of educational content delivery was important.

When considering particular policies that were discussed as ameliorative or protective in specific contexts, factors at the national, institutional, programmatic or curriculum levels were discussed. At the national level, governmental support with IT access, reduction of student fees, and increase in scholarships, economic and welfare support was important (Appolloni et al., 2021; De los Reyes et al., 2022; Ebersöhn, 2020; Ibrahim et al., 2021; Obrad, 2020; Trogisch et al., 2020; Ulenaers et al., 2021). Conversely, efficiency measures across the universities necessitated by financial pressures faced by governments as a result of the pandemic, were discussed as inadvertently decreasing the resilience capacities not only of the staff affected by cost cuts, but also education systems in the long-term. At the institutional level, leadership with a built-in crisis management and forward-looking resilience planning was important (Baharin et al., 2021; Baumber et al., 2021; Federico et al., 2022; Forycka et al., 2022; Guthrie et al., 2022; Ibrahim et al., 2021; King et al., 2021; Nandy et al., 2021). Particular interventions discussed in the literature included resilience-enhancing trainings and more generally well-being support for

faculty and students, including hiring of additional staff members to increase the capacity of the institution to devote time and resources for these activities. In addition, particular attention was devoted to interventions supporting at-risk groups and administrative support with distance education (Abdelsattar et al. 2021; Appolloni et al. 2021; Arima et al. 2020; Deng and Sun, 2022; Du et al., 2020; Duffy et al., 2021; Federico et al., 2022; Forycka et al., 2022; García et al., 2021; Ibrahim et al., 2021; Ross et al., 2022; Scharp et al., 2022; Schwartzman, 2020; Stewart et al, 2021).

In terms of preparedness for online and blended modalities, differences in preparedness of faculty members were sometimes observed, and faculty trainings were useful in better preparing faculty for online instruction (Badiozaman, 2021; Baumber et al., 2021; Eri et al., 2021; Gherardi et al., 2021; King et al., 2021; Obrad, 2020; Oliveira et al., 2021; Sumer et al., 2021). With respect to comparisons between face-to-face and online delivery of the same course, worthwhile to note are the findings of Teimourtash and Teimourtash (2021) who found that students in the online modality reported higher resilience outcomes vis-à-vis students taking the same course in a face-to-face setting during the pandemic. This was the only study in our sample which conducted a comparison between online and non-online delivery of the same educational content. Further follow-up studies are needed to explore whether the outcome was primarily due to the shielding effect of online modality during the pandemic, or whether there are additional factors beyond the pandemic that played a role here. Yang Yowler et al. (2021), similarly, reported positive resilience outcomes of a training program which had to rapidly transfer to an online format during the pandemic restrictions (though the comparison was only pre- and post-program, with no control group taking the course in face-to-face settings during the pandemic).

To encourage self-organization within sub-units of the university or departments, platforms encouraging bidirectional open lines of feedback, collaboration, and sharing of best practices can be useful sources of resilience led from bottom-up initiatives and fostering the community support within which the individuals – both students, as well as faculty and support staff – are functioning (Abdelsattar et al. 2021; Baumber et al., 2021; Bento et al. 2021; Deng and Sun, 2022; Duffy et al., 2021; Eri et al., 2021; Federico et al., 2022; Grunspan et al., 2021;

King et al., 2021; Kornacki and Pietrzak, 2021; Mead et al., 2021; Ross et al., 2022; Schwartzman, 2020; Sumer et al., 2021).

Finally, at the level of programmatic and curriculum development, time and resources to develop and improve online materials or create virtual curriculum for online or blended modalities were recommended (Abdelsattar et al., 2021; Badiozaman, 2021; Baumber et al., 2021; Eri et al., 2021; Ibrahim et al., 2021; King et al., 2021; Mavu et al., 2020; Roy and Brown, 2022; Sánchez Ruiz et al., 2021; Schwartzman, 2020; Sumer et al., 2021). Sustaining an immersive educational model in face-to-face settings was the focus of discussion in Butler (2022), who argued for a strategy to foster resilience in crisis settings not only in program continuation during the emergency response, but also by enhancing the resilience of students and faculty during the crisis. Problem-based reflective pedagogies, and project-based learning or learning on the job were additional dimensions identified in the literature as fostering resilience-related competences.

Resilience- and wellness-oriented interventions were sometimes discussed only in the implications of the reviewed literature, and hence, more empirical studies assessing the effects of particular interventions, especially within post-emergency educational contexts, would be beneficial. Similarly, considering non-individual levels of analysis would also be of benefit to the literature. Further studies that could be useful in this respect are those focusing on exploring resilience of support systems at collective, programmatic, or institutional levels. More specifically, studies that identify the conditions under which supportive systems at the institutional or community level can be established, as well as function in long-term, are needed.

The impacts of resilience

Our review suggested there was limited literature focusing on the impacts of resilience. The small sample of studies that did focus on impacts were mostly quantitative and examined psychological well-being outcomes (for a detailed overview please see Appendix 5), with an additional few number of studies reporting on the establishment of innovations due to resilience. Among the innovations discussed, there were improvements in the online

educational provision, because of easier access to experts globally who were no longer constrained by travel during the pandemic restrictions (Abdelsattar et al., 2021; Oliveira et al., 2021); new opportunities for collaboration and research opportunities with colleagues from abroad (de los Reyes et al., 2022; Trogisch et al., 2020); educators adopting new techniques to facilitate student engagement online (flipped classroom in Sánchez Ruiz et al., 2021; mindset change and upskilling of educators in Raghunathan et al., 2022); curricular innovations facilitated by a community of practice (Mead et al., 2021); or an offline immersive educational model retained in the time period with multiple restrictions on face-to-face communication during the pandemic (Butler, 2022).

Resilience understood as forward-looking planning and ability to thrive rather than just adapt functioning with previous levels of performance was discussed in a sub-sample of studies as facilitating innovative responses. Distance and blended education was identified as a viable resilience strategy that should be continued in post-pandemic higher education settings (Appolloni et al., 2021; Cândea and Cândea, 2020; Guthrie et al., 2022; Schwartzman, 2020). In this regard, King et al. (2021), for example, discussed virtual and remote laboratories with technological tools of extended reality. Gherardi et al. (2021) and Ibrahim et al. (2021), argued for inclusion of reflective pedagogies into the curriculum as a strategy to increase collective resilience against pandemic-related effects and potentially exacerbated inequities. Duffy et al. (2021) also highlighted that the pandemic was a period of growth, with more collaboration between different institutional departments, building of trust, and an increased number of collaborative initiatives.

Cândea and Cândea (2020) focused on the level of programs and discused resilience in the context of new skills needed to be introduced in management education programs, as well as new forms of blended education modes to be retained post-pandemic. Other benefits of the digital format were pointed out by Schwartzman (2020) who argued for potential opportunities in digital pedagogical formats which could capitalize on the expertise, while simultaneously structure personalized context, more tailored to the needs of particular student groups. Federico et al. (2022) discussed different types of resilience-enhancing interventions to be included in the curriculum as a strategy to increase wellness outcomes for the orthopedic

surgery residents. Another example was the study by Muller et al. (2021) which discussed two types of interventions at their own institution having an impact either directly at the individual level, targeting the needs of groups at-risk, or facilitated more resilient communities by establishing support structures at the community and institutional level (some of these were occurring in non-online settings, being direct support with food products for groups that were hit by the pandemic the hardest and were experiencing severe financial difficulties). At the community level, Sexson and Wilson (2021) drew attention to the need for institutional recognition of social and community engagement by academics as a legitimate activity alongside research, education, and practice. This was argued to not only enhance societal resilience of communities by working with the academics, but also increasing the resilience of academics themselves, placing them in an institution which is supportive instead of undermining. These initiatives or interventions were discussed in the context of opportunities identified during the pandemic and their potential to be kept as transformative practices post-pandemic as well.

Discussion

This article focused on how resilience in higher educational settings has been approached in the literature during the Covid-19 pandemic – published from 2020 and up to 27 March 2022, and being the first wave of literature on the emergency education response in the crisis response stage. Our analysis focused on empirical articles, but also included conceptual work, as well as reflective pieces with empirical examples. This was done in order to survey broad themes in the literature and identify the trends in conceptualization of resilience, its measurement, and the types of questions the scholars have focused on in response to the pandemic in the early stages of crisis management.

Our analysis revealed that the existing literature largely focused on resilience of students than resilience of academic staff members. With the exception of Duffy et al. (2021) who also considered resilience of librarians together with the resilience of students and faculty, studies focusing on the resilience of support staff were absent in our reviewed sample. A focus on staff resilience was essentially non-existent, which is a troubling finding when one considers the

adjacent literature on well-being of educators working in academia, as well as the multiple compounding stressors that the pandemic has exacerbated for university staff.

There were several studies in the sample that focused on communities, organizations, and educational systems, however, we observed a variety of approaches not only in measurements, but also in the definitions of what is understood by resilience in organizations and systems. As a result, in terms of policy implications, the diversity and fragmentation between approaches makes it hard to have consistent recommendations, comparable between contexts. In terms of advancing the academic conversation in the field, the academic conversation in the field also needs systematization in the second wave of literature on the subject.

Quite a few studies considered that supportive mechanisms are needed at meso-levels, embedding individuals working in organizations in supportive formal and informal structures, and, thus, facilitating resilience at different levels of the system. Others drew attention to the importance of structural facilitating conditions that improve resilience of the education systems, nesting individuals in supportive environments. While the literature did pay attention to the contextual and socio-environmental factors in the support system around individuals, identifying them as conditions supporting resilience, resilience as a group level construct was explored to a lesser extent, and especially so in the empirical studies. With the exception of Baharin et al. (2021) and Guthrie et al. (2022) with measures of organizational resilience, Baumber et al. (2021) with an indirect measure of resilience of education systems, and Bento et al. (2021) and Sánchez Ruiz et al. (2021) measuring adaptation processes at the organizational level, we did not encounter empirical measures of organizational or system-level resilience in the reviewed literature. By extension then, the policies and support that focus on groups are a less prominent theme in empirical studies of resilience in the literature we reviewed.

