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Abstract

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Keywords

Online learning, videoconferencing pedagogies, occupational therapy students, stress in college

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ABSTRACT

Videoconferencing was heavily utilized as an online learning tool at universities during the COVID-19 pandemic. Despite the high utilization, few studies have examined students' perspectives on their health, social interaction, and preferences in using specific videoconferencing features for online pedagogy and campus participation. This study surveyed 275 occupational therapy students from six class cohorts regarding the use of videoconferencing during the 2020-2021 academic year. Students reported physical changes in fatigue, eye, and back discomfort from the use of videoconferencing for extended periods, in addition to increased stress and anxiety during this period. Students reported lower class engagement during videoconferencing, as indicated by less frequency of asking/answering questions, paying attention, participating in breakout rooms with unfamiliar peers, and less motivation to attend classes. While students preferred in-person versus videoconferencing for overall classroom engagement and knowledge retention, preferences were equivocal for use of videoconferencing in meeting with professors, peer tutoring, group projects, and office hours. A benefit to videoconferencing availability was the ability to maintain social communication with friends and family, particularly for undergraduates. Comparisons among class cohorts are presented.

Introduction

The COVID-19 pandemic prompted a rapid shift to online teaching in occupational therapy (OT) programs so that students could continue their paths toward graduation. Videoconferencing was heavily utilized as an instructional strategy platform that permitted communication and information exchange among students and faculty using synchronous video and audio features (Mather et al., 2020). Videoconferencing platforms commonly utilized across college campuses during the COVID-19 pandemic included Zoom, Webex, and Google Classrooms, among others. Despite the return to primarily in-person education, university programs have recognized the opportunities that videoconferencing offers and have retained videoconferencing as a pedagogy to supplement in-person learning due to its logistical convenience in communicating with students and decreased travel time (O'Brien & Yadzani Aliabadi, 2020). The ease of videoconferencing has also expanded options for participating in advising and co-curricular activities. However, concerns have been raised about student engagement during videoconferencing, interpersonal skill development, and students' overall satisfaction with videoconferencing as a platform for learning and socially participating in college experiences (Abbasi et al., 2020).

Literature Review

The use of technology-based communication to maintain social interaction is familiar to this generation of young adults. The Pew Research Center (2023) indicated that about 90% of young adults used social media or technology-based interactions in 2023, with 70% visiting social media sites daily. Goodman-Deane et al. (2016) found that students valued communication technologies that enable non-verbal cues for maintaining close relationships with friends and family such as face-to-face communication and video calls instead of more restricted methods, such as text messaging and instant messaging. David and Roberts (2021) found that smartphone use (social media, Facetime) socially connected a sample of 400 undergraduate college students with friends and family during the COVID-19 pandemic.

Despite the reported benefits of smartphone use for social networking and maintaining relationships, the specific use of laptop-based videoconferencing technology for social connectedness is less clear. Bailenson (2021) examined the use of videoconferencing for communication in social and work acquaintances related to the concept of personal space. Bailenson suggested that videoconferencing has the potential to invade personal space by exaggerating face size on a monitor. Face sizes greater than 5.13" (head to chin) on a computer monitor equate to about 20" viewing distance in person. This distance is equivalent to the personal space allotted to our closest relationships (0'-2'). The study of proxemics indicates that the personal space allotted for friends and family is 2' to 4', and that of social and work acquaintances is 4' to 12' (Hall, 1963). Therefore, laptop videoconferencing may create an unnatural closeness not expected in United States culture (Bailenson, 2021; Hall, 1963).

The use of video conferencing as a learning pedagogy has more recently been examined relative to its utility in transitioning in-person content to a virtual format. In general, videoconferencing has been found challenging for students' learning of

practical skills (Abbasi et al., 2020; Stamm et al., 2021; Vandenberg & Magnuson, 2021). Abbasi et al. (2020) reported that over 40% of 1255 health science students found online learning using videoconferencing platforms to be acceptable for learning theoretical content; however, only 13% agreed that online learning through videoconferencing was useful for developing practical skills. Similarly, Vandenberg and Magnuson (2021) reported that only 12% of 90 nursing students were satisfied with using videoconferencing for learning practical skills, compared to 53% of faculty who believed videoconferencing to be effective for this use. Similarly, Stamm et al. (2021) found that online instruction for classes such as labs created a difficult environment for self-identified kinesthetic learners in an occupational therapy undergraduate cohort. Almost 74% of these participants noted they had difficulty comprehending concepts during virtual lab instruction and would not be confident in performing such activities in future clinical practice.

