Title: Physiotherapy students' views on the changes to education during the covid-19 pandemic in preparation in for their role as a Band 5 physiotherapist

Introduction

Covid-19 was announced as a public health emergency by January 2020 (WHO,2023) by March 2020 a world pandemic was declared (Ayenigbara et al, 2020). Covid-19 is characterised as respiratory failure caused by the SARS-CoV-2 virus (WHO, 2023). Being transmitted by coughing, sneezing, breathing or speaking, (WHO 2023) close contact increases the risk of transmission, social distancing was enforced to reduce the rate of transmission (Chesterton et al, 2022).

Traditionally, the UK physiotherapy curriculum is delivered by campus learning model and clinical placements (Chesterton et al, 2022). The covid-19 pandemic forced the closure of universities due to the national lockdown, triggering an unprecedented disruption to healthcare systems and medical education (Alsoufi, 2020; Mian 2020). The teaching of medical curriculum was translated to an online platform (Lee et al, 2022). The shift to online learning enabled education to continue during the covid-19 pandemic (Papapanou et al, 2021). Cessation of lectures on campus altered the student experience and the delivery of teaching due to the dramatic shift to online learning, caused by the covid-19 pandemic (Burns et al, 2020). Main et al (2020) hypothesised that there was potential of disruption to assessments due them no longer being carried out face-to-face, as they had been transferred to the online platform, which could lead to reduced student satisfaction.

Chesterton et al (2022) cross-sectional survey of 236 former physiotherapy students, investigated how satisfied physiotherapy students felt about online and hybrid learning during the covid-19 pandemic. Concluding that online learning was recognised to be a flexible and convenient method of learning. 79% of the students considered that online education had a negative influence on their understanding, generating low student satisfaction and feeling disadvantaged on account of not receiving face-to-face teaching. Students found that key

elements such as hands-on practical skills diminished and that not all lectures had the ability to carry out online lectures. The Chesterton et al (2022) study is of importance to the current investigation as it may become apparent that similar themes and findings may emerge. According to McNair and Lewis (2012) cross sectional study designs offer the lowest level of aetiology due to participants being recorded once, relating to the current study as one questionnaire and one focus group will take place once and no planned follow up.

Godbold et al (2022) interviewed sixteen student nurses who had worked as healthcare assistants as part of the covid-19 response, the following year twelve participants from the original group were re-interviewed to explore their experience of transitioning to qualifying during the covid-19 pandemic. Three themes emerged: change in the clinical environment, mental health and well-being and reflecting on the past in order to learn for the future. Their findings suggest that student nurses experienced a unique transition to qualification, demonstrating increased resilience, similarly to those of physiotherapy students. Mandatory preceptorship programmes are required for newly qualified graduates to increase expectations and responsibilities in the clinical environment, with the support of the Trust (Godbold et al, 2022). This supports the unique transition and develops professionalism within the workplace. The qualitative research provides level IV evidence according to Levels of Evidence Based Medicine (Song and Chung, 2010). Please see Appendix 1 for Song and Chung (2010) levels of evidence. Daly et al (2007) suggests that as the study provides in-depth data on the experiences and/ or views of an individual can be explored, providing a greater understanding of nurses' experiences throughout their training. The current research relating to the preparedness of physiotherapy students has an association with the student nurses as they experienced similar circumstances whilst completing their training during the covid-19 pandemic.

A retrospective case-control study carried out by Rossettini et al (2021) investigated physiotherapy student satisfaction of online learning during the covid-19 pandemic in Italy.

Comparison of student satisfaction and performances between students who were taught online due to the pandemic and a group of students who completed the same course face-to-face five years prior, exploring the possibility that online learning caused dissatisfaction. Their findings proposed a statistical significance in favouring online teaching, a challenge reported was to ensure that University trained lecturers deliver a high standard of teaching via online resources (Rossettini et al, 2021); the levels of satisfaction are related to the levels of preparedness in relation to the current research. The study offers Level III evidence according to Levels of Evidence Based Medicine (Song and Chung, 2010).

Dost et al (2020) cross-sectional online national survey explored the attitudes of the perception of e-learning by 2721 medical students across 39 medical schools by students who studied during the covid-19 pandemic. Their findings implied that online and face-to-face learning should both be incorporated to improve the efficiency of medical education (Dost et al, 2020). Their findings suggest that flexible teaching platforms are positive outcomes for online e-learning, however poor internet connections and family distractions are negative outcomes for e-learning. The perception of online learning of medical students relates to the current research into physiotherapy students with their experience of learning during the pandemic. Equally, to Chesterton et al (2022) this cross-sectional survey provides low level of evidence, although a high response rate gathered provides a clear understanding to how medical students perceived online learning during the covid-19 pandemic.

A thorough literature analysis highlights there is limited research into physiotherapy students learning experience during the covid-19 pandemic. Furthermore, there is no current literature investigating the preparedness of physiotherapy students transitioning to Band 5 physiotherapists in the NHS, after completion of their online training due to the covid-19 pandemic, hence the reasoning for this study. Has online learning affected perception of preparedness for physiotherapy students who trained during the covid-19 pandemic in the following areas: Clinical Practice, Communication, Teaching and Learning, Understanding the Work Environment and Team Working?

Research Methodology

Design

A mixed method study allows the integration of both qualitative and quantitative data to be analysed for one single study (Creswell, 1999). This form of data collection can clarify data collected from qualitative and quantitative analyses (Castro et al, 2010). The use of a mixed method design allows the researcher to gather plentiful information, which would not be acquired by using each method separately (Almeida, 2018). Mixed method research study provides benefits as it allows the researcher to comprehend the phenomena qualitatively as well as being clarified through statistical analysis (Creswell, 1999). Social and health sciences have utilized mixed method research as it involves the combination of qualitative and quantitative research (Skamagki et al, 2022). Physiotherapy research has principally been distinguished by a focus of either quantitative or qualitative methodologies. Integration of data is a notable attribute of mixed methods research, where researchers collect data separately but intentionally combine data (Skamagki et al, 2022). The study recommends a comprehensive judgement on the collected data to draw conclusions.

Incorporation of the two methods will allow for a deeper understanding of how prepared physiotherapy students were for their role as a Band 5 physiotherapist, owing to their experience of online learning. The collaborative approach will investigate whether the educational changes faced by physiotherapy students during the covid-19 pandemic have affected their readiness to become newly qualified rotating Band 5 physiotherapists while working in the NHS. A common goal of the research was to understand how traditional physical therapy teaching methods delivered to students have changed during the covid-19 pandemic. Describe qualified physiotherapists' perceptions of the support they received by their Trust to meet the workplace expectations in relation to the managers, employers, colleagues in the workplace. Investigate the strategies offered within the Trust as they were perceived by physiotherapists and analyse the relative importance and effectiveness of these strategies as

identified by them. Discover if and how former physiotherapy students are meeting the learning goals set by the University, their Trust and their own expectations after working as a Band 5 Physiotherapist.

Methods

Concurrent mixed methods design was selected, pragmatic reasoning being qualitative and quantitative data can be collected at the same time, as the study is Master's student led, meaning there are time constraints due to the course duration and therefore does not allow for an exploratory design. Exclusion criteria included physiotherapy students who commenced their degrees before 2019 or are working in a private practice and not the NHS.

Questionnaires are a beneficial survey tool which can assess a large population as well as gain a greater statistical power, whereas surveys are functional, although requiring extensive planning to ensure they can be accessed with ease (Jones et al, 2013). A disadvantage with using electronic questionnaires is that access online may not be available to everyone who is eligible for the study, subsequently there may be non-responses (Jones et al, 2013).

An anonymous survey encourages truthful self-disclosure of sensitive or stigmatizing information or experiences (Murdoch, 2014). Couper and Singer (2009) highlight the importance of obtaining consent and preserving the confidentiality of the participant's responses. Informed consent indicates that that the individual participant has been informed of the content of the survey and they have given their consent to partake in the study, meeting ethical guidelines.