As a construct, resilience was conceptualized differently – depending on the disciplinary traditions, the level of analysis, and the measurement indicator available. This finding is consistent with previous review studies in the field, which note the fragmentation in the literature and the existence of multiple definitions, as well as measurements. This presents challenges in terms of "measurement" - namely, the type, scope and degree of resilience

challenges will fluctuate as a consequence of operational definitions - leading to 'over and under-reporting', furthermore making institutional comparisons virtually impossible. In the absence of broader international consensus on the resilience construct, it is also difficult to make cross-national comparisons of factors that buffer the impacts of external shocks such as a pandemic. Thus, greater conceptual clarity is needed in the research literature to facilitate institutional comparisons within and across national contexts.

Our analysis also indicated that different definitions often captured different aspects of the resilience concept. The latter has implications on the construct of resilience itself – if the concept being explored is in essence different between specific studies or fields, it is harder to have a shared understanding. Policies adopted on the basis of study recommendations are harder to assess against each other. For example, someone doing very well in terms of academic resilience can also have very low outcomes in resilience, reflecting psychological well-being (as measured by instruments focusing on psychological dimensions). Hence, performing well academically can potentially lead to situations of emotional burnout and stress in the long run, resulting from an overstretch of one's reserves. That is, doing well academically (which is reflected in academic resilience) can also co-exist with inability to flourish in terms of developmental well-being (a situation, which could be identified with conceptualizations of resilience focusing on psychological aspects). Thus, it is crucial to be very clear from the outset which aspects of resilience one is focusing on – i.e. aspects of self-regulation when faced with academic challenges as the instrument by Martin (2013) or Cassidy (2016) would allow, or psychological aspects related to adaptation processes as the Brief Resilience Scale (Smith et al., 2008) or the Connor-Davidson Resilience Scale (2003) would focus on. In terms of policy-making, both are important to consider, as we should be caring not only about outputs in terms of academic performance, but also well-being, which is impossible to fully take into account without considering the psychological dimensions of resilience.

The challenge of not having a common conceptual ground in the field of work on resilience has importance implications beyond the academic domain, translating into implications for policy not only at the individual, but also meso-levels of the educational system. Resilience conceptualized at the level of individuals (both students and/or educators, and

regardless of whether it is focusing on self-regulation, or adaptation dimensions of resilience) is sometimes not compatible or is even conflicting with resilience conceptualized at the level of organizations. This is important for both university management policies, as well as department/university policies supporting well-being of staff and students. Policies designed with the purpose to sustain resilience of programs and universities can overlook the need for, or sometimes even undermine, the resilience of individuals within the organization. Conversely, policies focusing only on support at the individual level inadvertently place the locus of responsibility on the individual staff and students, overlooking the need for systems which embed the individuals in a supportive environment, thus fostering their resilience capacities.

Conclusion

By exploring the emerging body of literature on resilience during the pandemic emergency educational response, this article has identified several promising venues for future research. In terms of studies focusing on individual-level resilience, much work has been done on resilience of students, less so – on resilience of academic staff, and very little if any – on the resilience of support staff at universities. Given the finding of many studies on the importance of supportive relations between faculty and students, as well as students, faculty, and support staff, more detailed empirical investigations on what enhances resilience of academic and non-academic university staff would be a beneficial line of future research. In essence, more research is needed that considers all of the relevant stakeholder groups within higher education settings, so that support practices are not fragmented, and policy recommendations attend to the entire institutional context.

Another important question at the individual level is resilience of individuals in a long-term perspective. In this respect, it would be important to explore whether the effects observed in the early literature on the emergency response are lasting in the long-term perspective. Special attention here would need to be paid to at-risk groups, as long-term effects could vary for individuals in different contextual circumstances. For example, in the longer-term perspective some groups could experience resilience levels comparable to pre-pandemic state, and a smaller sub-group of those in privileged positions could be potentially even better off,

having capitalized on new opportunities in the online settings. However, for groups identified in the literature as having been hit by the pandemic the hardest, or suffering from prior existing inequities, there is a risk of lasting long-term negative effects. Another interesting line of research could be exploring how high levels of demonstrated resilience in the immediate crisis response stage affects long-term resilience, and whether there is a cost of burnout, impacting resilience negatively in the long term perspective.

Evaluations of specific resilience-enhancing programs are important in order to assess psychological aspects of resilience at the individual level. At the level of programmatic content, evaluations of online educational modalities vis-à-vis the same educational content in offline settings is another important venue, given the preliminary insights of some of the studies in our reviewed sample. Furthermore, and perhaps even more critical is to attend to resilience at meso-levels, with the question of how to design resilient support systems at the level of curriculum, program, and university planning. Here, while many studies discuss the importance of such systems conceptually or in the implications of their research findings on individual resilience, more empirical research on the subject would be most welcome. Some of the possible themes to explore in this area could be evaluations of particular interventions – in terms of their effect on individuals and groups, and explorations of potentially conflicting and at other times synergetic relationships between resilience operationalized at the individual level and group level. Along these lines, important would be also studies exploring ways to operationalize and measure resilience at levels of analysis beyond the individual level, and studies focusing on conditions in educational systems able to unlock transformative potential of resilience beyond just coping to instead creating innovative potential.

Stemming from a more prominent focus on the individual-level resilience in the literature, many policy-making implications concern interventions focusing on the individual level-resilience support. These range from the resilience-enhancing trainings, well-being support, to reflective pedagogies, project-based or on-the job learning fostering resilence-related competences. However, while these support policies may be provided by universities or organizational sub-units within higher education settings, they still put the locus of perspective on the individual and are less so focused on improving resilience of systems within which

individuals are embedded. In this sense, the focus on individual resilience via provision of resilience-enhancing interventions is important, but also needs to be nested within the focus on resilient supportive systems/environments. An important theme to explore in this venue of research is the question of which conditions facilitate supportive structures at the organizational and community levels, including conditions for collaborations, supportive communities of practice, or innovations at the organizational level. Overall, safeguards are required so that the locus of responsibility remains firmly rooted on institutions, to enable individuals to work and function productively. Thus, fostering institutional support systems at different levels that attend concurrently to student, faculty, and staff needs remains critical for both post- and potentially future pandemic contexts.

References

Abdelsattar, J. M., Coleman, J. R., Nagler, A., Shabahang, M., Ellison, E. C., Baker, Y., Stain, S. C., Matthews, J. B., Dent, D., Blair, P., Britt, L. D., Sachdeva, A. K., & Spanknebel, K. (2021). Lived Experiences of Surgical Residents During the COVID-19 Pandemic: A Qualitative Assessment. *Journal of surgical education*, *78*(6), 1851–1862.

Adjepong, M., Amoah-Agyei, F., Du, C., Wang, W., Fenton, J. I., & Tucker, R. M. (2022). Limited negative effects of the COVID-19 pandemic on mental health measures of Ghanaian university students. *Journal of affective disorders reports*, *7*, 100306.

Aguilar, M. V., Mostajo, S., & Legaspi, O. M. (2022). Discovering the resilience of working women from academic institutions in the Philippines during the Covid-19 pandemic crisis. *Journal of Institutional Research South East Asia, 19 (1).*

Ahern, N. R., Kiehl, E. M., Sole, M. L., & Byers, J. (2006). A review of instruments measuring resilience. *Issues in comprehensive pediatric nursing*, *29*(2), 103–125.

Appolloni, A., Colasanti, N., Fantauzzi, C., Fiorani, G., & Frondizi, R. (2021). Distance Learning as a Resilience Strategy during Covid-19: An Analysis of the Italian Context. *Sustainability*, *13*(3), 1388. MDPI AG.

Arima, M., Takamiya, Y., Furuta, A., Siriratsivawong, K., Tsuchiya, S., & Izumi, M. (2020). Factors associated with the mental health status of medical students during the COVID-19 pandemic: a cross-sectional study in Japan. *BMJ open*, *10*(12), e043728.

Asghar, M. Z., Arif, S., Barbera, E., Seitamaa-Hakkarainen, P., & Kocayoruk, E. (2021). Support through Social Media and Online Class Participation to Enhance Psychological Resilience. *International Journal of Environmental Research and Public Health*, *18*(22), 11962. MDPI AG.

Badiozaman, I. F. A. (2021). Exploring online readiness in the context of the COVID 19 pandemic. *Teaching in Higher Education*, 1-19.

Baharin, S. N., Yusof, F., Said, J., & Zahari, A. I. (2021). Assessing organisational resilience of private higher learning institutions. *MOJEM: Malaysian Online Journal of Educational Management*, *9*(4), 53-72.

Baumber, A. ., Allen, L., Key, T., Kligyte, G., Melvold, J., & Pratt, S. (2021). Teaching Resilience: Enabling Factors for Effective Responses to COVID-19. *Student Success*, *12*(3), 14-25.

Bento, F., Giglio Bottino, A., Cerchiareto Pereira, F., Forastieri de Almeida, J., & Gomes Rodrigues, F. (2021). Resilience in Higher Education: A Complex Perspective to Lecturers' Adaptive Processes in Response to the COVID-19 Pandemic. *Education Sciences*, *11*(9), 492. MDPI AG.

Berdida, D. & Grande, R. (2021). Quality of life and academic resilience of Filipino nursing students during the COVID-19 pandemic: a cross-sectional study. *International Journal of Nursing Education Scholarship*, *18*(1), 20210115.

Bono, G., Reil, K., & Hescox, J. (2020). Stress and wellbeing in college students during the COVID-19 pandemic: Can grit and gratitude help? *International Journal of Wellbeing*, *10*(3), 39-57.

Borazon, E. Q., & Chuang, H. H. (2023). Resilience in educational system: A systematic review and directions for future research. *International Journal of Educational Development*, *99*, 102761.

Brewer, M. L., Van Kessel, G., Sanderson, B., Naumann, F., Lane, M., Reubenson, A., & Carter, A. (2019). Resilience in higher education students: A scoping review. *Higher Education Research & Development*, *38*(6), 1105-1120.

Butler, M. (2022). Interdisciplinary experiential learning during COVID-19: lessons learned and reflections for the future. *Journal of Environmental Studies and Sciences, 12*, 369 - 377.

Cândea, D. & Cândea, R. (2020). Management and management education in the post-pandemic world: A point of view. *Review of Management & Economic Engineering, 19* (3), 343-355.

Casey, C., Harvey, O., Taylor, J., Knight, F., & Trenoweth, S. (2022). Exploring the wellbeing and resilience of postgraduate researchers. *Journal of Further and Higher Education*, *46*(6), 850-867.

Cassidy, S. (2016). The Academic Resilience Scale (ARS-30): A new multidimensional construct measure. Frontiers in Psychology, 7, 1787.