Nevertheless, students reported more positive attitudes toward the use of videoconferencing for daily interactions with professors. Abassi et al. (2020) found that over half of students in their study (52%) were satisfied with timely responses from teachers and 45% were satisfied with feedback in an online or videoconferencing format. When Vandenberg and Magnuson (2021) compared attitudes toward videoconferencing (using a Zoom platform) in 90 nursing students and 18 faculty, faculty ratings of Zoom as a teaching pedagogy were generally higher than students' ratings. Only 24% of the student sample reported feeling connected to peers and instructors, compared to 53% of faculty.

Additionally, student and faculty attitudes toward videoconferencing and influences of class-based videoconferencing on students' mental health have been addressed. Abassi et al. (2020) found that stress and anxiety while using Zoom existed for 54% of students which may have been related to distractions in the home environment and lack of overall social connectedness during the COVID-19 pandemic. Gullo and Walker (2021) found that depression and anxiety using videoconferencing increased with the duration of self-viewing time for 143 college-age individuals, interpreted as discomfort with their body image and other pandemic-related social issues.

The term "Zoom Fatigue" has emerged in reference to the burnout and exhaustion commonly reported during extended use of videoconferencing (Lee, 2020; Reidl, 2022). Factors contributing to Zoom fatigue are posited as excessive amounts of close-up eye gaze that traditionally occur only with close relationships, eccentric eye gaze (discord between camera and screen), constantly mirroring one's self-reflection, difficulties in perceiving non-verbal communication, and lack of physical movement for extended periods (Bailenson, 2021; Elbogen et al., 2022; Kushner, 2021). Reidl (2022) explained that cognitive overload may result from challenges in viewing multiple individuals on a screen and attempting to interpret their non-verbal communication. The combination of a 1.2 second lag in audio response and lack of direct eye contact with recipients creates a situation in which speakers cannot validate that recipients understand or are engaged in the topic. Recipients in turn must closely monitor fast moving conversations to

determine the precise time to interject a comment. Such experiences may contribute to disjointed conversations, emotional disconnect, increased cognitive load, and overall increased anxiety and fatigue for recipients (Bailenson, 2021; Elbogen et al., 2022; Kushner, 2021; Reidl, 2022).

Fauville et al. (2021) developed the Zoom Exhaustion and Fatigue (ZEF) scale, a 13-question Likert-like scale to quantify the dimensions of fatigue when using a videoconferencing platform such as Zoom. The scale includes five subconstructs related to fatigue: general fatigue, visual fatigue, social fatigue, motivational fatigue, and emotional fatigue. McCabe et al. (2023) utilized the ZEF scale to investigate factors that contribute to mental fatigue and cognitive load when using Zoom. Results of surveying 116 college students found that Zoom fatigue was positively related to the total time spent on Zoom, number of Zoom classes in a day, and duration of classes. Authors suggested a dose-response relationship between length of Zoom exposure and Zoom fatigue. The cognitive load experienced during Zoom was ameliorated by enjoyment of the class, relevancy of content, positive relationships, connecting with instructors, and self-efficacy.

To summarize, studies demonstrated that videoconferencing technology has been utilized effectively for social communication. However, studies collectively demonstrate students' preference for in-person pedagogies particularly for learning clinical skills and for creating personal connections amongst peers (Abbasi et al., 2020; Vandenburg & Magnuson, 2021). A strong dose-response relationship relative to Zoom fatigue (McCabe et al., 2023) suggests that limited, intentional use of videoconferencing may highlight the convenience and minimize the negative consequences. Still, a better understanding of specific aspects of the videoconferencing experience is necessary. Few studies have addressed specific aspects of using videoconferencing for classroom engagement (asking/answering questions, paying attention, use of breakout rooms), advising, and campus participation in clubs. Analysis of these wide applications of social participation using videoconferencing during college life may provide considerations for the future.

The purpose of this study was to examine perspectives on the use of videoconferencing for social participation at college in OT students. Results of the study are intended to inform best practices for videoconferencing use in academic settings. The research question was: How does the use of videoconferencing impact the social participation of OT students? Social participation was defined as students' interpersonal interactions that occurred over videoconferencing with family/friends, in class-related activities, campus organizations, and the impact of videoconferencing on personal health. This definition is based on the Occupational Therapy Practice Framework definition for social participation, activities that involve socially interacting with family, friends, and peers to support social connectedness (American Occupational Therapy Association, 2020). Social participation using videoconferencing was examined according to the following four categories: (a) impact on personal health (mental, physical, emotional), (b) social interaction with family and friends, (c) classroom participation, and (d) campus participation.