The questionnaire intended to investigate the preparedness of physiotherapy students who had experienced educational changes due to the covid-19 pandemic. The questionnaire was based on an existing questionnaire by Braniff et al (2015) study 'Assistantship improves medical students' perception of their preparedness for starting work'. Tsang et al (2017) suggests that using an existing questionnaire is more efficient and saves resources and time. A validated and published questionnaire allows the comparison of findings between both

studies and has been piloted, demonstrating its validity (Boynton and Greenhalgh, 2004). Braniff et al (2015) questionnaire had been influenced by Illing et al (2008) study 'How prepared are medical students to begin practice?' Braniff et al (2015) investigated the preparedness of medical students for clinical practice before and after they had carried out their assistantships. The study included five key areas of investigation: Clinical Practice Skills, Communication, Teaching and Learning, Understanding the Work Environment and Team Working. The current research will investigate the following five areas of interest as identified by Braniff et al (2015) Clinical Practice, Communication, Teaching and Learning, Understanding the Work Environment and Team Working. The questionnaires were designed to have an online format, allowing participants to answer at their convenience. Likert responses are used significantly in exercise science research, prevalent psychometric item scoring systems attempt to quantify opinions, interests, or the effectiveness of an intervention (Bishop and Herron, 2015). Reasoning why a Likert scale has been selected for the questionnaires and were scored as: 1 Strongly Agree, 2 Agree, 3 Neutral, 4 Disagree and 5 Strongly Disagree.

Table 1: Likert Scale used for questionnaire.

Likert Scale	
Strongly Agree	1
Agree	2
Neutral	3
Disagree	4
Strongly Disagree	5

Ethical Approval

Ethical approval was obtained from the University of Birmingham Ethics Committee (approval number: MCR2223_29). The participants were informed before completing the questionnaire that their answers were anonymous. Participants were made aware that by completing the questionnaire and submitting their responses they were consenting to the study.

Survey Pilot

Primary piloting was conducted and assessed for validity by five MSc second year physiotherapy students at the University of Birmingham. Pilot testing refers to a mini version of the research study and refers to pre-testing of a full-scale study, a crucial element of a study design, decreasing mistakes and increasing the quality of the questionnaire (Van Teijlingen and Hundley, 2002). The physiotherapy students involved in the pilot assessed the ease of completion, question format and provided comments for improvement. Respondent demographic was initially captured including their gender, age, ethnicity, year of study and type of degree. The survey then guided the participants into the five key areas of interest. The data that the participants provided ensured that they could not be identified based upon the information provided.

Respondents

All respondents were physiotherapy students who were either BSc students commencing their degree in September 2019 or MSc students commencing their degree in September 2020. The survey was emailed to Senior Physiotherapy leads in the Acute NHS Trusts across the West Midlands to distribute to physiotherapists who met selection criteria. The study was entirely voluntary, the respondents were informed that the completion of the study and submission implied their consent to the survey.

Table 2: Respondent Demographic

Respondent Demographic	
Gender	
Female	**80%**
Male	**20%**
Age	
18-24	**73%**
25-34	**27%**
Ethnic Group	
White	**13**
Black or African American	**1**
Asian	**1**
Year of study and course	
BSc commencing in 2019	**67%**
MSc commencing in 2020	**33%**

The gender, age, ethnic group, year of study and course type are presented in the table above. The survey analysis includes 15 respondents who completed the questionnaire. Participants included 12 women and 3 men, age ranged from 18 to 34. 10 participants were BSc students, commencing their degree in 2019 (67%). The remaining 5 participants were MSc students with their degree commencing in 2020 (33%). Please see Appendix 2, 3, 4 and 5 for participant demographic figures.

Statistical Analysis

The questionnaire was divided into five areas: Clinical Practice, Communication, Teaching and Learning, Understanding the Work Environment and Team Working. The participants ranked each question for the level of preparedness they felt for their role as a Band 5 physiotherapist after receiving online learning as part of their physiotherapy education. 1 was "Strongly Agree" and 5 was "Strongly Disagree". The data gathered allowed for statistical analysis to be performed in SPSS software. A Chi-square goodness of fit test was selected to examine the fit of a one-way frequency distribution with the variable of interest (Forthofer et al, 2007). Frequency of responses to each category within the Likert scale for each question were input into SPSS to calculate the p-value and determine significance.

Quantitative and Qualitative Integration

A peer MSc student (B.T) carried out the qualitative data of the study via a focus group to delve deeper into the learning experience of student physiotherapists who trained during the covid-19 pandemic. Skamagki et al (2022) suggest that integration is a unique quality of mixed methods research which will be beneficial to the current research to gain a deeper understanding of the preparedness of the physiotherapy students. The integration has examined for correlations in the findings in the questionnaire and the focus group.

Results

Considering the following options: Very Effective, Somewhat Effective, Neither Effective nor Ineffective, Somewhat Ineffective, Very Ineffective; physiotherapists were asked to rate how

effective they found online teaching and learning within physiotherapy. 9 of the respondents felt that they were prepared for their role as a Band 5 physiotherapist after graduating, with 6 respondents reporting that they did not feel prepared. 100% of the respondents felt that they had been supported by the Trust to help them feel confident in their clinical practice and progression.

Table 3: Effectiveness of online learning in preparation for becoming a Band physiotherapist.

How effective did you find online learning within your physiotherapy training?					
	Online Learning Descriptive	**Online Learning Number of participants**	**Mode**	**P Value**	**Significance**
Very effective	6.7%	1	Somewhat ineffective (5)	**0.504**	**No**
Somewhat effective	26.7%	4			
Neither effective or ineffective	13.3%	2			
Somewhat ineffective	33.3%	5			
Very ineffective	20%	3			

Please see Appendix 6 and 7 for figure of effectiveness of online learning in preparation for becoming a Band 5 physiotherapist.

Table 4: Effectiveness of online teaching in preparation for becoming a Band physiotherapist.

How effective did you find online teaching within your physiotherapy training?					
	Online Teaching Descriptive	**Online Teaching Number of participants**	**Mode**	**P Value**	**Significance**
Very effective	13.3%	2	Somewhat effective (6)	**0.323**	**No**
Somewhat effective	40%	6			
Neither effective or ineffective	20%	3			
Somewhat ineffective	20%	3			
Very ineffective	6.7%	1			

Please see Appendix 8 and 9 for figure of effectiveness of online teaching in preparation for becoming a Band 5 physiotherapist.

Table 5: Rating of preparedness after graduating, after receiving online learning.

Rating preparedness after graduating	
Course Type	**Being prepared for the role**
BSc degree commencing 2019	50%
MSc degree commencing 2020	80%

50 % of BSc student felt prepared after graduating and 80% of MSc students felt prepared after graduating. Overall, 75% of the respondents were prepared for their role as a Band 5 physiotherapist after graduating.

Table 6: Rating of preparedness after graduating, after receiving online learning.

Rating preparedness after graduating					
	Online Teaching Descriptive	**Online Teaching Number of participants**	**Mode**	**P Value**	**Significance**
Very prepared	0	0	Somewhat prepared (8)	**0.013**	**No**
Somewhat prepared	53.3%	8			
Neither prepared nor unprepared	20%	3			
Somewhat very unprepared	20%	3			
Very unprepared	6.7%	1			

Please see Appendix 10 and 11 for figure of preparedness of Band 5 physiotherapy respondents after graduating and Chi-square goodness of fit statistical analysis.

Table: 7 Rating of preparedness 6 months into the role, after receiving online learning.

Rating preparedness 6 months into the role					
	Online Teaching Descriptive	**Online Teaching Number of participants**	**Mode**	**P Value**	**Significance**
Very prepared	66.7%	10	Very prepared (10)	**0.001**	**Yes**
Somewhat prepared	33.3%	5			
Neither prepared nor unprepared	0	0			
Somewhat very unprepared	0	0			
Very unprepared	0	0			

Please see Appendix 12 for Chi-square goodness of fit test figure of preparedness of Band 5 physiotherapy respondents 6 months into the physiotherapy role.

Table 8: Impact on preparedness for the role with lack of face-to-face learning.

If you did not feel prepared, do you think this was due to the lack of face-to-face learning?		Mode	P Value
Yes	6	6 (Yes)	0.439 Not Significant
No	9		

Please see Appendix 13 for Chi-square goodness of fit test figure for preparedness due to lack of face-to-face learning.

Table 9: Has the Trust you are working in help you feel confident in your clinical practice?

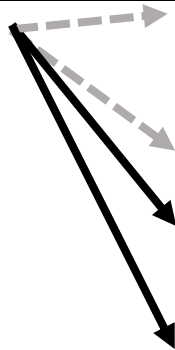| Support from Trust to improve confidence within clinical practice		Mode	P Value
Yes	15	Yes	0.001 Significant
No	0		

Please see Appendix 14 for Chi-square goodness of fit test figure for support from Trust to improve confidence within clinical practice.