Chan, S. L., Takemura, N., Chau, P. H., Lin, C. C., & Wang, M. P. (2021). Psychological Impact of the COVID-19 Pandemic on Licensed Full-Time Practicing Nurses Undertaking Part-Time Studies in Higher Education: A Cross-Sectional Study. *International journal of environmental research and public health*, *18*(16), 8569.

Chen, T., & Lucock, M. (2022). The mental health of university students during the COVID-19 pandemic: An online survey in the UK. *PloS one*, *17*(1), e0262562.

Cohen, L., Pooley, J., Ferguson, C. A., & Harms, C. A. (2011). Psychologists' understanding of resilience: implications for the discipline of psychology and psychology practice. The Australian Community Psychologist, 23(2), 7-22.

Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and anxiety*, *18*(2), 76-82.

De los Reyes, E. J., Blannin, J., Cohrssen, C., & Mahat, M. (2022). Resilience of higher education academics in the time of 21st century pandemics: a narrative review. *Journal of Higher Education Policy and Management*, *44*(1), 39-56.

Delgado-Gallegos, J. L., Padilla-Rivas, G. R., Zuñiga-Violante, E., Avilés-Rodriguez, G., Arellanos-Soto, D., Villareal, H. F., Cosío-León, M. L. Á., Romo-Cardenas, G. S., & Islas, J. F. (2021). Teaching Anxiety, Stress and Resilience During the COVID-19 Pandemic: Evaluating the Vulnerability of Academic Professionals in Mexico Through the Adapted COVID-19 Stress Scales. *Frontiers in public health*, *9*, 669057.

Deng, X., & Sun, R. (2022). Barriers to e-learning during crisis: A capital theory perspective on academic adversity. *Journal of Information Systems Education*, *33*(1), 75.

Deng, J., Zhou, F., Hou, W., Silver, Z., Wong, C. Y., Chang, O., ... & Huang, E. (2021). The prevalence of depressive symptoms, anxiety symptoms and sleep disturbance in higher education students during the COVID-19 pandemic: A systematic review and meta-analysis. *Psychiatry research*, *301*, 113863.

Du, C., Zan, M. C. H., Cho, M. J., Fenton, J. I., Hsiao, P. Y., Hsiao, R., Keaver, L., Lai, C. C., Lee, H., Ludy, M. J., Shen, W., Swee, W. C. S., Thrivikraman, J., Tseng, K. W., Tseng, W. C., & Tucker, R. M. (2020). Increased Resilience Weakens the Relationship between Perceived Stress and Anxiety on Sleep Quality: A Moderated Mediation Analysis of Higher Education Students from 7 Countries. *Clocks & sleep*, *2*(3), 334–353.

Duffy, B., Rose-Wiles, L. M., & Loesch, M. M. (2021). Contemplating library instruction: Integrating contemplative practices in a mid-sized academic library. *The Journal of Academic Librarianship*, *47*(3), 102329.

García, D. T., Akinkugbe, A. A., Mosavel, M., Smith, C. S., & Brickhouse, T. H. (2021). COVID-19 and dental and dental hygiene students' career plans. *JDR Clinical & Translational Research*, *6*(2), 153-160.

Ebersohn, L. (2020). Collective resilience to global challenge: a collective wellbeing agenda to transform towards sustained equitable education. *Praxis educativa*, *15*.

Fang, Y., Ji, B., Liu, Y., Zhang, J., Liu, Q., Ge, Y., ... & Liu, C. (2022). The prevalence of psychological stress in student populations during the COVID-19 epidemic: a systematic review and meta-analysis. *Scientific Reports*, *12*(1), 1-20.

Federico, V., Higgins, J., Nolte, M., & Kogan, M. (2022). Promoting Wellness in Orthopaedic Surgery Residency. *Journal of the American Academy of Orthopaedic Surgeons. Global research & reviews*, *6*(3), e21.00227.

Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts, and theory. *European Psychologist, 18*(1), 12–23.

Folke, C. Resilience: The emergence of a perspective for social–ecological systems analyses. *Glob. Environ. Chang.* **2006**, *16*, 253–267. (APA ORMAT NEEDED

Forycka, J., Pawłowicz-Szlarska, E., Burczyńska, A., Cegielska, N., Harendarz, K., & Nowicki, M. (2022). Polish medical students facing the pandemic-Assessment of resilience, well-being and burnout in the COVID-19 era. *PloS one*, *17*(1), e0261652.

Gherardi, S. A., Mallonee, J. R., & Gergerich, E. (2021). We move on and get it done: Educating social workers through a pandemic. *Journal of Social Work Education*, *57*(sup1), 27-43.

Grunspan, D. Z., Holt, E. A., & Keenan, S. M. (2021). Instructional Communities of Practice during COVID-19: Social Networks and Their Implications for Resilience. *Journal of microbiology & biology education*, *22*(1), 22.1.44.

Guthrie, J., Linnenluecke, M. K., Martin-Sardesai, A., Shen, Y., & Smith, T. (2022). On the resilience of Australian public universities: why our institutions may fail unless vice-chancellors rethink broken commercial business models. *Accounting and Finance*, *62*(2), 2203-2235.

Hardman, J., Shankar, K., Crick, T., McGaughey, F., Watermeyer, R., Suri, V. R., ... & Chung, R. (2022). "Does anyone even notice us?" COVID-19's impact on academics' well-being in a developing country. *South African Journal of Higher Education*, *36*(1), 1-19.

Hassan, B. A. R., Mohammed, A. H., Wayyes, A. M., Farhan, S. S., Al-Ani, O. A., Blebil, A., & Dujaili, J. (2022). Exploring the level of lockdown fatigue and effect of personal resilience and coping behaviours on university students during the covid-19 pandemic: a cross-sectional analysis from Iraq. *Current psychology (New Brunswick, N.J.)*, 1–9. Advance online publication.

Hinduan, Z. R., Wedyaswari, M., Reswara, I. P., & Setyowibowo, H. (2021). A Counseling Application as an Alternative Tool in Increasing Coping Self-Efficacy Among University Students With Academic Distress During Coronavirus Disease 2019 Pandemic in Indonesia: A Study Protocol for a Randomized Controlled Non-Inferiority Trial. *Frontiers in psychology*, *12*, 712806.

Hunt, C., Gibson, G. C., Vander Horst, A., Cleveland, K. A., Wawrosch, C., Granot, M., Kuhn, T., Woolverton, C. J., & Hughes, J. W. (2021). Gender diverse college students exhibit higher psychological distress than male and female peers during the novel coronavirus (COVID-19) pandemic. *Psychology of Sexual Orientation and Gender Diversity, 8*(2), 238–244.

Ibrahim, S. E., Fowler, A. F., & Kiggundu, M. N. (2021). Business management education in the African context of (post-) Covid-19: Applying a proximity framework. *Africa Journal of Management*, *7*(1), 13-38.

Jardon, C., & Choi, K. R. (2022). COVID-19 experiences and mental health among graduate and undergraduate nursing students in Los Angeles. *Journal of the American Psychiatric Nurses Association*, 10783903211072222.

Keener, T. A., Hall, K., Wang, K., Hulsey, T., & Piamjariyakul, U. (2021). Quality of life, resilience, and related factors of nursing students during the COVID-19 pandemic. *Nurse educator*, *46*(3), 143-148.

Keener, T.A., Wang, K., Hall, K., Hulsey, T., & Piamjariyakul, U. (2022). Mediating role of resilience on nursing faculty and student QoL during COVID-19. *Western Journal of Nursing Research*, *44*(11), 1006-1015.

Kimhi, S., & Eshel, Y. (2015). The missing link in resilience research. *Psychological Inquiry*, *26*(2), 181-186.

King, I., Saxena, C., Pak, C., Lam, C. M., & Cai, H. (2021). Rethinking engineering education: Policy, pedagogy, and assessment during crises. *IEEE Signal Processing Magazine*, *38*(3), 174-184.

Kornacki, M., & Pietrzak, P. (2021). New translator training environments: Towards improving translation students' digital resilience. *New Voices in Translation Studies*, *17*(1), 1-22.

Kunaviktikul, W., Ang, E., Baridwan, N. S., Bernal, A. B., Dones, L. B. P., Flores, J. L., ... & Shorey, S. (2022). Nursing students' and faculty members' experiences of online education during COVID-19 across Southeast Asia: A Photovoice study. *Nurse education today*, *111*, 105307.

Liu, C., McCabe, M., Dawson, A., Cyrzon, C., Shankar, S., Gerges, N., ... & Cornish, K. (2021). Identifying predictors of university students' wellbeing during the COVID-19 pandemic—A data-driven approach. *International journal of environmental research and public health*, *18*(13), 6730.

Luton, O. W., James, O. P., Mellor, K., Eley, C., Hopkins, L., Robinson, D. B. T., ... & Egan, R. J. (2021). Enhanced stress-resilience training for surgical trainees. *BJS open*, *5*(4), zrab054.

Maddi, S. R., & Kobasa, S. C. (1984). The hardy executive: Health under stress. Pacific Grove, CA: Brooks cole.

Mahon, D., & Mahon, A. (2023). Educational responses to the challenges of the COVID-19 global pandemic: online provision and its consequences for the social resilience of minority communities. *Globalisation, Societies and Education*, *21*(1), 102-113.

Martin, A. J. (2013). Academic Buoyancy and Academic Resilience: Exploring 'Everyday' and 'Classic' Resilience in the Face of Academic Adversity. *School Psychology International,* 34, 488-500.

Mavu, D., Lates, J., Hango, E., Rennie, T., Lusepani, M., Kibuule, D., & Mubita, M. (2020). COVID-19 resilient pharmacy education: A grassroots work-integrated programme to strengthen the pharmaceutical workforce in Namibia. *Pharmacy Education*, *20*(2), 205-11.

McGaughey, F., Watermeyer, R., Shankar, K., Suri, V. R., Knight, C., Crick, T., ... & Chung, R. (2022). 'This can't be the new norm': academics' perspectives on the COVID-19 crisis for the Australian university sector. *Higher education research & development*, *41*(7), 2231-2246.

Mead, T., Pietsch, C., Matthew, V., Lipkin-Moore, S., Metzger, E., Avdeev, I. V., & Ruzycki, N. J. (2021). Leveraging a community of practice to build faculty resilience and support innovations in teaching during a time of crisis. *Sustainability*, *13*(18), 10172.

Mete-Otlu, B., & Aysan, F. (2015). Coping strategies used in crisis intervention scale: A validity and reliability study. Turkish International Journal of Special Education and Guidance & Counselling, 4(2), 13–23.