Methodology

Research Study Design and Context

The research was a non-experimental survey design using a convenience sample of OT students in their OT seminar classes. At this University, from March 2020 until December 2020, students relied on videoconferencing for taking classes, attending clubs, and communicating with families (they were not permitted weekend travel due to exposure concerns). The use of videoconferencing for academic and social pursuits continued throughout the 2020-2021 academic year to mitigate further spread of COVID-19. One year later, in Spring 2022, this survey was administered, reflecting on students' use of videoconferencing. The survey underwent review by the University Human Experimental Committee and received exempt status. Students signed an informed consent to acknowledge their choice to participate, confidentiality of responses, and lack of impact of survey participation on course grade.

Participants

Participants were entry-level OT students attending a university in the Northeast. Six cohorts of students from a master's in occupational therapy (MOT) program and a post-baccalaureate occupational therapy doctoral program (PB-OTD) were invited to participate: MOT Freshmen, MOT Sophomore, MOT Junior, MOT Senior, MOT Graduate, and post-baccalaureate (PB) entry-level OTD students (students who graduated with a bachelor's degree in another field and returned for the entry-level PB-OTD program). Inclusion criteria were full-time matriculation at the university and being 18 years or older. Participants were recruited to participate via an email invitation and an announcement posted on the OT class learning management system. The invitations were sent a week before survey administration highlighting the voluntary nature of participation and confidentiality of responses.

Instrument

The 31-item Attitudes Towards Zoom (ATZ) questionnaire was developed for this study. The ATZ included four sections: personal health (mental health [MH], physical health [PH], and emotional health [EH]), social interaction with family and friends (SI), classroom participation (CP), and campus engagement (QP) related to videoconferencing. Questions were posed as students' perceptions of videoconferencing compared to in-person or classroom experiences during the academic year (AY) of 2020-2021 as compared to previous years. The questionnaire was designed with approximately four to five questions in each category and scored on a Likert-like scale. Likert scale response options were 1, "strongly disagree", 2, "disagree", 3 "neutral", 4 "agree", and 5 "strongly agree" with the option for "not applicable/choose not to answer". Each question in the subscale was scored and reported individually. Four questions for the personal health section were adapted from content in the Zoom Exhaustion and Fatigue (ZEF) scale (Fauville et al., 2021). Cronbach's alpha coefficient was used to determine the reliability and internal

consistency of each subscale. The ATZ has good reliability and internal consistency for subscales of personal health (.68 - .74), social interaction (.73), and class participation (.77). The internal validity for campus engagement was lower (.47) possibly due to fewer questions in the subscale.

Data Collection

Students completed hard copies of surveys during OT seminar classes for MOT Freshmen, MOT Sophomores, MOT Juniors, MOT Seniors, MOT Graduate students, and PB-OTD students. Researchers explained the purpose of the study and the anonymous and voluntary nature of the survey prior to administration. The surveys were distributed during the first 10 minutes of class, placed in an envelope upon completion, sealed and handed to the researchers.

Data Analysis

Surveys were analyzed using SPSS, Version 28.0. Descriptive statistics described characteristics of the sample and percent agreement for each question. Analysis of variance (ANOVA) was used to analyze mean differences among grade levels; Tukey's D was performed for post-hoc comparison of differences among grade levels. The scores for each question were reported uniquely instead of a subsection score.

Results

Participant Demographics

Surveys were disseminated to 364 students; 275 students completed the study for a response rate of 75.6%. The distribution of respondents per college level were MOT Freshman (22%, *n*=60), MOT Sophomore (16%, *n*=44), MOT Junior (10.5%, *n*=29), MOT Senior (13.8%, *n*=38), MOT Graduate (31.3%, *n*=86), and PB-OTD students (6.2%, *n*=17). The MOT senior class had the lowest response rate of all classes (refer to Table 1 for specific values).

The mean age for participants was 20.8 (range 18-27 yrs.) with most respondents identifying as female (97.5%) and white (88.7%). These demographics are representative of student enrollment for the OT program at this university. Living situations were divided among those living in dorms with one or more roommates (44.7%) and those living in off campus housing or an apartment (48.7%).