Figure 1: Preparedness for Clinical Practice

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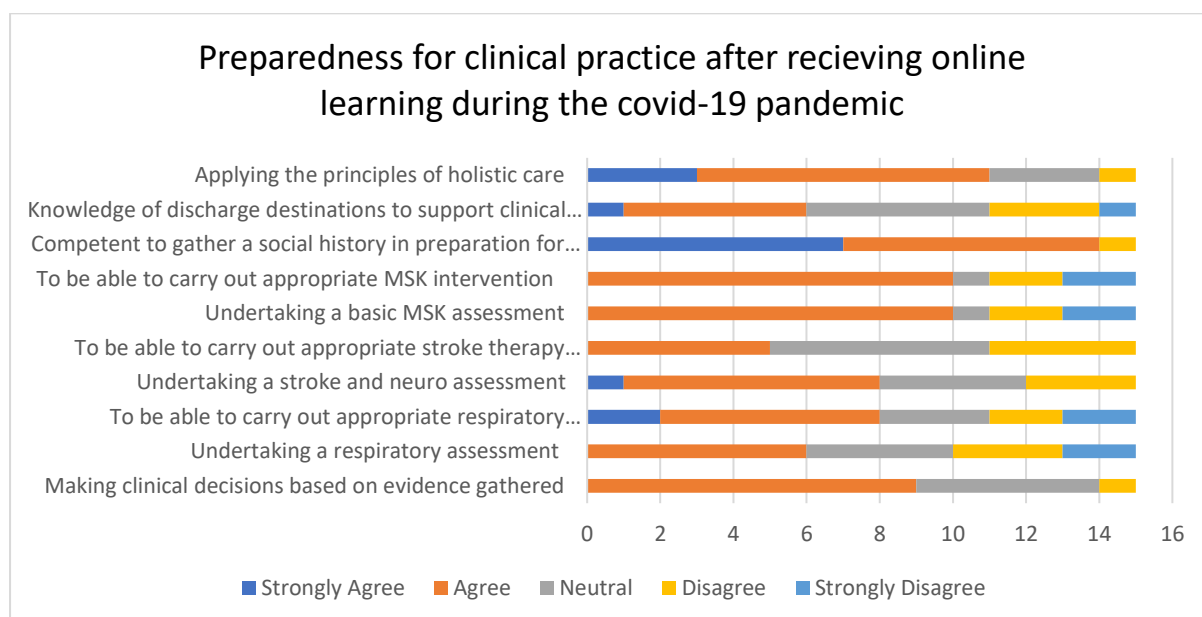
Please see Appendix 15 for figure of preparedness of physiotherapy respondents 6 months into their physiotherapy role.

Table 10: Clinical Practice Chi-square goodness of fit test and mode value for

Overarching Themes	Categories	Quantitative Findings	Linking Activity	Quote from Qualitative Data
Stress and apprehension	Clinical Practice	Making clinical decisions based on evidence gathered. <u>Highest Result:</u> Agree being prepared 60% P Value: 0.01 **Significant: Yes**		"Am making the right decision though there's not another option here or that's not the most appropriate way to go." "I felt absolutely lost for the first few weeks." "Always like gaining new skills in different areas." "It's like at it first, it's scary or whatever, and then as you start to do it a bit more, it's not. But yeah, I don't think that's due to COVID, I wouldn't say that my lack of experience is because of that."

preparedness for becoming a Band 5 physiotherapist after receiving online learning.

| Clinical Practice	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mode	P Value	Significant
Making clinical decisions based on evidence gathered		**60%**	33.3%	6.7%		**Agree (9)**	**0.01**	**Yes**
Undertaking a basic MSK assessment		**66.7%**	6.7%	13.3%	13.3%	**Agree (10)**	**0.001**	**Yes**
To be able to carry out appropriate MSK intervention		**66.7%**	6.7%	13.3%	13.3%	**Agree (10)**	**0.001**	**Yes**

Please see Appendix 16 – 26 of SPSS Chi-square goodness of fit results for each question within Clinical Practice. Please see Appendix 26 and 27 for full table of clinical practice Chi-square goodness of fit and mode results.

Table 11: Clinical Practice Integration of quantitative and qualitative data

The above table highlights common themes that emerged from comparison of the questionnaire ratings and the verbal responses from the focus groups across the Clinical Practice category. Links were found between verbal responses the themes of: Stress and Apprehension, Preparedness to start new role despite COVID-19, Support from Trust, Worries about starting the role, and positive ratings of preparedness for clinical practice. The data suggest that participants generally considered themselves to be well prepared for clinical practice across the Clinical Practice questionnaire questions apart from: Undertaking a respiratory assessment and To be able to carry out appropriate respiratory intervention.

Please see Appendix 28 for qualitative data collected for Clinical Practice and Appendix 29 for full table of integration of qualitative and quantitative data for Clinical Practice preparedness.
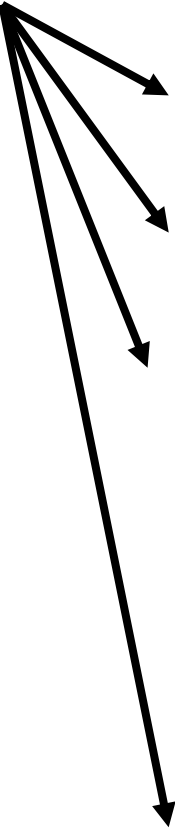
Figure 2: Preparedness for Communication

Preparedness for communication after recieving online learning during the covid-19 pandemic
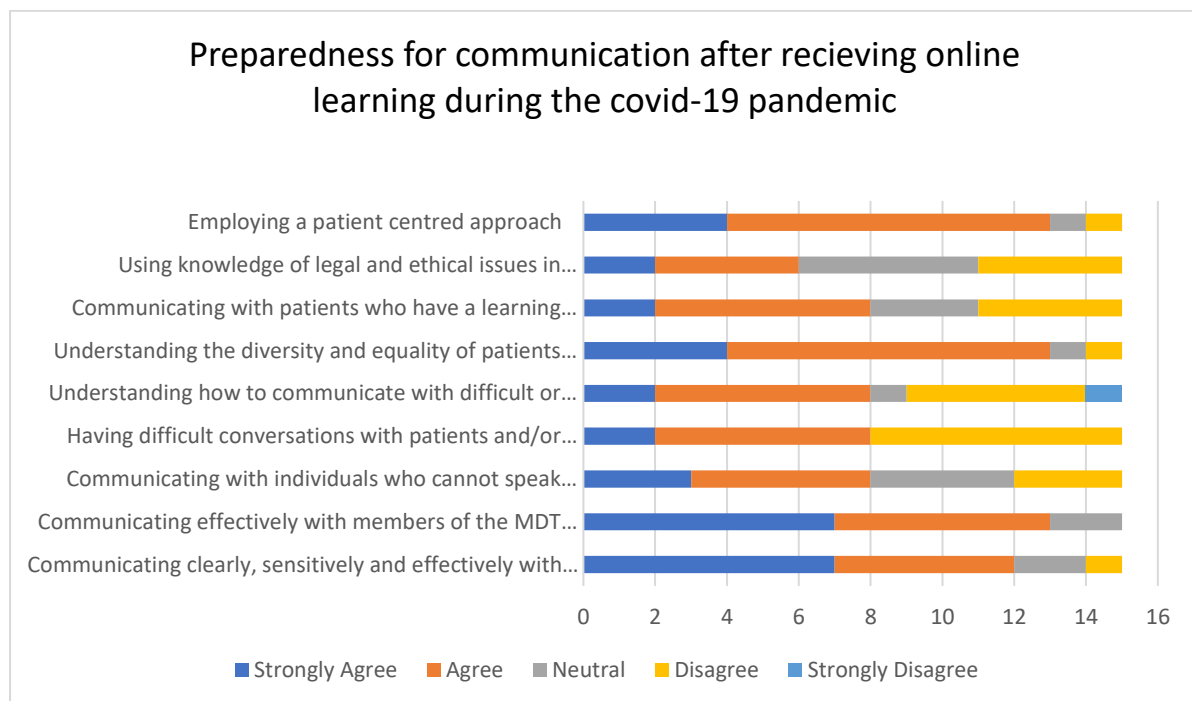
Table 12: Communication Chi-square goodness of fit test and mode value

Communication	1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree	Mode	P Value	Significant
Having difficult conversations patients and/or relatives	13.3%	40%		46.7%		Disagree (7)	0.005	Yes

Please see Appendix 15 – 29 for Chi-square goodness of fit tests for all questions within Clinical Practice. Please see 41 and 42 for Chi-square goodness of fit and mode tables.

| Overarching Themes	Categories	Quantitative Findings	Linking Activity	Quote from Qualitative Data
Stress and apprehension	Communication	Having difficult conversations patients and/or relatives. <u>Highest Result:</u> 46.7%Disagree being prepared. P Value: 0.005 **Significant: Yes**		"I found that like main thing worked quite a big thing we do is like talk to families and about the patients that like you wouldn't be talking to families because no family members were coming in. So like those skills." "Addressing family's expectations and things like that require a lot of like in depth communication skills." "I think you do have to have some quite like I have. Anyway, in my experience, like quite emotional conversations that you know, like addressing family's expectations and things like that which require a lot of like really in-depth communication skills. I think it's you just sometimes I just sit there and go, I don't know the answer. Like I'm sitting here panicking like I don't know what you want from me." "I struggled with having disccisions with families, but it was an extra thing to think about."