Morales-Rodríguez, F. M., Martínez-Ramón, J. P., Méndez, I., & Ruiz-Esteban, C. (2021). Stress, coping, and resilience before and after COVID-19: A predictive model based on artificial intelligence in the university environment. *Frontiers in Psychology*, *12*, 647964.

Moret-Tatay, C., Fernández, J. J., Civera, C., Navarro-Pardo, E., and De la Hera, C. M. A. (2015). Psychometric properties and factor structure of the BRCS in an elderly Spanish sample. *An. Psicol.* 31, 1030–1034. doi: 10.6018/analesps.31. 3.188401

Muller, D., Hurtado, A., Cunningham, T., Soriano, R. P., Palermo, A. G. S., Hess, L., ... & Parkas, V. (2022). Social determinants, risk factors, and needs: A new paradigm for medical education. *Academic Medicine*, *97*(3), S12.

Nandy, M., Lodh, S., & Tang, A. (2021). Lessons from Covid-19 and a resilience model for higher education. *Industry and Higher Education*, *35*(1), 3-9.

Obrad, C. (2020). Constraints and consequences of online teaching. *Sustainability*, *12*(17), 6982.

Oláh, A. (2005). *Emotions, Coping and Optimal Experience*. Budapest: Trefort Kiadó.

Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology*, *52*(4), 1357-1376.

Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *bmj*, *372*.

Parker, M. L. (2018). *An Examination of the Differences in Doctoral Students' Levels of Life Stress, Burnout, and Resilience by Program Phase* (Doctoral dissertation).

Pastan, C. D. (2021). Mind-body wellness: A complement to dental education and professional development. *International journal of yoga*, *14*(3), 239.

Pooley, J.A., & Cohen, L. (2010). Resilience: A Definition in Context.

Raghunathan, S., Darshan Singh, A., & Sharma, B. (2022, January). Study of resilience in Learning environments during the Covid-19 Pandemic. In *Frontiers in Education* (Vol. 6). Frontiers Media SA.

Ren, Z., Xin, Y., Wang, Z., Liu, D., Ho, R. C., & Ho, C. S. (2021). What factors are most closely associated with mood disorders in adolescents during the COVID-19 pandemic? A cross-sectional study based on 1,771 adolescents in Shandong Province, China. *Frontiers in psychiatry*, *12*, 728278.

Ross, P. M., Scanes, E., Poronnik, P., Coates, H., & Locke, W. (2022). Understanding STEM academics' responses and resilience to educational reform of academic roles in higher education. *International journal of STEM education*, *9*(1), 11.

Roy, S., & Brown, S. (2022). Higher education in India in the time of pandemic, sans a learning management system. *AERA Open*, *8*, 23328584211069527.

Rudd, G., Meissel, K., & Meyer, F. (2021). Measuring academic resilience in quantitative research: A systematic review of the literature. *Educational Research Review*, *34*, 100402.

Sánchez Ruiz, L. M., Moll-López, S., Moraño-Fernández, J. A., & Llobregat-Gómez, N. (2021). B-learning and technology: Enablers for university education resilience. An experience case under COVID-19 in Spain. *Sustainability*, *13*(6), 3532.

Savitsky, B., Findling, Y., Ereli, A., & Hendel, T. (2020). Anxiety and coping strategies among nursing students during the covid-19 pandemic. *Nurse education in practice*, *46*, 102809.

Scharp, K. M., Wang, T. R., & Wolfe, B. H. (2022). Communicative resilience of first-generation college students during the COVID-19 pandemic. *Human Communication Research*, *48*(1), 1-30.

Schwartzman, R. (2020). Performing pandemic pedagogy. *Communication Education*, *69*(4), 502-517.

Servant-Miklos, V. (2022). Environmental education and socio-ecological resilience in the COVID-19 pandemic: lessons from educational action research. *Environmental Education Research*, *28*(1), 18-39.

Sexson, W. R., & Wilson, M. J. (2021). The university's fragile role in fostering societal resilience by facilitating the development of community-engaged professionalism. *The Law Teacher*, *55*(1), 88-100.

Shafi, A., Middleton, T., Millican, R., & Templeton, S. (2020). *Reconsidering resilience in education: An exploration using the dynamic interactive model of resilience*. Springer International Publishing.

Sinclair, V. G., and Wallston, K. A. (2004). The development and psychometric evaluation of the brief resilient coping scale. *Assessment* 11, 94–101.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *International journal of behavioral medicine*, *15*, 194-200.

Smith, C. S., Kennedy, E., Quick, K., Carrico, C. K., & Saeed, S. (2022). Dental faculty well-being amid COVID-19 in fall 2020: a multi-site measure of burnout, loneliness, and resilience. *Journal of dental education*, *86*(4), 406-415.

Soroka, I. A. (2022). Social Adaptation of Students in a Multicultural Environment during Distance Learning. *Journal of Curriculum and Teaching*, *11*(1), 208-217.

Stewart, N. K., Rahman, A., Adams, P. R., & Hughes, J. (2021). Same storm, different nightmares: emergency remote teaching by contingent communication instructors during the pandemic. *Communication Education*, *70*(4), 402-420.

Sümen, A., & Adıbelli, D. (2021). Nursing students' readiness and coping strategies for the Covid-19 pandemic in Turkey. *Journal of Professional Nursing*, *37*(3), 553-561.

Sumer, M., Douglas, T., & Sim, K. N. (2021). Academic Development through a Pandemic Crisis: Lessons Learnt from Three Cases Incorporating Technical, Pedagogical and Social Support. *Journal of University Teaching and Learning Practice*, *18*(5), 1.

Swartz, S., & Shrivastava, A. (2022). Stepping up the game–meeting the needs of global business through virtual team projects. *Higher Education, Skills and Work-Based Learning*, *12*(2), 346-368.

Takács, R., Takács, S., T Kárász, J., Horváth, Z., & Oláh, A. (2021). Exploring coping strategies of different generations of students starting university. *Frontiers in psychology*, *12*, 740569.

Teimourtash, M., & Teimourtash, M. (2021). An Appraisal Look into Shielded Journal of Language & Education Volume 7, Issue 4, 2021 Online Education in Covid Era: Resilience Revisited. *Journal of Language and Education, 7*(4), 156-171.

Trogisch, S., Albert, G., Du, J., Wang, Y., Xue, K., & Bruelheide, H. (2020). Promoting resilience of large international collaborative research programs in times of global crisis. *Ecology and Evolution*, *10*(22), 12549-12554.

Tudor, K. E., & Spray, C. M. (2017). Approaches to measuring academic resilience: A systematic review. *International Journal of Research Studies in Education*, *7*(4).

Ulenaers, D., Grosemans, J., Schrooten, W., & Bergs, J. (2021). Clinical placement experience of nursing students during the COVID-19 pandemic: A cross-sectional study. *Nurse education today*, *99*, 104746.

Van De Laar, M., Marotta, J., & De Graaf, L. (2023, January). A Comprehensive Approach to Understanding E-resilience in Education A Review of the Literature. In *14th International Conference on Society and Information Technologies, ICSIT 2023* (pp. 78-85). International Institute of Informatics and Cybernetics.

Van de Velde, S., Buffel, V., van der Heijde, C., Çoksan, S., Bracke, P., Abel, T., Busse, H., Zeeb, H., Rabiee-Khan, F., Stathopoulou, T., Van Hal, G., Ladner, J., Tavolacci, M., Tholen, R., Wouters, E., & C19 ISWS consortium (2021). Depressive symptoms in higher education students during the first wave of the COVID-19 pandemic. An examination of the association with various social risk factors across multiple high- and middle-income countries. *SSM - population health*, *16*, 100936.

Versteeg, M., & Kappe, R. (2021). Resilience and higher education support as protective factors for student academic stress and depression during Covid-19 in the Netherlands. *Frontiers in Public Health*, *9*, 737223.

Volante, L., & Klinger, D. A. (2023). PISA, global reference societies, and policy borrowing: The promises and pitfalls of 'academic resilience'. *Policy Futures in Education*, *21*(7), 755-764.

Von Lautz-Cauzanet, E. (2022). EdTech: Why the project-based approach must change in order to contribute to system resilience. *Prospects*, *51*(4), 573-581.

Wagnild, G. M. (2010). The Resilience Scale user's guide for the US English version of the Resilience Scale and the 14-Item Resilience Scale (RS-14). Worden, MT: The Resilience Center.

Wagnild, G., & Young, H. (1993). Development and psychometric evaluation of the Resilience Scale. Journal of nursing measurement, 1(2), 165-178.

Wald, H. S., & Monteverde, S. (2021). COVID-19 era healthcare ethics education: Cultivating educational and moral resilience. *Nursing ethics*, *28*(1), 58-65.

Wald, H. S., & Ruddy, M. (2021). Surreal becomes real: ethical dilemmas related to the COVID-19 pandemic and professional identity formation of health professionals. *Journal of Continuing Education in the Health Professions*, *41*(2), 124-129.

Wallace, S., Schuler, M. S., Kaulback, M., Hunt, K., & Baker, M. (2021, July). Nursing student experiences of remote learning during the COVID-19 pandemic. In *Nursing Forum* (Vol. 56, No. 3, pp. 612-618).

Wang, J., Liu, W., Zhang, Y., Xie, S., & Yang, B. (2021). Perceived stress among Chinese medical students engaging in online learning in light of COVID-19. *Psychology research and behavior management*, 549-562.

Watermeyer, R., Crick, T., Knight, C., & Goodall, J. (2021a). COVID-19 and digital disruption in UK universities: Afflictions and affordances of emergency online migration. *Higher education*, *81*, 623-641.

Watermeyer, R., Shankar, K., Crick, T., Knight, C., McGaughey, F., Hardman, J., ... & Phelan, D. (2021b). 'Pandemia': A reckoning of UK universities' corporate response to COVID-19 and its academic fallout. *British Journal of Sociology of Education*, *42*(5-6), 651-666.

Windle, G., Bennett, K. M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and quality of life outcomes*, *9*(1), 1-18.
Wosnitza, M., Peixoto, F., Beltman, S., & Mansfield, C. F. (2018). *Resilience in education*. Dordrecht: Springer.

Yang Yowler, J., Knier, K., WareJoncas, Z., Ehlers, S. L., Ekker, S. C., Guasp Reyes, F., ... & Pierret, C. (2021). Rapid adaptation and remote delivery of undergraduate research training during the covid-19 pandemic. *Sustainability*, *13*(11), 6133.