Table 1

Demographics of the Sample

Characteristic	Percent of total sample (n=275) *Percent (number of students)*
Age	20.8 yr (Range 18-27 yrs)
College Year[a]	
MOT Freshman	22% (60)
MOT Sophomore	16% (44)
MOT Junior	10.5% (29)
MOT Senior	13.8% (38)
MOT Graduate	31.3% (86)
PB-OTD	6.2% (17)
Identified Gender	
Male	1.5% (4)
Female	97.5% (268)
Non-binary	.4% (1)
Genderfluid	.4% (1)
Chose not to answer	.4% (1)
Ethnicity	
Asian	.4% (1)
Black or African American	3.3% (9)
Hispanic or Latino	2.2% (6)
White or Caucasian	88.7% (244)
Mixed Race	3.6% (10)
Prefer not to Answer	.4% (1)
Living Situation[b]	
On campus dorm, 1 roommate	14.2% (39)
On campus dorm, >1 roommate	30.5% (84)
Off campus housing, 1 roommate	1.5% (4)
Off campus housing, >1 roommate	2.9% (8)
Off campus apt, 1 roommate	6.5% (18)
Off campus apt, >1 roommate	37.8% (104)
NA or prefer not to answer	6.6% (18)

Note: a) Percentages refer to the number of students in that cohort as a percent of the total sample. Percentages may not add to 100% due to rounding, b) The designation *Off campus apt* refers to non-university affiliated housing.

Impact of Video conferencing on Social Participation

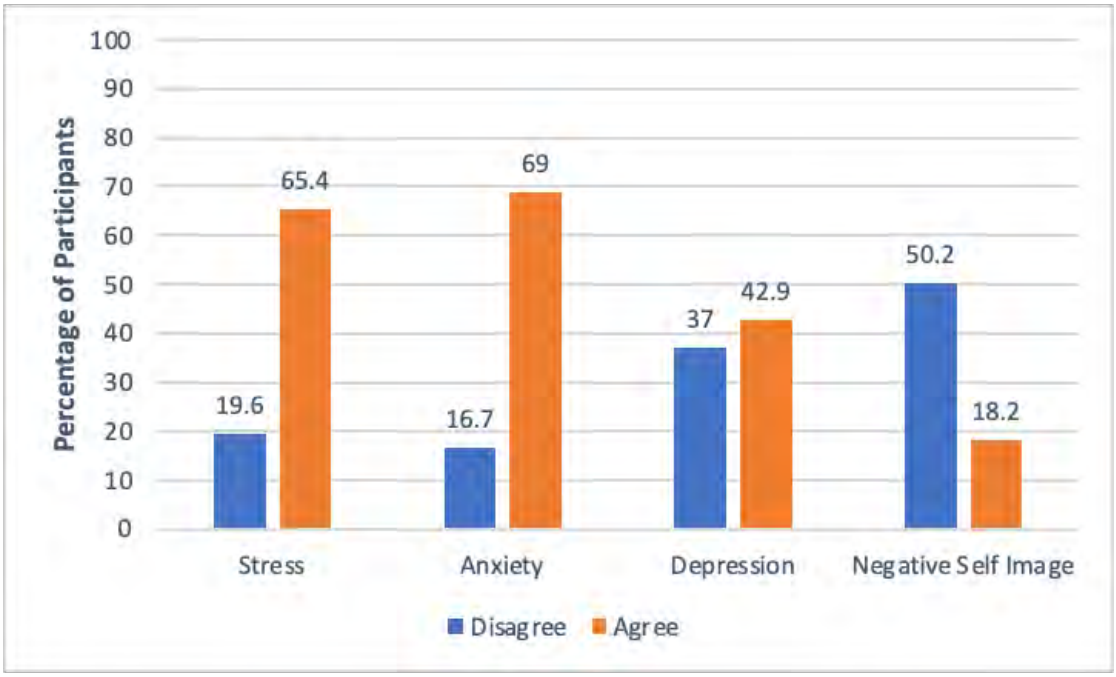
The results are presented to best represent the overall data trends. The descriptive categories of agree/strongly agree and disagree/strongly disagree are combined to summarize the percentages for questions. Key agree and disagree findings are graphically displayed in Figures 1, 2, and 3. Specific data for each question are provided in Table 2.

Personal Health

Mental Health. Most students indicated they experienced more mental health concerns in 2020-2021 than in previous years. Students agreed to strongly agreed they had higher levels of stress (65.4%, *n*=180) and anxiety (69%, *n*=190) in this period than previously. Over 40% of the sample (42.9%, *n*=118) agreed to strongly agreed they had feelings of depression during this time. However, only 18.2 % (*n*=50) agreed to strongly agreed that videoconferencing negatively affected their body image.