Table 13: Communication Integration of quantitative and qualitative data

The above table highlights common themes that emerged from comparison of the questionnaire ratings and the verbal responses from the focus groups across the Communication category. Links were found between verbal responses the themes of: Stress and Apprehension, Preparedness to start new role despite covid-19, Support from Trust, and positive ratings of preparedness for communication within the Multidisciplinary Team (MDT) and during assessment and intervention of patients. The data suggest that participants

generally considered themselves to be well prepared for communication across the Communication questionnaire questions apart from: Having difficult conversations patients and/or relatives.

Please see Appendix 43 for qualitative data from the focus group. Please see Appendix 44 for full table of clinical practice integration of qualitative and quantitative data for communication.
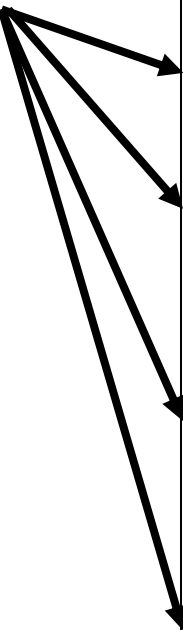
Figure 3: Preparedness for Teaching and Learning Results
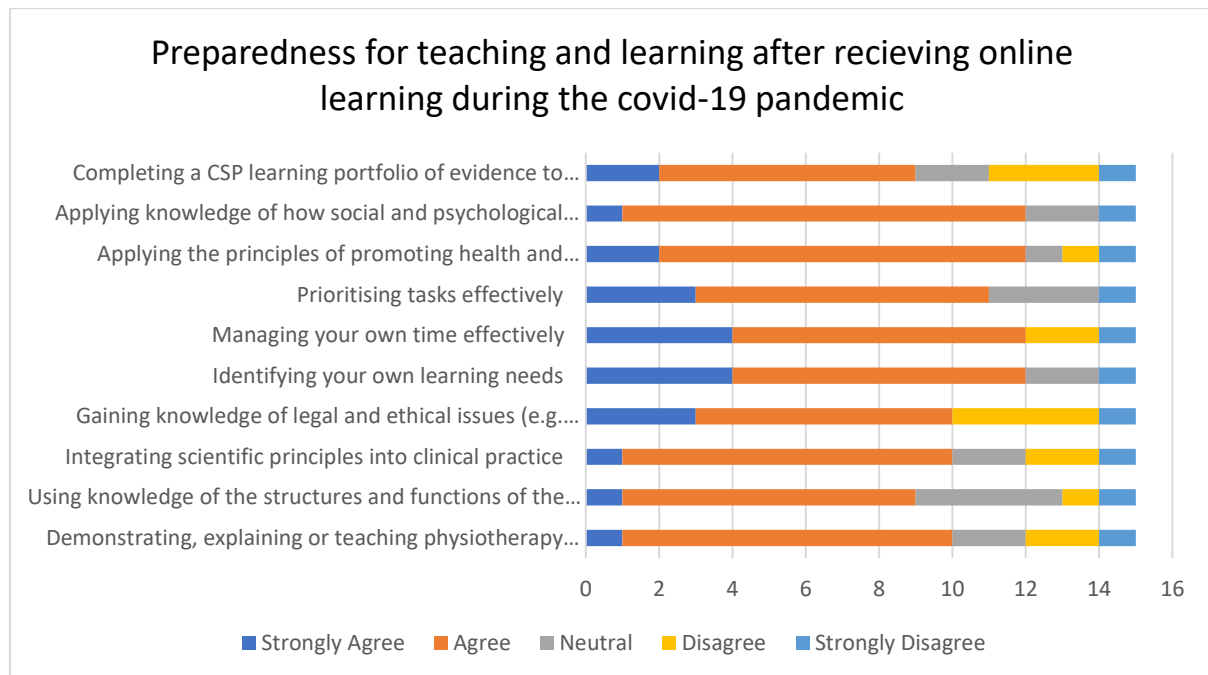
Table 14: Teaching and Learning Chi-square goodness of fit test and mode value

Teaching and Learning	1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree	Mode	*p* Value	Significant
Identifying your own learning needs	26.7%	**53.3%**	13.3%		6.7	**Agree (8)**	**0.010**	**Yes**

Please see Appendix 46 – 54 for Chi-square goodness of fit test results for each question within Teaching and Learning. Please see Appendix 55 and 56 for full table of teaching and learning Chi-square goodness of fit test and mode value.

| Overarching Themes	Categories	Quantitative Findings	Linking Activity	Quote from Qualitative Data
Prepared to start new role despite Covid-19	Teaching and Learning	Identifying your own learning needs. <u>Highest Result:</u> 53.3% Agree being prepared. P Value: 0.010 **Significant: Yes**		"In this role you are constantly learning and you are constantly making mistakes and learning from your mistakes and whatever. And like always like gaining new skills in different areas." "I probably say that's like my main way of learning. Even just like shadowing and watching them do something. You know, like see one, do one, teach one type thing, but um, yeah, I'd say." "So I just kind of create my own little issues that I had, all things that I wanted to learn and progress more about and then yes use seniors like you said to help support that." "Then also like research around the side if possible. But I also did like some of the training courses that they did as well that would like provided by the trust."

Table 15: Teaching and Learning Combining quantitative and qualitative

The above table highlights common themes that emerged from comparison of the questionnaire ratings and the verbal responses from the focus groups across the Teaching and Learning category. Links were found between verbal responses the themes of: Stress and Apprehension, Preparedness to start new role despite covid-19, Support from Trust and Worries starting the role, and positive ratings of preparedness for teaching and learning within their role as a Band 5 physiotherapist. The positive ratings of preparedness for identification of own learning needs were strongly demonstrated in the questionnaire and focus group. The data suggest that participants generally considered themselves to be well prepared for teaching of others and for their own learning to progress as a Band 5 physiotherapist across the Teaching and Learning questionnaire questions.

Please see Appendix 57 for qualitative data for Teaching and Learning from the focus group. Please see Appendix 58 for integration of mixed methods data.
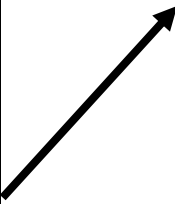
Figure 4: Preparedness of Understanding the Work Environment Results

Preparedness for understanding the work environment after recieving online learning during the covid-19 pandemic
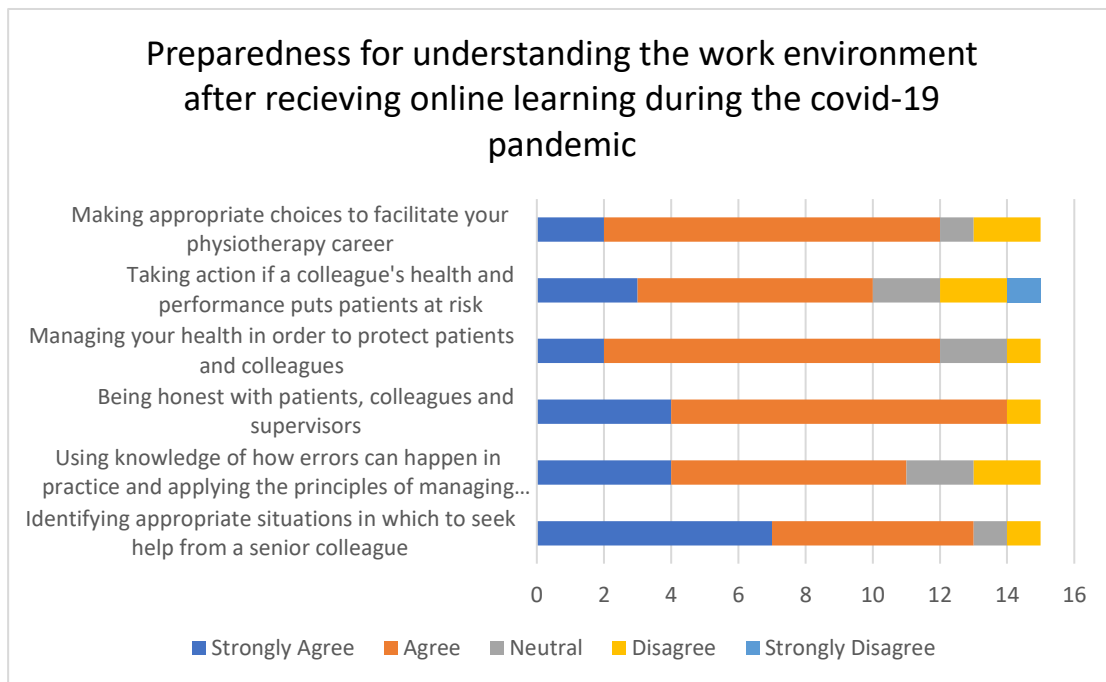
Table 16: Understanding the work environment Chi-square goodness of fit test and mode value