Zhang, X., Huang, P. F., Li, B. Q., Xu, W. J., Li, W., & Zhou, B. (2021). The influence of interpersonal relationships on school adaptation among Chinese university students during COVID-19 control period: Multiple mediating roles of social support and resilience. *Journal of affective disorders*, *285*, 97-104.

Zúñiga, D., Torres-Sahli, M., Nitsche, P., Echeverría, G., Pedrals, N., Grassi, B., ... & Bitran, M. (2021). Reduced burnout and higher mindfulness in medical students after a self-care program during the COVID-19 pandemic. *Rev. Med. Chile*, 846-855.

Appendix 1. The coding scheme for the review.

1. Article.
2. Resilience – at which level of analysis?
3. Country/Institutional context.
4. Definition of resilience.
5. Article – empirical? Conceptual? Commentary?
6. Dependent variable.
7. Explanatory variables.
8. Measurement of resilience.
9. Details of measurement.
10. Main findings.
11. Which factors contribute to resilience (if resilience is a dependent variable)?
12. What are the effects of resilience (if resilience is an explanatory variable)?
13. Implications for which support policies in which contexts matter most.
14. Any gaps for future research identified in the article?

Appendix 2. The overview of included studies.

Study	Country/ Institutional context	Unit of analysis/Sample	Methodology	At which level of analysis is resilience addressed?	Main focus of the study
Abdelsattar et al. (2021)	USA and Canada	Surgical residents	Qualitative	Individual	Training and wellness of surgical residents. Resilience is discussed as a theme in qualitative data segments.
Adjepong et al. (2022)	Ghana	University students, one university	Quantitative	Individual	Resilience is one of the dependent variables in the model, exploring the impacts of the Covid-19 pandemic on university students.
Aguilar et al. (2022)	The Philippines	Filipino women working in the academe and with children in the family	Mixed methods	Individual, community	Resilience levels of Filipino women working in the academe, challenges and their effects, coping strategies.
Appolloni et al. (2021)	Italy	Italian universities	Qualitative	Educational system	Emergency remote education response of the Italian higher education institutions during the Covid-19 pandemic, best practices that should be kept post-pandemic as a resilience strategy of educational systems.
Arima et al. (2020)	Japan	Medical students, one university	Quantitative	Individual	Factors associated with higher/lower psychological distress during the enforced home quarantine. Resilience is discussed in the context of educational interventions recommended for supporting students' self-efficacy.
Asghar et al. (2021)	Pakistan	Pre-service special education teachers in universities	Quantitative	Individual	Psychological resilience. Main explanatory variables of interest are online class participation, social media usage, and social support.
Badiozaman (2021)	Malaysia	University educators teaching online	Qualitative	Individual	Readiness for online teaching and learning (OTL) and competences perceived to be central during the

					pandemic. Resilience is discussed as a sub-theme in qualitative data.
Baharin et al. (2021)	Malaysia	Private higher learning institutions (from the perspective of the top management employees)	Quantitative	Organizational	Factors contributing to organizational resilience.
Baumber et al. (2021)	Australia	Two transdisciplinary undergraduate courses, one university	Qualitative	Education systems	Resilience of the teaching system in which students learn.
Bento et al. (2021)	Brazil	Local adaptation processes in the case university college (via interviews with university lecturers)	Qualitative	Organizational	Local adaptation processes in the case university college. Resilience is understood in a temporal perspective as system's capabilities to anticipate and react to shocks.
Berdida and Grande (2022)	The Philippines	Nursing students, two universities	Quantitative	Individual	The relationship between academic resilience and quality of life, and predictors of academic resilience and quality of life.
Bono et al. (2020)	USA	First year psychology students, one university	Quantitative	Individual	Stress and subjective well-being during the pandemic Resilience is one of the dependent variables in the model, exploring the impacts of the Covid 19-pandemic on students.
Butler (2022)	USA	University students and faculty in the case program	Qualitative	Learning models, curriculum/program	Resilience of the experiental immersive education model (being able to continue in a non-online setting)
Cândea andea and Cândea (2020)	Global	Managers (individual level) and management education (curriculum/program level)	Non-empirical, commentary	Individual, curriculum/program	Discusses new challenges to management education and new opportunities in online markets. Mental resilience is understood as a complex skill related to emotional intelligence and needed for post-pandemic settings.

Chan et al. (2021)	Hong Kong	Nurses undertaking part-time studies	Quantitative	Individual	The psychological impacts of the Covid-19 pandemic on nurses undertaking part-time studies. Associations between resilience and anxiety, resilience and depression.
Chen and Lucock (2022)	UK	University students, England	Quantitative	Individual	Mental health of students during the pandemic. Resilience is one of the dependent variables in the model.
De los Reyes et al. (2022)	Global	University teaching staff	Literature review	Individual	Resilience of university teaching staff.
Delgado-Gallegos et al. (2021)	Mexico	Academic professionals (at the university level – subset of the sample)	Quantitative	Individual	Resilience is one of the explanatory variables in the model exploring determinants of stress.
Deng and Sun (2022)	USA	University students in underserved population groups	Qualitative	Individual	Barriers for e-learning of underserved students. Resilience is understood as succeeding despite academic adversities.
Du et al. (2020)	China, Ireland, Malaysia, Taiwan, South Korea, the Netherlands, the United States	University students	Quantitative	Individual	Sleep quality and sleep duration, with resilience being a moderating variable in the model.
Duffy et al. (2021)	USA	Contemplative practices in academic libraries (for students and faculty), one university	Qualitative	Individual	Contemplative practices or pedagogies in academic libraries as a strategy for librarians, faculty and students to prevent burnout, especially in the Covid-19 pandemic.
Ebersöhn (2020)	Global, examples from Africa are provided for illustrative purposes	Flocking strategies – consultation, consensus, and 'supply chain management' – providing social support at different levels of the educational system	Position paper with conceptual insights	Collective, networks, system	Collaboration for resource distribution during the Covid-19 pandemic, flocking response to high collective need.

Eri et al. (2021)	Australia, Cambodia, China, India, Malaysia	University students	Mixed methods	Individual	Digital competencies and digital resilience.
Federico et al. (2022)	USA	Orthopaedic surgery residents	Review of practices	Individual	The main focus is on physician wellness. Interventions in the wellness curriculum to teach resilience are discussed.
Forycka et al. (2022)	Poland	Medical students	Quantitative	Individual	Resilience, well-being and burnout levels during the Covid-19 pandemic
García et al. (2021)	USA	Dental students, one dental school	Mixed methods	Individual	The effect of the Covid-19 pandemic on dental students' career plans after graduation, wellness and readiness for clinical practice among students who reported a change in career plans.
Gherardi et al. (2021)	USA	Social work students, from the perspective of social work educators	Qualitative	Individual	Challenges of the pandemic and sources of resilience. Resilience is discussed as a theme in qualitative data.
Grunspan et al. (2021)	USA	Biology department, one university	Quantitative	Individual department members, course teams, organizational/ community of practice;	Patterns of network interactions in a community of practice, in- and out-degree of connections, degree of centralization. Resilience is not directly measured, but is used as a conceptual frame and is being interpreted as likely being higher in networks where ties are more distributed across all members rather than completely centralized.
Guthrie et al. (2022)	Australia	Universities	Quantitative	University systems	Financial health of universities. A conflict in the understanding of organizational resilience is discussed – prioritizing short-term resilience in profit-maximizing terms can conflict with long-term resilience which requires resilient workforce and ability to generate reserves and surplus margins which can be used in case of shocks.

Hassan et al. (2022)	Iraq	University students	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of lockdown fatigue.
Hinduan et al. (2021)	Indonesia	University students with academic-related psychological problems	Quantitative study protocol	Individual	Psychological counseling via a mobile-based application. Study protocol for a randomized control non-inferiority trial exploring the effects of an intervention aiming to improve coping self-efficacy (CSE scale), resilience, and a decrease in the level of depression.
Hunt et al. (2021)	USA	University students	Quantitative	Individual	Gender diversity and resilience.
Ibrahim et al. (2021)	Africa	Educational systems, business management education schools	Conceptual, with a case illustration	Educational systems	Business management education's vulnerabilities in the context of the pandemic in Africa. Resilience is discussed in the context of strategies for business management education schools.
Jardon and Choi (2022)	USA	Nursing students, one university	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of mental health outcomes and mental health service use.
Keener et al. (2021)	USA	Nursing students, one university	Mixed methods	Individual	Resilience is one of the independent variables in the model exploring the determinants of quality of life.
Keener et al. (2022)	USA	Nursing students and nursing faculty, one university	Quantitative	Individual	Resilience is a mediating variable in the model exploring the determinants of quality of life.
King et al. (2022)	Hong Kong	Approaches in engineering education	Conceptual, with empirical examples of practices	Educational systems	Prevention, preparedness, response, recovery as the framework of crisis management. Examples of practices in all five attributes of resilient systems are discussed.
Kornacki and Pietrzak (2021)	Global	Online translation training environments	Conceptual	Individual	Learning in online translation training environments and digital resilience. A set of facilitating conditions for digital resilience is discussed.

Kunaviktikul et al. (2022)	Indonesia, Malaysia, the Philippines, Thailand, Vietnam, and Hong Kong	Nursing students and faculty	Qualitative	Individual	Experiences related to online education during pandemic. Resilience is a theme in qualitative data segments.
Liu et al. (2021)	Australia and Malaysia	University students, one university, two campuses	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of psychological well-being.
Luton et al. (2021)	UK	Surgical trainees, one university	Qualitative	Individual	A feasibility study of a training course aiming to enhance resilience.
Mahon and Mahon (2021)	Global	Scenarios of online education disadvantaging minority groups	Conceptual	Individual, community, institutional	Resilience at one of the levels (institutional, communal, individual) may clash or be incompatible with resilience at one or several of the other levels. This argument is supported with various examples focusing on education of minority groups.
Mavu et al. (2020)	Namibia	Blended pharmacy program	Descriptive evaluation of program components	Program	Key elements of the program, initial impacts in the pharmaceutical systems and workforce. Resilience is understood as continuity, not disrupted by the pandemic.
Mead et al. (2021)	USA	Faculty project grantees in a community of practice	Qualitative	Individual, community of practice, organizational	Resilience of faculty participating in a community of practice.
Morales-Rodrigues et al. (2021)	Spain	University faculty, students, and their families	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of stress levels.