Figure 1

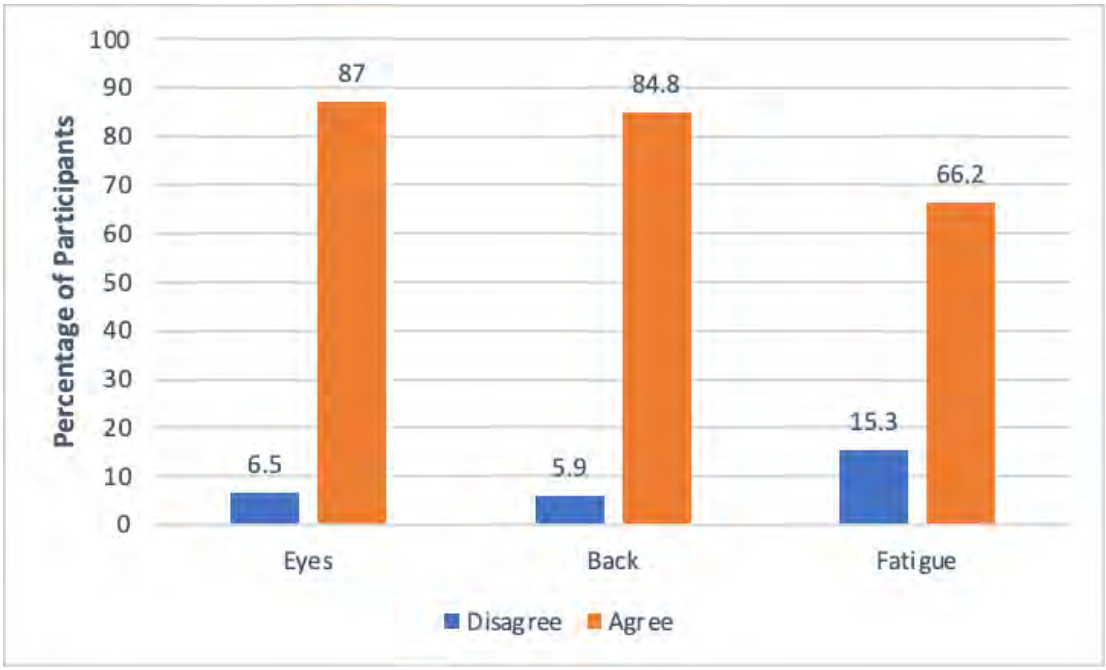
Increases in Mental Health Concerns in 2020-2021 as Compared to Previous Years



Physical Health. Students overwhelmingly noticed fatigue in their eyes and backs after video conferencing for extended periods, with over 84% (*n*=233) agreeing to strongly agreeing they experienced changes in these body parts. About 66% (*n*=182) of students felt more fatigued after a day of video conferencing as compared to a day of in-person classes.

Figure 2

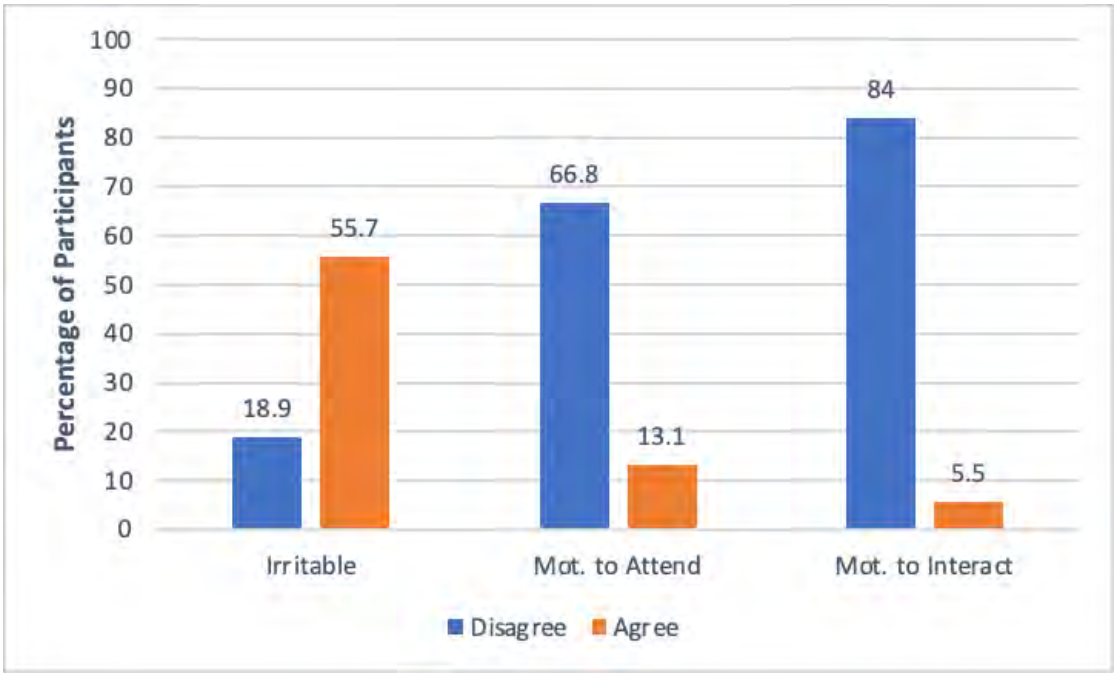
Increases in Fatigue after Extended Videoconferencing



Emotional health. Students agreed to strongly agreed they felt more irritable after a day of videoconferencing as compared to in-person classes (55.7%, *n*=183). They indicated less motivation to attend videoconferencing classes (66.8%, *n*=184) and less motivation to interact with others as compared to in-person classes (84%, *n*=131).