Understanding the Work Environment	1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree	Mode	P Value	Significant
Identifying appropriate situations in which to seek help from a senior colleague	**46.7%**	40%	6.7%	6.7%		**Strongly Agree (7)**	**0.007**	**Yes**

Please see Appendix 60 – 66 for Chi-square goodness of fit test results for each question within Understanding the Work Environment. Please see Appendix 67 and 68 for full table of Understanding the Work Environment Chi-square goodness of fit test and mode value.

Overarching Themes	Categories	Quantitative Findings	Linking Activity	Quote from Qualitative Data
Prepared despite Covid	<u>Understanding the work environment</u>	Identifying appropriate situations in which to seek help from a senior colleague. <u>Highest Result:</u> 46.7% Strongly Agree being prepared. P Value: 0.007 **Significant: Yes**		"I just kind of create my own little issues that I had, all things that I wanted to learn and progress more about and then yes use seniors like you said to help support that."

Table 17: Understanding the Work Environment Combining quantitative and qualitative

The above table highlights common themes that emerged from comparison of the questionnaire ratings and the verbal responses from the focus groups across the Understanding the Work Environment category. Links were found between verbal responses the themes of: Stress and Apprehension, Preparedness to start new role despite covid-19 and Support from Trust, and positive ratings of preparedness for understanding the work environment within their role as a Band 5 physiotherapist. The positive ratings of preparedness for seeking senior support in appropriate situations to clinically reason actions and understanding management of risk was demonstrated within the questionnaire and focus group. The data suggest that participants generally considered themselves to be well prepared for understanding the work environment across the Understanding the Work Environment questionnaire questions.

Please see Appendix 69 for qualitative data for Understanding the Work Environment focus group. Please see Appendix 70 for full table of integration of qualitative and quantitative data for Understanding the Work Environment preparedness.
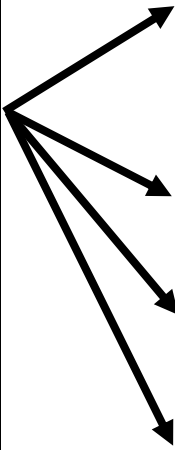
Figure 5: Preparedness for Team Working
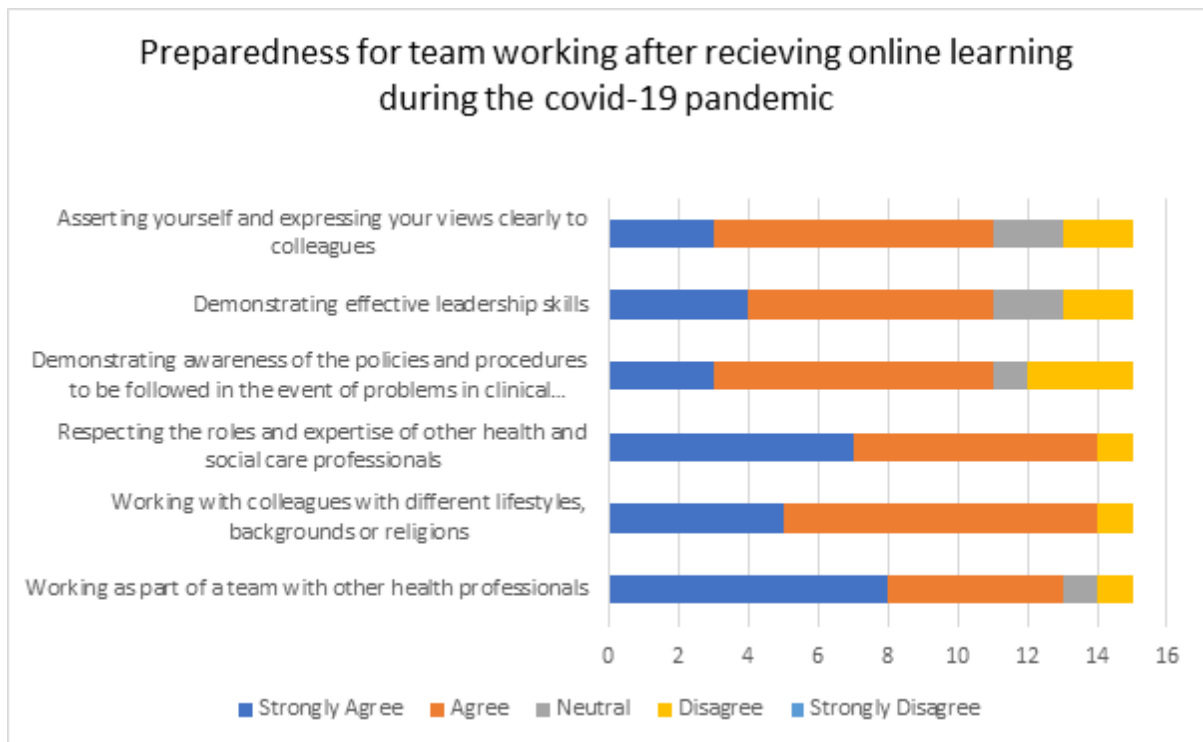
Table 18: Team working Chi-square goodness of fit test and mode value

Team working	1 Strongly Agree	2 Agree	3 Neutral	4 Disagree	5 Strongly Disagree	Mode	P Value	Significant
Working as part of a team with other health professionals	**53.3%**	33.3%	6.7%	6.7%		**Strongly Agree (8)**	**0.004**	**Yes**

Please see Appendix 72 - 77 for Chi-square goodness of fit test results for each question within Team Working. Please see Appendix 78 and 79 for full table of Team Working Chi-square goodness of fit test and mode value.

Table 19: Team Working Combining quantitative and qualitative

Overarching Themes	Categories	Quantitative Findings	Linking Activity	Quote from Qualitative Data
Support from Trust	Team Working	Working as part of a team with other health professionals <u>Highest Result:</u> 53.3% Strongly Agree being prepared. P Value: 0.004 **Significant: Yes**		"Helped hugely like getting to know all the other band 5 and OT and stuff like that. It helped to know who people were." "I'd say my senior are my biggest support where I get most of my learning from, whether that be through in-service training and competencies for respiratory." "I'd say I use my seniors a lot. Always asking questions." "Like I can think of loads of scenarios where I've needed help and advice or whatever, but I don't think this is down to COVID just lack of experience as a new band 5."

The above table highlights common themes that emerged from comparison of the questionnaire ratings and the verbal responses from the focus groups across the Team Working category. Links were found between verbal responses the themes of: Stress and Apprehension, Preparedness to start new role despite covid-19, Support from Trust and Worries starting the role, and positive ratings of preparedness for understanding team working within their role as a Band 5 physiotherapist. The positive ratings of preparedness for working within the team and confidence in own leadership skills was demonstrated within the questionnaire and conversely in the focus group lack of confidence and worries of settling into a new Trust were identified. The data suggest that participants generally considered themselves to be well prepared for team working across Team Working questionnaire questions apart from: Working as part of a team with other health professionals.

Please see Appendix 80 for qualitative data for Team Working focus group. Please see Appendix 81 for full table of integration of qualitative and quantitative data for Team Working preparedness.

Discussion

Has online learning affected physiotherapists who trained during the covid-19 pandemic perceptions of how prepared they were for the following areas: Clinical Practice, Communication, Teaching and Learning, Understanding the Work Environment and Team Working? 9 respondents (60%) stated being prepared for their role as a Band 5 physiotherapist after graduating. This has been reflected in the responses to the five categories, the majority of the questionnaire questions were answered in either strong agreement or agreement in being prepared for the task of a Band 5 physiotherapist. This is consistent with Chesterton et al (2022) study who found that institutes provided provisions to ensure that students were prepared for the challenges of healthcare education and the workplace. Universities demonstrated that they needed to provide a learning platform during the covid-19 pandemic that would support physiotherapy students becoming Band 5 physiotherapists. Collaboration with the findings from Dost et al (2020) that online learning is a flexible teaching platform which can be beneficial for medical students. Although, moving forward a hybrid model of both face-to-face and online teaching should be incorporated into the delivery of medical courses.