Muller et al. (2021)	USA	Policy interventions	Conceptual, with empirical illustration of practices	Community, individual	The authors make the case for the application of the social determinants of health framework to identify structural factors of risk, social risk factors at the individual level, and social needs at the individual level. These are to guide policy planning at the institutional level.
Nandy et al. (2021)	Global	Policy planning	Conceptual	Organizational	Recommendations for staff members and higher education institutions to adopt a resilience model, focusing on 1) issues prominent during the crisis survival stage, 2) rebuild stage (short-term policies after the lockdown), 3) when possible, period of thriving (long-term measures after the lockdowns). Mainly, monitoring, early warning, and preventative action.
Obrad (2020)	Romania	Romanian educators (at different levels, tertiary included)	Mainly quantitative, but mixed methods	Individual	Resilience is one of the dependent variables in the model exploring the impact of the pandemic on educators.
Oliveira et al. (2021)	Portuguese-speaking higher education institutions	University students and educators	Qualitative	Individual	Experiences related to online education during pandemic. Resilience is a sub-theme in qualitative data segments discussing IT platforms as an enabling factor for institutions to continue educational activities.
Pastan (2021)	USA	Dental students, one university	Commentary, with empirical examples	Individual	Mind-body practices, and inclusion of such in the curriculum of dental schools, to help students learning stress management techniques, improve own self-regulation, and be more resilient.
Raghunathan et al. (2022)	Malaysia, Fiji, India	Teacher (at all levels of education, university included)	Descriptive statistics	Individual	Resilience of educators, with resilience understood as including several dimensions - internal (mindset change and upskilling), interpersonal (communication with learners), external (organizational or community climate).

Ren et al. (2021)	China	Students (University students - sub-sample)	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of anxiety and depression.
Ross et al. (2022)	Australia	STEM academics in education	Qualitative	Individual	Views on the educational reform of the academic role (education-focused academic track). Resilience is used as a theoretical construct to interpret findings. When discussed as present, it is largely an outcome of supportive nested environment around the individual.
Roy and Brown (2022)	India	Teaching faculty	Qualitative	Individual	Experiences of several faculty members in universities of India, largely unprepared for the rapid switch to emergency remote education. Resilience is discussed as exhibited at the individual level, despite the lack of institutional support at the organizational level.
Sánchez Ruiz et al. (2021)	Spain	University, data collected via student perceptions' variable, students in one large course	Quantitative	Organizational	Student perception of university and class adaptation to online learning. Resilience is understood as adaptability to the emergency education response, and was facilitated by a switch to flipped-classroom methodology in the didactic approach.
Savitsky et al. (2020)	Israel	Nursing students, one college	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of anxiety.
Scharp et al. (2022)	USA	First-generation university students	Qualitative	Individual	Resilience triggers and communicative resilience processes. The triggers are identified as systemic, situational, or overlapping. For groups suffering from overlapping triggers, previously existing inequities are exacerbated by the pandemic.
Schwartzman (2020)	USA	Digital pedagogy	Commentary, with empirical examples	Individual and community	Systemic inequities affect online education (home/work conflation, at-risk groups are affected disproportinately - issues of online access, but also compound burdens - financial, work, care

					responsibilities). Neoliberal practices put the locus of agency and responsibility at the individual, particularly in crisis, whereas the focus should be at enabling resilience at the collective level.
Servant-Miklos (2022)	the Netherlands	10 students who took *The Climate Crisis* course and 10 students who have not taken it as of 2020, small liberal arts college	Qualitative	Individual, community, systemic levels	Students' experiences of socio-ecological resilience. More focus on individual productivity in the students not taking the Climate Crisis course, more focus on social prioritization in the students who took the course; for those taking the course - shift towards focus on others contributes to a more resilient self, less stress (individual and community resilience become intertangled).
Sexson and Wilson (2021)	USA	Social advocacy and community work as the fourth pillar of university responsibility (in addition to education, research, clinical practice - for medical fields).	Commentary, with empirical examples	Community, societal	Resilience of institutions is sometimes incompatible or at conflict with individual-level resilience. Societal resilience needs to be supported via professional engagement of academics with the community.
Smith et al. (2021)	USA	Dental faculty in four dental schools	Quantitative	Individual	Resilience is one of the dependent variables in the model to explore the impact of the pandemic.
Sood and Sharma (2020)	India	University students	Quantitative	Individual	Resilience is one of the independent variables in the model exploring the determinants of psychological well-being.
Soroka (2022)	Not retrievable from the study description	Foreign students in a multicultural environment	Quantitative	Individual	Resilience of foreign students in a multicultural environment during pandemic distance learning.
Stapleton and Meier (2021)	USA	Collective learning experience facilitating resilience	Qualitative	Collective, systemic, individual	Collective experience of collaboration on the project fosters individual-level resilience. The educational experience also improves community resilience, in terms of food security education.

Stewart et al. (2021)	USA	Teaching staff on temporary contracts	Qualitative	Individual	Experiences of the teaching staff on temporary contracts during the pandemic. Resilience is discussed in the context of supportive networks.
Sümen and Adıbelli (2021)	Turkey	Nursing students, 2 universities	Quantitative	Individual	Nursing students' readiness and coping strategies. Individual resilience is one of the variables assessed (self-reported by students).
Sumer et al. (2021)	3 cases, Turkey, Australia, New Zealand	Teaching staff	Qualitative	Individual	Teaching staff resilience, understood as being able to move to the online emergency response teaching.
Swartz and Shrivastava (2021)	India, Germany, France, USA	Virtual collaboration teams of students	Mixed methods	Individual	Intercultural sensitivity and intercultural competences. Resilience of virtual teams is a secondary focus.
Takács et al. (2021)	Not retrievable from the study description	Students, generation Y and Z, one university	Quantitative	Individual	Psychological coping skills, with generation difference being the main focus of interest.
Teimourtash and Teimourtash (2021)	Iran	Junior undergraduate EFL students, one university	Quantitative	Individual	Resilience of students, control/experimental group, one - taking course in a face-to-face setting, the other - online students.
Trogisch et al. (2020)	Germany and China	Large collaborative research programs (case of a joint doctoral program)	Qualitative	Program	Reflections on adaptations to a program due to pandemic constraints. Educational and training opportunities in the digital space due to travel restrictions.
Ulenaers et al. (2021)	Belgium	Nursing students, 9 schools	Mixed methods	Individual	Nursing students' experiences during the pandemic. A question on resilience is one of the items in the survey.

Versteeg and Kappe (2021)	The Netherlands	University students, universities of applied sciences	Quantitative	Individual	Resilience is one of the independent variables in the model, exploring the determinants of student wellbeing.
von Lautz-Causanet (2022)	Global	EdTech project approach	Viewpoint based on empirical material	Educational systems	Resilience is discussed in the context of designing long-term scalable solutions in educational systems.
Wald and Monteverde (2021)	Global	Pedagogies to foster reflective spaces supporting moral resilience	Commentary	Educational system in the healthcare sector	Pedagogies to foster reflective spaces to deal with ethical issues in healthcare presented by the Covid-19 pandemic.
Wald and Ruddy (2021)	Global	Health care trainees and professionals	Commentary	Individual	Pedagogies to foster reflective spaces to deal with ethical issues in healthcare presented by Covid.
Wallace et al. (2021)	USA	Junior and senior nursing students, one university	Qualitative	Individual	Nursing students' experiences during the pandemic - barriers and challenges. Resilience theme is discussed in the positive aspects – in the context of being able to reframe the challenges and find creative solutions.
Wang et al. (2021)	China	University students engaged in online learning, three medical universities	Quantitative	Individual	Personal and environmental predictors of perceived stress during the pandemic.
Yang Yowler et al. (2021)	USA	Undergraduate students taking a virtual summer program/training	Mixed methods	Individual	Nonrandomized pre-post case study of the training program run during the emergency remote education response (including an external control of undergraduate students for wellbeing measures). Resilience is one of the dependent variables operationalizing well-being outcomes.
Zhang et al. (2021)	China	University students resuming offline	Quantitative	Individual	Resilience is a mediating variable in the model, exploring the determinants of school adaptation.

		education, 2 universities			
Zuniga et al. (2021)	Chile	Fourth year medical students taking an intervention program	Quantitative	Individual	Resilience is one of the dependent variables in the model, exploring the effects of an educational intervention (focusing on mindfulness/self-care, conducted remotely).

Appendix 3. Geographical scope and level of analysis overview.