Figure 3

Increases in Irritability and Motivation using Videoconferencing as Compared to In-Person Classes



Note: Labels: Mot. to Attend refers to motivation to attend classes; b) Mot. to Interact refers to motivation to socially interact with peers during class.

Social Interaction with Family and Friends

Students used videoconferencing to maintain social relationships. They agreed to strongly agreed they used videoconferencing to communicate with parents (65.8%, *n*=181), siblings (52%, *n*=143), and other family (56.7%, *n*=156). Students reported increasing their use of videoconferencing during the academic year 2020-2021 for interactions with family (64%, *n*= 176) and friends (57.5%, *n*=158). However, students overwhelmingly preferred in-person interactions with both friends (97.1%, *n*=267) and family (94.1%, *n*=259) when able (refer to Table 2).

Table 2

Percent Agreement in Impact of Videoconferencing on Personal Health and Social Interaction

Category/ Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Personal Health					
Mental Health: Increases in mental health concerns in 2020-2021 compared to previous years:					
Stress	.7 (2)	18.9 (52)	14.9 (41)	39.6 (109)	25.8 (71)
Anxiety	2.2 (6)	14.5 (40)	14.2 (39)	42.5 (117)	26.5 (73)
Depression	6.5 (18)	30.5 (84)	18.9 (52)	28.0 (77)	14.9 (41)
Neg Self Image	13.1(36)	37.1 (102)	30.5 (84)	12.7 (35)	5.5 (15)
Physical Health – Increases in eye/back/general fatigue after a day of videoconferencing:					
Eyes	.7 (2)	5.8 (16)	6.2 (17)	41.5 (114)	45.5 (125)
Back	.4 (1)	5.5 (15)	9.1 (25)	33.5 (92)	51.3 (141)
Gen Fatigue	3.3(9)	12 (33)	17.8 (49)	29.8 (82)	36.4 (100)
Emotional Health- Increases in irritability/motivation after a day of videoconferencing:					
Irritable	2.2 (6)	16.7 (46)	24.7 (68)	37.5 (103)	18.2 (50)
Mot Attend	23.2 (64)	43.6 (120)	19.6 (54)	10.2 (28)	2.9 (8)
Mot Interact	46.2 (127)	37.8 (104)	10.2 (28)	4.4 (12)	1.1 (3)
Social Interaction - Use of videoconferencing to interact with:					
Sibling	14.9 (41)	20 (55)	8.7 (24)	36.7 (101)	15.3 (42)
Parents	12 (33)	12.7 (35)	8.7 (24)	45.1 (124)	20.7 (57)
Family	10.5 (29)	20.4 (56)	9.8 (27)	42.2 (116)	14.5 (40)
Use of videoconferencing more so in 2020-2021 than previously to interact with:					
Family	5.8 (16)	13.8 (38)	15.3 (42)	38.5 (106)	25.5 (70)
Friend	9.8 (27)	17.8 (49)	14.2 (39)	44 (121)	13.5 (37)
Enjoy videoconferencing more than in-person to interact with:					
Family	67.6 (186)	26.5 (73)	2.2 (6)	2.2 (6)	.7 (2)
Friend	72 (198)	25.1 (69)	2.2 (4)	.4 (1)	0

Note: Label clarification a) Mot Attend refers to Motivation to Attend Classes; b) Mot Interact refers to motivation to socially interact with peers during classes.

Classroom Participation

Students expressed a range of perspectives related to class engagement while videoconferencing. Ninety percent (90%, *n*=248) of students indicated they paid less attention in videoconferencing classes than in-person classes and 75.2% (*n*=207) indicated they asked/answered fewer questions. Perspectives on participation in breakout rooms varied with students' familiarity with peers. Over 58% (*n*=161) of students reported being engaged when placed into a breakout room with people they knew. However, only 18.2% (*n*=50) of students reported being engaged in breakout rooms with non-familiar peers. Students overwhelmingly reported they did not retain information as effectively when learning via videoconferencing rather than in person (83.2%, *n*=229).