12 of the 15 respondents (80%) reported not feeling prepared for being a Band 5 physiotherapist upon graduation due to online learning. 6 months into the role 10 respondents (67%) were very prepared and 5 were somewhat prepared. All reported feeling supported by the Trust within which they are working, which could be why their preparedness for the role as a Band 5 physiotherapist improved. Rossettini et al (2021) findings did not correlate as the Italian physiotherapists involved in the study favoured online learning, although the teaching and independent learning could have influenced this result.

Future of Clinical Learning

The findings from the study are beneficial for the future planning of physiotherapy courses, where a hybrid model of teaching including online and face-to-face can be incorporated to

maximise student education potential. Ravat et al (2021) found that the combination of blended teaching within physiotherapy programmes allowed for students more opportunity to engage, though there were no statistical differences for clinical performance. Hybrid teaching improved theoretical marks, underpinning knowledge and understanding of the student had developed. The benefits of incorporating online and face-to-face learning within physiotherapy courses creates a hybrid model to provide in depth learning at novice level. It could be suggested that a hybrid form of learning will be beneficial for the future workforce of the NHS, as physiotherapists will have a deeper understanding of the theory and be able to expand their clinical practice through hands-on experience. The results identified that student physiotherapists were prepared to carry out the expectations clinically post-graduation, indicating that online learning sufficiently preparade them for their role as a Band 5 physiotherapist. Online learning is a process that student physiotherapists are accustomed to and will not find overwhelming when completing mandatory training within the Trust induction programme as the NHS transformed their own teaching and learning platforms during the covid-19 pandemic.

Henderson et al (2020) research into the transformation of the workforce at the Royal Free London NHS Foundation Trust used online learning and teaching to prepare staff to work outside their regular medical speciality. The study concluded that online learning is acceptable and informative, providing opportunities which could be beneficial for undergraduate and postgraduate teaching in conjunction with face-to-face learning. The findings could be useful for the future workforce of the NHS to develop their own learning portfolios. Those who have carried out online or hybrid learning would recognise the benefits and understand how to optimise online learning to develop their skill set. 73% of the respondents could be classified as belonging to Generation Z due to being born in the 1990s and raised in the 2000s (Singh and Dangmei, 2016). It can be considered that the integration of the internet forms a normal part of teaching and learning within this cohort of respondents, it may be assumed that these physiotherapy students are digitally aware and conversant with this method of teaching.

Although not receiving traditional face-to-face physiotherapy education, the results indicate their adaptability to engage with online teaching. 53.3% found online teaching effective within their physiotherapy course. 20% with no preference were accepting of this model of teaching. 26.7% respondents reported this was not their preferred method of learning, this may be partly due to the pace and quality at which online learning had to be introduced as a result of the covid-19 pandemic. Previous educational experience of online learning equipped the physiotherapy students to adapt to the sudden transformation of online learning within their physiotherapy training due to the covid-19 pandemic. The online technical skills of the lectures delivering the online learning will determine the perception of the delivery and therefore the preparedness of the students.

As physiotherapist who trained during the covid-19 pandemic were adequately prepared for their role as a Band 5, it could be suggested that they are at an advantage for carrying out independent CDP work. The CPD Certification Service (2016) highlight that online training courses can provide personal optimum time for professional development. This could be due to being taught how to complete a CSP portfolio within the online learning curriculum. It may be due to the documentation of each lecture online and the content learnt within that lesson. This will provide preparedness for completing their own CSP, CPD portfolio once qualified, implying that the physiotherapists will continue their own learning to enhance knowledge and develop within their rotations.

Preparedness of the physiotherapists to identify their own learning needs and seek senior support whilst on rotations will enhance their clinical knowledge base. Taking ownership of learning and progress within the clinical setting is an important part of the role to develop clinical reasoning skills. Rohwer et al (2017) found no difference in outcomes between online and face-to-face learning, hybrid learning can therefore improve knowledge, skills, and attitudes. 80% of MSc respondents reported being prepared for their role as a Band 5 physiotherapist after graduating, it could be proposed that the respondents who had experience of studying previously had increased preparedness for understanding their own

learning style. It could be implied that the MSc students had previous experience working within a team which is why 80% felt prepared for this role as a Band 5 physiotherapist and understand the importance of effective team working. The data suggests that online learning prepared the physiotherapy students for their role as a Band 5 physiotherapist.

The results of the effectiveness of online learning and teaching may be due to the student's personal preferences and the teaching styles in which the lecture is delivered. There may have been increased flexibility with pre-recorded lectures, however, this could lead to an unstructured timetable of learning. The teaching style of the lectures may have increased the effectiveness of the delivery of information, which is why it may have been somewhat effective, providing the opportunity to repeat the video session to clarify learning. The response to online learning and teaching may have been influenced by the nature of the module being taught for example: MSK, respiratory and neuro. There was the option to practice hands on MSK skills with students living in the same household or family, consolidating the hands-on practical skills. This is reflected in the questionnaire response to MSK assessment and intervention results being 66.7% agreeing with the statement that online learning prepared them for this core element of the role.

Respiratory assessment and intervention had a response rate of 40% agreeing to being prepared, with 60% feeling underprepared, this could be attributed to the difficulty understanding and applying this practically. This relates to the complexity of the respiratory devices used in assessment and intervention in respiratory conditions, which is an expectation of Band 5's to support on call service within an Acute Trust. Neuro assessment had a response rate of 46.7% agreeing to be prepared and 33.3% agreeing to be prepared to carry out a neuro intervention. 66.7% felt unprepared to carry out a neuro treatment, possibly linked to disrupted placement experience caused the covid-19 pandemic and the ability to develop the appropriate skills via online learning. Correlating with Chesterton et al (2022) findings that students felt that they had missed out on hands-on practical skills which could have developed their preparedness for respiratory and neuro assessments and interventions. This emphasises

the importance to maintain an element of face-to-face learning within the course programme delivery to ensure physiotherapists are prepared for the areas of core practice prior to becoming a Band 5 physiotherapist.

Challenges of Organizational Dynamics and Communication

Online learning may have influenced physiotherapy students' preparedness to have difficult conversations with patients and/or relatives. 46.7% of respondents disagreed in being prepared to communicate difficult conversations, physiotherapists may not have been exposed to this nature of conversation during online learning or had limited exposure during clinical placements. Increased support from seniors in the Trust they are working in will be required to ensure Band 5 physiotherapists are able to communicate effectivity during difficult conversations. The introduction in developing the skills to deliver difficult conversations appropriately could be taught whilst on placement. Braniff et al (2015) found similar findings that 45.1% medical students were not prepared to have difficult conversations with patients or relatives, despite their training having been carried out in a traditional face-to-face setting, illustrating an advantage to the physiotherapists who trained during the covid-19 pandemic.

Effective team working is essential for best patient outcomes, 46.7% of the respondents strongly agreed being prepared to communicate effectively with the MDT. O'Daniel and Rosenstein (2008) highlight that effective communication inspires team working providing clarity for collaborative working within patient care and prevention of errors within the clinical environment. There is a need to upskill the existing workforce to support a flexible skilled workforce to deliver high patient quality care. The preparedness of physiotherapists for effective team working is essential for best practice within the NHS. Disagree and strongly disagree were not selected by the respondents, emphasising that physiotherapy students who studied online were prepared for effective collaboration within the MDT in the clinical setting.

The importance of collaborative working and exposure within clinical placements and shadowing members of the MDT is a valuable adjunct to understanding the effectiveness of communication and MDT working. The focus group highlighted the importance of being aware

of the role of individual members of the team and having a full induction into the clinical area in preparation for starting the role.