At which level of analysis is resilience measured/discussed?	The geographical focus of studies reviewed
Individual: student	**Northern America**: Abdelsattar et al., 2021; Bono et al., 2020; Deng and Sun, 2022; Duffy et al., 2021; Federico et al., 2022; García et al., 2021; Gherardi et al., 2021; Hunt et al., 2021; Jardon and Choi, 2022; Keener at al., 2021; Keener et al., 2022; Muller et al., 2021; Pastan, 2021; Scharp et al., 2022; Schwartzman, 2020; Stapleton and Meier, 2021; Wallace at al., 2021; Yang Yowler et al., 2021; **Latin America**: Zuniga et al., 2021; **Europe:** Chen and Lucock, 2022; Forycka et al., 2022; Luton et al., 2021; Morales-Rodrigues et al., 2021; Servant-Miklos, 2022; Ulenaers et al., 2021; Versteeg and Kappe, 2021; **Africa:** Adjepong et al., 2022; **Eurasia:** Sümen and Adıbelli, 2021 **Middle East:** Hassan et al., 2022; Savitsky et al., 2020; Teimourtash and Teimourtash, 2021; **Asia-Pacific:** Arima et al., 2020; Asghar et al., 2021; Berdida and Grande, 2022; Chan et al., 2021; Eri et al., 2021; Hinduan et al., 2021; Kunaviktikul et al., 2022; Liu et al., 2021; Ren et al., 2021; Sood and Sharma, 2020; Wang et al., 2021; et al., 2021; **Global:** Cândea and Cândea, 2020; Du et al., 2020; Kornacki and Pietrzak, 2021; Mahon and Mahon, 2021; Swartz and Shrivastava, 2021; Wald and Ruddy, 2021; **Context not retrievable from the study description:** Soroka, 2022; Takács et al., 2021
Individual: teaching/research faculty staff	**Northern America**: Duffy et al., 2021; Grunspan et al., 2021; Keener et al., 2022; Mead et al., 2021; Muller et al., 2021; Schwartzman, 2020; Smith et al., 2021; Stewart et al., 2021; **Latin America**: Delgado-Gallegos et al., 2021; **Europe:** Morales-Rodrigues et al., 2021; Obrad, 2020; **Africa:** none; **Eurasia:** none; **Middle East:** Sumer et al., 2021; **Asia-Pacific:** Badiozaman, 2021; Kunaviktikul et al., 2022; Aguilar et al., 2022; Raghunathan et al., 2022; Ross et al., 2022; Roy and Brown, 2022; Sumer et al., 2021; **Global:** De los Reyes et al., 2022; Cândea and Cândea, 2020
Individual: supporting staff	**Northern America:** Muller et al., 2021; **Global:** Nandy et al., 2021
Organization *(Universities or higher education institutions, communities, community of practice/department)*	**Northern America**: Grunspan et al., 2021; Mead et al., 2021; Muller et al., 2021; Stapleton and Meier, 2021; Stewart et al., 2021; **Latin America**: Bento et al., 2021; Oliveira et al., 2021; **Europe:** Appolloni et al., 2021; Oliveira et al., 2021; Sánchez Ruiz et al., 2021; **Africa:** Ibrahim et al., 2021; **Eurasia:** none; **Middle East:** none; **Asia-Pacific:** Baharin et al., 2021; Guthrie et al., 2022; **Global:** Mahon and Mahon, 2021; Nandy et al., 2021
Program or curriculum	**Northern America**: Butler, 2022; Stapleton and Meier, 2021; **Latin America**: none **Europe:** Sánchez Ruiz et al., 2021, Trogisch et al., 2020; **Africa:** Mavu et al., 2020; **Eurasia:** none; **Middle East:** none; **Asia-Pacific:** Trogisch et al., 2020; **Global:** Cândea and Cândea, 2020.
Education system	**Northern America**: Schwartzman, 2020; Sexson and Wilson, 2021; Stewart et al., 2021; **Latin America**: none; **Europe:** Appolloni et al., 2021; **Africa:** Ebersöhn, 2020; Ibrahim et al., 2021; **Eurasia:** none; **Middle East:** none; **Asia-Pacific:** Baumber et al., 2021; Guthrie et al., 2022; King et al., 2022 **Global:** Ebersöhn, 2020; Mahon and Mahon, 2021; Schwartzman (2020), Sexson and Wilson, 2021; von Lautz-Causanet, 2022; Wald and Monteverde, 2021.

Appendix 4. Resilience Measurement.

Resilience Conceptualization and Measurement	Studies
At the individual level	**six items Brief Resilience Scale (BRS) (Smith et al. 2008)** in Adjepong et al., 2022; Chen and Lucock, 2022; Du et al., 2020; Eri et al., 2021; García et al., 2021; Hassan et al., 2022; Hunt et al., 2021; Jardon and Choi, 2022; Liu et al., 2021; Smith et al., 2021; Sood and Sharma, 2020; Versteeg and Kappe, 2021; Yang Yowler et al., 2021 **The Connor-Davidson Resilience Scale**: 10 items in Chan et al., 2021; Keener at al., 2021; Keener et al., 2022; Ren et al., 2021; Zuniga et al., 2021; 10 items modified to reflect pandemic impacts in Bono et al. 2020; 4 items in Savitsky et al., 2020; 25 items of the Chinese version (CD-RISC) in Zhang et al., 2021 **Resilience scale (RS-14) developed by Wagnild and Young (1993)** in Delgado-Gallegos et al., 2021 (see Wagnild, 2010, for the details on use); Polish version in Forycka et al., 2022 and Hinduan et al., 2021; Teimourtash and Teimourtash, 2021 **Instruments measuring academic resilience:** Academic adversity index - Academic Risk and Resilience Scale (ARRS) developed by Martin (2013) discussed in Deng and Sun (2022); 30-item academic resilience scale (AR-30) by Cassidy (2016) in Berdida and Grande, 2022, and discussed in Deng and Sun (2022) **Other instruments:** Brief Resilient Coping Scale (BRCS) by Sinclair and Wallston (2004), the Spanish version (Moret-Tatay et al., 2015) in Morales-Rodriguez et al. (2021); Coping Strategies used in Crisis Intervention Scale (CSCIS) by Mete-Otlu and Aysan (2015) in Sümen and Adıbelli, 2021; the Maddi-Kobasa Hardiness Scale (1984) in Soroka, 2022; Psychological Immune Competence Inventory Survey (Oláh, 2005) in Takács et al., 2021; coping and adaptation assessed via self-efficacy (GSES) in Arima et al., 2020; the modified personal resilience scale (PRS) by Cooper et al. (2013), with the addition of perseverance (self-designed construct, based on other studies) and open-ended questions in the survey in Aguilar et al. (2022); construct as part of self-developed survey in Asghar et al., 2021; Obrad, 2020; Raghunathan et al., 2022; Ulenaers et al., 2021; Not directly measured, but discussed as mental resilience – with implications of measurement emotional skills – emotional self-regulation, emotional sensitivity/emotional intelligence in Candea and Candea (2020); Post-intervention indirect assessment in Luton et al., 2021 **A theme in qualitative data or conceptual discussion:** Abdelsattar et al., 2021; Badiozaman, 2021; Duffy et al., 2021; Federico et al., 2022; Gherardi et al., 2021; Kornacki and Pietrzak, 2021; Kunaviktikul et al., 2022; Pastan, 2021; Ross et al., 2022; Roy and Brown, 2022; Scharp et al., 2022; Servant-Miklos, 2022; Stewart et al., 2022; Sumer et al., 2021; Swartz and Shrivastava, 2021; Wald and Ruddy, 2021; Wallace at al., 2021; Wang et al., 2021

At the programmatic, organizational or systems level	**Programmatic:** Butler, 2022; Mavu et al., 2020; Sánchez Ruiz et al., 2021; Trogisch et al., 2020 **Organizational:** Baharin et al., 2021; Bento et al., 2021; Guthrie et al., 2022; Nandy et al., 2021; Oliveira et al., 2021; **Systems:** Appolloni et al. 2021; Baumber et al., 2021; Guthrie et al., 2022; Ibrahim et al., 2021; King et al., 2022; Sánchez Ruiz et al., 2021; von Lautz-Causanet, 2022; Wald and Monteverde, 2021
Conceptualization at different levels	Cândea and Cândea, 2020; Ebersöhn, 2020; Grunspan et al., 2021; Mahon and Mahon, 2021; Mead et al., 2021; Muller et al., 2021; Schwartzman, 2020; Servant-Miklos, 2022; Sexson and Wilson, 2021; Stapleton and Meier, 2021

Appendix 5. The effects of resilience.

Type of effect	At the individual level	At the curriculum/program level	At the level of organization
Aspects of psychological well-being	**Lower level of anxiety** in Chan et al., 2021; Delgado-Gallegos et al., 2021; Jardon and Choi, 2022; Ren et al., 2021; Savitsky et al., 2020 **Lower level of stress** in Arima et al., 2020; Butler, 2022; Delgado-Gallegos et al., 2021; Hunt et al., 2021; Jardon and Choi, 2022; Morales-Rodrigues et al., 2021; Sood and Sharma, 2020; Wang et al., 2021 **Lower levels of depression** in Jardon and Choi, 2022; Ren et al., 2021; Versteeg and Kappe, 2021; **Decreased negative association between perceived stress, anxiety and sleep quality** in Du et al., 2020; **Higher level of well-being** in Butler, 2022; Federico et al., 2022; Liu et al., 2021; Sood and Sharma, 2020; Stapleton and Meier, 2021 **Better quality of life** in Keener at al., 2021; Keener et al., 2022 **Lower level of lockdown fatigue** in Hassan et al., 2022 **College students' school adaptation** in Zhang et al., 2021; **A state of emotional safety allowing one to retain self-motivation and creativity, emotional well-being** in Cândea and Cândea, 2020; Wald and Monteverde, 2021; Wald and Ruddy, 2021		
Innovative practices established	Mead et al., 2021	Butler, 2022; Cândea and Cândea, 2020; Mead et al., 2021; Schwartzman, 2020; Sexson and Wilson, 2021	Appolloni et al., 2021; Muller et al., 2021; Nandy et al., 2021

Appendix 6. Factors facilitating resilience. (synthesized based on direct empirical relationships established, as well as discussed implications in the studies).

Protective factors – type and at which level of analysis?	Resilience At the individual level	Resilience At the level of community, organization or program	Resilience at the systems level
Intrapersonal			
Ability to adapt	Bono et al., 2020; De los Reyes et al., 2022; Gherardi et al., 2021; Roy and Brown, 2022; Soroka, 2022; Wallace at al., 2021; Yang Yowler et al., 2021;		
Lower levels of perceived stress or lower levels of anxiety	Adjepong et al., 2022; Yang Yowler et al., 2021; Du et al., 2020; Eri et al., 2021; Obrad, 2020; Pastan, 2021; Sumer et al., 2021		
Grit and gratitude as personal characteristics	Aguilar et al., 2022; Bono et al., 2020; Federico et al., 2022		
Resilience-enhancing coping mechanisms (positive re-evaluation, problem-solving skills, prioritization, time management, self-organizing mindset and supportive routines, self-care, physical activity, spirituality) and emotional skills (emotional self-regulation, emotional intelligence, sensitivity)	Aguilar et al., 2022; Arima et al. 2020; Bono et al., 2020; Cândea and Cândea, 2020; Eri et al., 2021; Federico et al., 2022; Federico et al., 2022; Gherardi et al., 2021; Morales-Rodrigues et al., 2021; Pastan, 2021; Raghunathan et al., 2022; Ross et al., 2022; Scharp et al., 2022; Takács et al., 2021; Yang Yowler et al., 2021; Wald and Monteverde, 2021; Wallace at al., 2021		Baumber et al., 2021; Wald and Monteverde, 2021;
Love of and/or sense of duty tied to own profession	Kunaviktikul et al., 2022; Sümen and Adıbelli, 2021		
Higher levels of academic achievement	Sümen and Adıbelli, 2021		
Prior experience in dealing with multiple sources of adversity	Wallace at al., 2021; Gherardi et al., 2021		
Interpersonal			
Supportive relations/communication in the academic environment (faculty members, administrators), including administrative support for increased distance services, and/or hiring of staff to support wellness	Abdelsattar et al., 2021; Aguilar et al., 2022; Asghar et al., 2021; De los Reyes et al., 2022; Deng and Sun, 2022; Duffy et al., 2021; Eri et al., 2021; Federico et al., 2022; Gherardi et al., 2021; Grunspan et al., 2021; Keener at al., 2021; Kunaviktikul et al., 2022; Mead et	Bento et al., 2021; Butler, 2022; Grunspan et al., 2021; Mavu et al., 2020; Mead et al.,	Appolloni et al. 2021; Baumber et al., 2021; Ebersöhn , 2020; King et al., 2022; Wald and Monteverde, 2021;