Preferences for the use of videoconferencing for specific activities such as group projects, tutoring, and exams were divided. For group projects, students tended toward preferences for in-person collaboration (47.2%, *n*=130). However, 27.6% (n=76) were neutral on the use of videoconferencing for group projects and 24.3% (*n*=67) preferred to use videoconferencing for group projects. For peer tutoring, results were similarly split among 40.4% (*n*=111) preferring to meet in person, 30.5% (*n*=84) preferring to meet via videoconferencing, and 29.1% (*n*=60) neutral. Again, taking exams using the university videoconferencing platform were split among those who preferred taking exams online (42.5%, *n*=117), in person (34.6%, *n*=95), or no preference (21.8%, *n*=60).

Finally, over half the student sample expressed a preference for meeting with professors in person (54.9%, *n*=151). However, students were more equally divided in preferences for office hours via videoconferencing or in-person (refer to Table 3).

Campus Participation

Students reported less campus participation via videoconferencing as compared to the prior year and as compared to in-person experiences. About 53% (*n*=145) reported that they did not join new campus clubs in AY 2020-2021. Similarly, 52% (*n*= 143) reported a preference for in-person club meetings rather than meetings using videoconferencing. Students perceived a decrease in the quality of meetings held via Zoom as compared to in-person (45%, *n*=123) which may have contributed to lack of interest in clubs overall (refer to Table 3).

Table 3

Percent Agreement in Behaviors and Attitudes Toward Using Videoconferencing for Classroom Participation and Campus Participation

Category/ Questions	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Classroom Participation-					
Performed behavior more during videoconferencing classes than in-person					
Ask/answer	35.6 (98)	39.6 (109)	13.1 (36)	10.2 (28)	3 (1.1)
Pay attention	53.6 (148)	36.4 (100)	7.3 (20)	1.5 (4)	.7 (2)
Part Gp projects	15.6 (43)	31.6 (87)	27.6 (76)	16.7 (46)	7.6 (21)
Part BreakoutNK	32.4 (89)	34.9 (96)	14.5 (40)	16.4 (45)	1.8 (5)
Part BreakoutK	12.4 (34)	14.9 (41)	13.8 (38)	46.2 (127)	12.4 (34)
Retain content	46.5 (128)	36.7 (101)	12.7 (35)	2.2 (6)	1.1 (3)
Preferred activity via videoconferencing more so than in-person					
Peer tutoring	16.4 (45)	24 (66)	29.1 (60)	20.7 (57)	9.8 (27)
Exams	17.1 (47)	17.5 (48)	21.8 (60)	23.6 (65)	18.9 (52)
Meet professor	21.8 (60)	33.1 (91)	32.4 (89)	10.5 (29)	1.8 (5)
Office hrs.	16.4 (45)	22.5 (62)	27.6 (76)	25.1 (69)	6.5 (18)
Campus Participation-					
Participated in AY 2020-2021 using Videoconferencing					
Join clubs	21.8 (60)	30.9 (85)	17.8 (49)	15.3 (42)	5.5 (15)
Attend club mtg	24.4 (67)	27.6 (76)	18.5 (51)	17.5 (48)	6.5 (18)
Dec club quality	5.8 (16)	10.2 (28)	28.4 (78)	32 (88)	12.7 (35)

Note: The code for the following categories are: a) Part Gp Project- participate in group projects; b) Part BreakoutK- participate in breakout rooms, know peers; c) Part BreakoutNK- participate in breakout room, not know peers

Differences Among College Levels

A one-way ANOVA revealed statistically significant differences in videoconferencing perspectives between at least two cohorts of OT students (refer to Table 4). Tukey's test for multiple comparisons was conducted to examine specific differences in the mean values among cohorts. Significant differences in responses among cohorts are presented in Table 4. A comparison of specific cohort responses is presented in the text.

Students reported significant differences in stress related to the use of videoconferencing between MOT Freshman and MOT Senior cohort ($p<.001$, 95% C.I. = [-1.54, -.31]) and between Senior and Graduate cohorts ($p<.001$, 95% C.I. = [.32, 1.48]. MOT Seniors reported the highest level of stress compared to the previous academic year (4.4/5); MOT freshman reported the lowest difference in stress levels compared to the previous year (3.4/5). This finding may have been due to MOT Freshmen having become familiarized with videoconferencing for classes during their high school years. However, there was a significant difference ($p=.018$) between MOT Freshman and MOT Sophomores in irritability levels after a day of zoom classes. MOT Freshman reported significantly higher levels of irritability (3.7/5) than MOT Sophomores (3.0/5).