Impact on transition to a qualified role

26.7% strongly agree and 53.3% agreed to being prepared to manage their own time effectively after graduation, suggesting that online learning provided adequate preparedness. This may in essence be as a result of physiotherapy students managing their own learning in a timely fashion during the covid-19 pandemic, indicating it was a skill they possessed prior to commencing their role a Band 5. Time management being demonstrated by attending all live online lectures and ensuring that essays were submitted on time. The focus group revealed that during their time as a Band 5 within the Trust their time management was tested whilst having to support more junior members of the team and therefore not completing their own caseload. This correlates with Godbold et al (2022) study into student nurses who worked as healthcare assistants during the covid-19 pandemic, once qualified the nurses found managing their time effectively challenging due to staffing levels and patient acuity. It could be suggested, due to the data collected, that physiotherapist had higher perceptions of preparedness compared to nurses who trained within the equivalent timeframe. However, the quantitative results indicated that 80% of the respondents were prepared to manage their time effectively after receiving online learning, conflicting with the focus group and Godbold et al (2022) findings.

Physiotherapists were adequately prepared to demonstrate leadership skills after receiving online learning. 60% of the respondents agree with being prepared to demonstrate, explain, or teach physiotherapy students and colleagues. Online learning might have provided the opportunity to develop leadership skills through group projects via teams or zoom. NHS Improvement (2019) The NHS Long Term Plan, emphasise the importance of senior clinical leadership to ensure the delivery of high-quality care and for the guidance of the staff to improve confidence and reduce anxiety. Physiotherapy students felt prepared to demonstrate their leadership skills indicates the effectiveness of online learning. Godbold et al (2022) found

that nurses compared to physiotherapists were not as prepared for carrying out leadership roles, as they did not "they did not feel ready" with one participant feeling "petrified". Working as HCA during the covid-19 pandemic did not prepare them for a leadership role as tasks were delegated by qualified nurses and there was little opportunity to develop leadership skills as it was such a novel environment for all clinical staff. The staff shortages may indicate why nursing students did not feel ready as a there was a lack of support initially when they commenced their role as a qualified nurse. In comparison the student physiotherapists respondents 60% agreed being prepared to demonstrate their leadership skills, implying that online learning has a positive approach to leadership and could maximise the leadership potential of the future NHS.

According to Anderson (2016) identification of preferred learning styles can enhance learning, as learners can acknowledge their strengths and areas for improvement of their learning.

Identification of own learning needs is essential for personal development as a Band 5 physiotherapist. 26.7% strongly agree 53.3% of the respondents agree being prepared to identify their own learning needs. Online learning may have facilitated the independence to identify their own learning needs whilst undertaking the physiotherapy course online. Recognitional of own learning needs was enhanced due to online learning as all physiotherapy students were partaking in online lectures, rather the traditional face-to-face practical sessions. Cunningham et al (2021) found that the preferred learning styles of newly qualified GPs differed with those who had been practicing for some years, highlighting the diverse learning needs within the medical profession and that identification of own learning needs is essential for personal development. Persky and Robinson (2017) suggest that early identification of learning needs as a novice, evolving throughout the physiotherapy career pathway to a clinical expert demonstrate the continuous learning cycle within the NHS. It may be that physiotherapist who trained during the covid-19 pandemic may have different learning styles compared to those who had previous face-to-face learning, although were still prepared for their role as a Band 5 physiotherapist.

The results indicate that physiotherapy students were prepared to identify appropriate situations in which to seek help from a senior colleague, 46.7% strongly agree and 40% agree being prepared to seek advice. This could be due to seeking advice from lecturers whilst carrying out online learning as part of their physiotherapy education, students may have been encouraged to seek advice from their lecturers to clarify learning. In conjunction with exposure to seeking help and support from clinical educators whilst on placement would serve to increase confidence to seek support and guidance when required as a newly qualified Band 5 physiotherapist.

There may have been experience of seeking help from clinical educators whilst on placement and the understanding how seniors can provide guidance. The NHS promotes early career support to create a robust and consistent approach to develop staff within the NHS, via the preceptorship programme in the first-year post qualification. This supports the new graduate physiotherapists professionally and develops clinical skills and delivery of patient care can be improved. The awareness and ability to seek help from seniors by Band 5 physiotherapists develops a significant trusting mentorship relationship and demonstrates and enthusiasm to develop clinically and therefore provide an effective healthcare service (NHS 75 England, N.D).

The benefits of hybrid learning were documented by Meydanlioglu and Arikan (2014) combining face-to-face and online learning is more effective, providing opportunities and endorsing student learning. Although, hybrid learning had been implemented at some Universities, public health emergency of the covid-19 pandemic inspired changes to educational teaching. Hopkins and Bardoel (2023) emphasises how hybrid working is a direct result of the covid-19 pandemic, with it being a flexible working model where time can be divided between remote and in-person working. The benefits of online learning have demonstrated that it is an integral aspect to learning and should be incorporated into medical education (Singh and Singh, 2021). Lee at al (2022) suggests that hybrid learning may provide

additional advantages compared to solely online learning, incorporation of both learning styles might deepen the understanding of students, providing preparedness.

Limitations

The first limitation for this study was that this was the first time carrying out a concurrent mixed methods design, integrating quantitative and qualitative data to assess for correlations. As a novice researcher there will be limitations within the study due to lack of experience. The response rate by physiotherapists who met the criteria to complete the questionnaire was a further limitation. Due to the questionnaire being anonymous there was no opportunity for financial incentives to complete the questionnaire and the study was reliant on the willingness of the physiotherapists to complete the questionnaire within the set timeframe. The questionnaire was sent via email to physiotherapy managers with the Acute Trusts in the West Midlands, the email may not have reached the target audience due to it being in junk mail or the manager did not action the request. The respondents were from the West Midlands region and therefore do not fully represent the views of all student physiotherapists meeting the inclusion criteria who trained throughout the UK in 2019 and 2020.

Further research of the study

Development of the study could be by sending the same questionnaire to current physiotherapy students due to graduate and who have had a hybrid learning experience. It would be interesting to analyse their responses to being prepared for their role as a Band 5 physiotherapist compared to the physiotherapist who trained during the covid-19 pandemic. Comparison of the two studies would be insightful to evaluate the themes and preparedness of both cohorts of students, to develop and improve the efficiency and effectiveness of physiotherapy teaching.

Conclusion

To conclude online learning did not affect physiotherapists who trained during the covid-19 pandemic perceptions of how prepared they were for the following areas: Clinical Practice,

Communication, Teaching and Learning, Understanding the Work Environment and Team Working. Overall, the respondents strongly agreed or agreeing to being prepared to each question within the categories, illustrating the level of preparedness for their role as a Band 5 physiotherapist. It may be assumed that as majority of the respondents were of the generation Z, with constant exposure to online platforms that they were able to adapt to online learning and therefore were prepared for their role as a Band 5 physiotherapist. Online learning is an effective tool that could be integrated into physiotherapy training to provide further consolidation of learning. The flexibility of online learning can adapt to the student's personal lives and support their optimal learning style. The use of hybrid learning could be the most effective way of teaching the physiotherapy curriculum, to provide hands on practical sessions as well as online learning that could be taught off campus. Online learning in conjunction with hands on practical sessions would provide an effective learning platform to prepare physiotherapy students for becoming Band 5 physiotherapists.

References

Almeida, F. (2018) "Strategies to Perform a Mixed Methods Study", *European Journal of Educational Studies,* 5(1), pp. 137-151. doi: 10.46827/ejes.v0i0.1902

Alsoufi, A. *et al.* (2020) "Impact of the COVID-19 pandemic on Medical Education: Medical Students' knowledge, attitudes, and practices regarding electronic learning," *PLOS ONE*, 15(11). Available at: https://doi.org/10.1371/journal.pone.0242905.

Anderson, I. (2016) 'Identifying different learning styles to enhance the learning experience', *Nursing Standard*, 31(7), pp. 53–63. doi:10.7748/ns.2016.e10407.

Ayenigbara, I.O. *et al.* (2020) "Covid-19 (SARS-COV-2) pandemic: Fears, facts and preventive measures," *Germs*, 10(3), pp. 218–228. Available at: https://doi.org/10.18683/germs.2020.1208.

Bishop, P. and Herron, L. (2015) 'Use and Misuse of the Likert Item Responses and Other Ordinal Measures', *International Journal Exercise Science.*, 1(8), pp. 279–302.

Braniff, C. *et al.* (2015) "Assistantship improves medical students' perception of their preparedness for starting work," *Medical Teacher*, 38(1), pp. 51–58. Available at: https://doi.org/10.3109/0142159x.2015.1045843.

Boynton, P.M. and Greenhalgh, T. (2004) 'Selecting, designing, and developing your questionnaire', *BMJ*, 328(7451), pp. 1312–1315. doi:10.1136/bmj.328.7451.1312.

Burns, D., Dagnall, N. and Holt, M. (2020) "Assessing the impact of the COVID-19 pandemic on student wellbeing at universities in the United Kingdom: A conceptual analysis," *Frontiers in Education*, 5. Available at: https://doi.org/10.3389/feduc.2020.582882.