programs and interventions; mentoring	al., 2021; Muller et al., 2021; Obrad, 2020; Scharp et al., 2022; Raghunathan et al., 2022; Yang Yowler et al., 2021; Ross et al., 2022; Roy and Brown, 2022; Savitsky et al., 2020; Sumer et al., 2021; Ulenaers et al., 2021; Wald and Monteverde, 2021; Wallace at al., 2021	2021; Muller et al., 2021; Trogisch et al., 2020	
Support from peers, social learning	Asghar et al., 2021; Eri et al., 2021; Gherardi et al., 2021; Keener at al., 2021; Kornacki and Pietrzak, 2021; Kunaviktikul et al., 2022; Mead et al., 2021; Ross et al., 2022;; Scharp et al., 2022; Stewart et al., 2021; Swartz and Shrivastava, 2021; Yang Yowler et al., 2021; Zhang et al., 2021; Roy and Brown, 2022; Stapleton and Meier, 2021; Sumer et al., 2021; Takács et al., 2021; Wald and Monteverde, 2021; Wallace at al., 2021	Bento et al., 2021; Butler, 2022; Mead et al., 2021; Stapleton and Meier, 2021	Baumber et al., 2021; Ebersöhn , 2020; King et al., 2022; Wald and Monteverde, 2021;
Supportive relationships/communication in the non-academic environment (support staff at work, counselors, family, friends)	Aguilar et al., 2022; Asghar et al., 2021; Cândea and Cândea, 2020; De los Reyes et al., 2022; Deng and Sun, 2022; Duffy et al., 2021; Federico et al., 2022; Gherardi et al., 2021; Hinduan et al., 2021; Mead et al., 2021; Muller et al., 2021; Obrad, 2020; Raghunathan et al., 2022; Scharp et al., 2022; Sumer et al., 2021; Zhang et al., 2021	Mead et al., 2021; Muller et al., 2021;	Ebersöhn , 2020; King et al., 2022
Bidirectional lines of communication, balancing feedbacks, building trust and supportive environment	Abdelsattar et al., 2021; Deng and Sun, 2022; Duffy et al., 2021; Eri et al., 2021; Federico et al., 2022; Kornacki and Pietrzak, 2021; Mead et al., 2021 Savitsky et al., 2020; Sumer et al., 2021; Wald and Monteverde, 2021; Wallace at al., 2021	Butler, 2022; Mead et al., 2021	Baumber et al., 2021; King et al., 2022; Wald and Monteverde, 2021;
Innovative ways to connect online	Abdelsattar et al., 2021; De los Reyes et al., 2022; Duffy et al., 2021; Mead et al., 2021; Raghunathan et al., 2022; Roy and Brown, 2022; Yang Yowler et al., 2021;	Bento et al., 2021; Cândea and Cândea, 2020; Mead et al., 2021; Oliveira et al., 2021; Sánchez Ruiz et al., 2021; Trogisch et al., 2020	Ebersöhn , 2020; King et al., 2022

Innovative ways to connect offline	Mead et al., 2021; Muller et al., 2021;	Butler, 2022; Mead et al., 2021; Muller et al., 2021;	
Context setting			
Preventative policies to address systemic injustices (at various levels)	Deng and Sun, 2022 Muller et al., 2021; Obrad, 2020; Scharp et al., 2022	Muller et al., 2021; Schwartzman, 2020; Sexson and Wilson, 2021; Stewart et al., 2021;	Ibrahim et al., 2021; Stewart et al., 2021; Sexson and Wilson, 2021
Equity and reciprocity as enablers of co-creation opportunities, creating opportunity in addition to equity, support to at-risk groups – adult students with multiple responsibilities (job, parenting), first or last year students, minoritized students, faculty and staff, especially with intersecting identities, or on temporary contracts, students with lack of IT access, early career researchers who suffered from restricted access to field sites or laboratories abroad, education-track academics.	Berdida and Grande, 2022; Deng and Sun, 2022; Federico et al., 2022; Forycka et al., 2022; García et al., 2021; Hunt et al (2021), Ibrahim et al (2021), Mahon and Mahon, 2021; Muller et al. (2021), Ross et al., 2022; Savitsky et al., 2020; Schwartzman, 2020; Sexson and Wilson, 2021; Sümen and Adıbelli, 2021 Chen and Lucock, 2022;	Muller et al., 2021; Schwartzman, 2020; Sexson and Wilson, 2021; Stewart et al., 2021; Trogisch et al., 2020	Baumber et al., 2021; Ibrahim et al., 2021 Mahon and Mahon, 2021; Muller et al., 2021; Stewart et al., 2021; von Lautz-Causanet, 2022
Reserves serving as buffers	Muller et al., 2021;	Guthrie et al., 2022; Muller et al., 2021;	Baumber et al., 2021; Guthrie et al., 2022;
At the national level/governmental support	De los Reyes et al., 2022; Obrad, 2020; Deng and Sun (2022), Trogisch et al., 2020; Ulenaers et al., 2021;	Guthrie et al., 2022;	Appolloni et al., 2021; Baumber et al., 2021; Ebersöhn , 2020; Guthrie et al., 2022;

At the institutional level			
Enterprise resource management for risk assessment, early warning, identifying new opportunities given changing contexts	Muller et al., 2021;	Baharin et al., 2021; Guthrie et al., 2022; Muller et al., 2021; Trogisch et al., 2020	Baumber et al., 2021; King et al., 2022; Muller et al., 2021
Institutionalized platforms and open communication channels for collaboration, sharing best practices and experiences for innovation	Grunspan et al., 2021; Kornacki and Pietrzak, 2021; Mead et al., 2021; Ross et al., 2022; Schwartzman, 2020; Sumer et al., 2021	Butler, 2021; Bento et al., 2021; Ebersöhn, 2020; Grunspan et al., 2021; Mead et al., 2021; Schwartzman, 2020; Sexson and Wilson, 2021	Baumber et al., 2021; Brack et al. (2021); King et al., 2022
Presence of an effective leader assuming responsibility for decision-making in crisis			Appolloni et al., 2021; Baumber et al., 2021;
Self-organization at local levels	Muller et al., 2021;	Butler, 2022; Muller et al., 2021; Schwartzman, 2020;	Baumber et al., 2021; Ebersöhn , 2020
Faculty programs supporting well-being of faculty and students, physical wellness programs	Abdelsattar et al., 2021; Aguilar et al., 2022; Arima et al. 2020; Federico et al., 2022; Forycka et al., 2022; Keener at al., 2021; Keener et al., 2022; Muller et al., 2021;, Takács et al., 2021; Ulenaers et al., 2021; Yang Yowler et al., 2021;	Muller et al., 2021;	
Agentic competence of educators. Professional development opportunities for educators,	Badiozaman, 2021; Eri et al., 2021; Obrad, 2020; Oliveira et al., 2021; Savitsky et al., 2020; Sumer et al., 2021; Wallace at al (2021)	Sánchez Ruiz et al., 2021;	Baumber et al., 2021; King et al., 2022

especially trainings on conducting education online (strategies for enhancing engagement, providing feedback, creating assessments)		Schwartzman, 2020;	
Resilience-enhancing trainings (mindfulness program, self-care, techniques of self-regulation and evoking positive emotions, reflexive practices, self-awareness)	Aguilar et al., 2022; Arima et al. 2020; Du et al., 2020; Duffy et al., 2021; Federico et al., 2022; Forycka et al., 2022; García et al., 2021; Keener at al., 2021; Keener et al., 2022; Luton et al., 2021; Pastan, 2021; Smith et al., 2021; Yang Yowler et al., 2021; Zuniga et al., 2021		
Resilience-enhancing planning at the organizational management level; flexible remote work policies	Federico et al., 2022; Forycka et al., 2022; Keener et al., 2022; Yang Yowler et al., 2021	Guthrie et al., 2022; Nandy et al., 2021	Baumber et al., 2021; Guthrie et al., 2022; Ibrahim et al., 2021; King et al., 2022
At the program/curriculum level			
Being prepared for online learning/blended programs/online learning materials	Abdelsattar et al., 2021; Badiozaman, 2021; Deng and Sun, 2022; Eri et al., 2021; Gherardi et al., 2021; Keener at al., 2021; Keener et al., 2022; Kornacki and Pietrzak, 2021; Mead et al., 2021; Obrad, 2020; Raghunathan et al., 2022; Roy and Brown, 2022; Yang Yowler et al., 2021; Schwartzman (2020), Sumer et al., 2021; Teimourtash and Teimourtash, 2021; Wallace at al., 2021	Mavu et al., 2020; Mead et al., 2021; Oliveira et al., 2021; Sánchez Ruiz et al., 2021; Schwartzman, 2020; Trogisch et a., 2020	Baumber et al., 2021; Ibrahim et al., 2021; King et al., 2022;
Problem-based, critical pedagogies fostering reflectivity; work-integrated curriculum to contextualize learning on the job, or project-based curriculum to foster resilience-related competences	Duffy et al., 2021; Gherardi et al., 2021; Keener at al., 2021; Servant-Miklos, 2022; Stapleton and Meier, 2021; Wald and Monteverde, 2021;Wald and Ruddy, 2021; Wallace at al., 2021; Yang Yowler et al., 2021;	Gherardi et al., 2021; Mavu et al., 2020; Stapleton and Meier, 2021	Ibrahim et al., 2021; Stapleton and Meier, 2021; Wald and Monteverde, 2021;
At the level of individual or his/her micro-			

environment			
Designated home workspace or workspace on-campus; separate work-home space boundaries	Deng and Sun, 2022; Keener et al., 2021; Keener et al., 2022; Muller et al., 2021; Roy and Brown, 2022; Schwartzman, 2020; Wallace at al., 2021	Schwartzman, 2020;	
Level of experienced adversity, for staff – sometimes the level of teaching load during the Covid-19 pandemic	Chen and Lucock, 2022; Deng and Sun, 2022; Muller et al., 2021;	Grunspan et al., 2021;	

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