Castro, F.G. *et al.* (2010) "A methodology for conducting Integrative Mixed Methods Research and data analyses," *Journal of Mixed Methods Research*, 4(4), pp. 342–360. Available at: https://doi.org/10.1177/1558689810382916.

Chesterton, P., Richardson, M. and Tears, C. (2022) "Student physiotherapists perceptions of online curriculum delivery during the COVID-19 pandemic," *BMC Medical Education*, 22(1). Available at: https://doi.org/10.1186/s12909-022-03486-5.

Couper, M.P. and Singer, E. (2009) 'The role of numeracy in informed consent for surveys', *Journal of Empirical Research on Human Research Ethics*, 4(4), pp. 17–26. doi:10.1525/jer.2009.4.4.17.

Coronavirus (2023) *World Health Organization*. World Health Organization. Available at: https://www.who.int/health-topics/coronavirus#tab=tab_1 (Accessed: January 13, 2023).

Coronavirus disease (covid-19): Mass gatherings (2023) *World Health Organization*. World Health Organization. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-mass-gatherings (Accessed: January 13, 2023).

Creswell, J.W. (1999) "Mixed-method research," *Handbook of Educational Policy*, pp. 455–472. Available at: https://doi.org/10.1016/b978-012174698-8/50045-x.

Cunningham, D.E. *et al.* (2021) 'Learning needs, preferred learning methods and learning challenges of first five general practitioners in NHS Scotland: A qualitative study', *BMJ Open*, 11(5). doi:10.1136/bmjopen-2020-044859.

Daly, J. *et al.* (2007) 'A hierarchy of evidence for assessing qualitative health research', *Journal of Clinical Epidemiology*, 60(1), pp. 43–49. doi:10.1016/j.jclinepi.2006.03.014.

Dost, S. *et al.* (2020) "Perceptions of medical students towards online teaching during the COVID-19 pandemic: A national cross-sectional survey of 2721 UK medical students," *BMJ Open*, 10(11). Available at: https://doi.org/10.1136/bmjopen-2020-042378.

Forthofer, R.N., Lee, E.S. and Hernandez, M. (2007) 'Analysis of categorical data', *Biostatistics*, pp. 269–296. doi:10.1016/b978-0-12-369492-8.50015-7.

Godbold, R. *et al.* (2022) "'all we've ever known is covid': A follow-up study with newly qualified nurses who worked as student nurses during the pandemic," *Journal of Clinical Nursing* [Preprint]. Available at: https://doi.org/10.1111/jocn.16591.

Henderson, D. *et al.* (2020) 'Keep calm and carry on learning: Using Microsoft Teams to deliver a medical education programme during the COVID-19 pandemic', *Future Healthcare Journal*, 7(3). doi:10.7861/fhj.2020-0071.

Hopkins, J. and Bardoel, A. (2023) 'The future is hybrid: How organisations are designing and supporting sustainable hybrid work models in Post-Pandemic Australia', *Sustainability*, 15(4), p. 3086. doi:10.3390/su15043086.

Illing J, Morrow G, Kergon C, Burford B, Spencer J, Peile E, Davies C, Baldauf B, Allen M, Johnson N, et al. 2008. How prepared are medical students to begin practice? A comparison of three diverse UK medical schools. GMC. Available from http://www.gmcuk.org/FINAL_How_prepared_are_medical_graduates_to_begin_practice_September_08.pdf_29697834.pdf

Jones, T., Baxter, M. and Khanduja, V. (2013) 'A quick guide to survey research', *The Annals of The Royal College of Surgeons of England*, 95(1), pp. 5–7. doi:10.1308/003588413x13511609956372.

Lee, I.C. *et al.* (2022) 'A synchronous hybrid team-based learning class: Why and how to do it?', *Medical Science Educator*, 32(3), pp. 697–702. doi:10.1007/s40670-022-01538-5.

McNair, P. and Lewis , G. (2012) 'Levels of evidence', *Evidence-based Medicine Toolkit*, pp. 94–96. doi:10.1002/9780470750605.ch15.

Meydanlioglu, A. , Arikan, F. (2014), 'Effect of Hybrid Learning in Higher Education', World Academy of Science, Engineering and Technology, Open Science Index 89, International Journal of Information and Communication Engineering, 8(5), 1292 - 1295.

Mian, A. and Khan, S. (2020) "Medical education during pandemics: A UK perspective," *BMC Medicine*, 18(1). Available at: https://doi.org/10.1186/s12916-020-01577-y.

Murdoch, M. *et al.* (2014) 'Impact of different privacy conditions and incentives on survey response rate, participant representativeness, and disclosure of sensitive information: A randomized controlled trial', *BMC Medical Research Methodology*, 14(1). doi:10.1186/1471-2288-14-90.

NHS Improvement (2019) *Clinical leadership – A framework for action - NHS england*, *Clinical leadership – a framework for action A guide for senior leaders on developing professional diversity at board level*. Available at: https://www.england.nhs.uk/wp-content/uploads/2021/08/clinical-leadership-framework.pdf (Accessed: 02 May 2023).

NHS 75 England (2023) *Change Model*, *NHS choices*. Available at: https://www.england.nhs.uk/sustainableimprovement/change-model/ (Accessed: 03 May 2023).

O'Daniel M, Rosenstein AH.(2008) Professional Communication and Team Collaboration. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); Chapter 33. Available from: https://www.ncbi.nlm.nih.gov/books/NBK2637/

Papapanou, M. *et al.* (2021) "Medical education challenges and innovations during COVID-19 pandemic," *Postgraduate Medical Journal*, 98(1159), pp. 321–327. Available at: https://doi.org/10.1136/postgradmedj-2021-140032.

Persky, A.M. and Robinson, J.D. (2017) 'Moving from novice to expertise and its implications for instruction', *American Journal of Pharmaceutical Education*, 81(9), p. 6065. doi:10.5688/ajpe6065.

Ravat, S., Barnard-Ashton, P. and Keller, M.M. (2021) 'Blended teaching versus traditional teaching for undergraduate physiotherapy students at the University of the Witwatersrand', *South African Journal of Physiotherapy*, 77(1). doi:10.4102/sajp.v77i1.1544.

Rohwer, A. *et al.* (2017) 'E-learning of evidence-based health care (EBHC) to increase EBHC competencies in healthcare professionals: A systematic review', *Campbell Systematic Reviews*, 13(1), pp. 1–147. doi:10.4073/csr.2017.4.

Rossettini, G. *et al.* (2021) "Online teaching in physiotherapy education during COVID-19 pandemic in Italy: A retrospective case-control study on students' satisfaction and performance," *BMC Medical Education*, 21(1). Available at: https://doi.org/10.1186/s12909-021-02896-1.

Singh, A.P. and Dangmei, J., 2016. Understanding the generation Z: the future workforce. *South-Asian journal of multidisciplinary studies*, *3*(3), pp.1-5.

Singh, J., Steele, K. and Singh, L. (2021) 'Combining the best of online and face-to-face learning: Hybrid and blended learning approach for COVID-19, post vaccine, & Post-Pandemic World', *Journal of Educational Technology Systems*, 50(2), pp. 140–171. doi:10.1177/00472395211047865.

Skamagki, G. *et al.* (2022a) 'The concept of integration in mixed methods research: A step-by-step guide using an example study in physiotherapy', *Physiotherapy Theory and Practice*, pp. 1–8. doi:10.1080/09593985.2022.2120375.

Song, J.W. and Chung, K.C. (2010) 'Observational studies: Cohort and case-control studies', *Plastic and Reconstructive Surgery*, 126(6), pp. 2234–2242. doi:10.1097/prs.0b013e3181f44abc.

Team, C.N. (2016) *Benefits of online CPD training courses*, *The CPD Certification Service*. Available at: https://cpduk.co.uk/news/benefits-online-cpd-learning-courses#:~:text=Online%20CPD%20training%20courses%20enable,others%20in%20the%20training%20classroom. (Accessed: 09 June 2023).

Tsang, S., Royse, C. and Terkawi, A. (2017) 'Guidelines for developing, translating, and validating a questionnaire in perioperative and Pain Medicine', *Saudi Journal of Anaesthesia*, 11(5), p. 80. doi:10.4103/sja.sja_203_17.

Van Teijlingen, E. and Hundley, V. (2002) 'The importance of pilot studies', *Nursing Standard*, 16(40), pp. 33–36. doi:10.7748/ns2002.06.16.40.33.c3214.