Significant differences were also noted among cohorts in videoconferencing use for social interaction. Lower division undergraduate students (MOT Freshmen, MOT Sophomores) reported significantly greater use of videoconferencing to communicate with friends and family during the COVID-19 pandemic as compared to MOT Graduate/PB-OTD cohort ($p<.001$). This difference may reflect the age and lifestyle differences between the cohorts.

For classroom participation, significant differences emerged in perspectives on the use of breakout rooms. MOT Freshman and MOT Sophomore cohorts reported more negative feelings about engagement in breakout rooms with unknown peers during videoconferencing classes, compared to MOT Seniors, MOT Graduate, and PB-OTD students. This may be attributed to MOT Seniors/MOT Graduates having a higher level of familiarity with their classmates after taking classes for multiple years together in comparison to younger cohorts. Tutoring via videoconferencing was preferred by MOT Freshmen and MOT Sophomores in comparison to MOT Graduates and PB-OTD students. While counterintuitive, this finding may be due to convenience (the college has three campuses), underclassman's lack of familiarity with school office locations, transportation, and resources.

Table 4

Between Group Differences Among Cohorts

Item	df	Sum of Square	Mean Square	F	Significance pvalue
Personal Health					
Stress	5	25.74	5.15	4.8	<.001
Anxiety	5	18.94	3.79	3.5	.005
Fatigue	5	19.17	3.83	2.8	.017
Irritability	5	18.67	3.73	3.3	.006
Motivation to attend	5	14.9	2.9	2.9	.014
Social Interaction via Videoconferencing					
Interact siblings	5	36.32	7.26	3.5	.004
Interact parents	5	41.14	8.23	5.1	<.001
Interact ext family	5	47.9	9.6	5.7	<.001
Increase family	5	21.73	4.34	2.9	.012
Increase friend	5	20.87	4.17	2.8	.016
Class Engagement					
Part BreakoutNK	5	38.77	7.76	6.9	<.001
Office hours	5	48.84	8.77	6.3	<.001
Tutoring	5	104.7	20.9	12.6	<.001
Exams	5	110	22	14.0	<.001
Campus Engagement					
Join clubs	5	53.45	10.69	6.6	<.001
Dec club quality	5	26.74	5.35	2.5	.028

Discussion

The ATZ survey examined perspectives on the use of videoconferencing for social participation (family/friends, class participation, campus engagement) in 275 occupational therapy students from six class cohorts. The survey additionally addressed students' dimensions of health (physical, mental, emotional) during the AY 2020-2021 year as compared to the previous year. Students overwhelmingly preferred in-person versus videoconferencing for classroom engagement and knowledge retention. Most students indicated less participation in class when using videoconferencing, specifically related to asking and answering questions, paying attention, and participating in breakout rooms with unknown peers. However, they were divided in preferences for use of videoconferencing for meeting with professors, peer tutoring, group projects, exams, and office hours.

Most students reported increased mental health issues related to videoconferencing in AY 2020-2021 as compared to previous years, noting higher levels of stress and anxiety. They reported increased overall fatigue and physical changes in eye and back as compared to the previous year. Significant differences in attitudes toward videoconferencing were found among cohorts when comparing undergraduate lower division (MOT Freshmen /MOT Sophomore) and upper division (MOT Senior/ MOT Graduate/PB-OTD) students. Lower division students indicated significantly less class engagement in breakout rooms with unknown peers and a stronger preference for in-person meetings with professors and peer tutors as compared to students in upper divisions.

Relation to Previous Research

Videoconferencing as a technology was consistently used for communicating with familiar individuals in this study. Students reported increased use of videoconferencing to maintain social interaction with friends and family during COVID-19 as compared to previous years. This finding reflects participants' comfort with using videoconferencing as a platform for communication with close relationships, consistent with the principles related to proxemics or personal space for close interaction (Bailenson, 2021; Hall, 1963).

Students were less positive about the use of videoconferencing technology for classroom pedagogies and campus engagements. These findings are consistent with previous research in academic environments indicating students' overall preference for in-person classes for class engagement and knowledge retention (Gullo & Walker, 2021; Vandenburg & Magnuson, 2020). This study extends the findings of previous studies by examining the specific behaviors that interfered with learning during videoconferencing and means by which students self-limited classroom engagement. Asking/answering questions is fundamental to ensuring that students understand content in lecture-based classes. However, findings from our study indicated that students were reticent to asking/answering questions and had more difficulty paying attention in virtual settings than in-person classes. Such behaviors impact the engagement necessary for students' deep learning and limit faculty's ability to gain feedback from students to gauge their learning. These findings may reflect Elbogen's point that challenges exist in communication exchange during videoconferencing due to difficulty interjecting a question or comment into a fast-paced discussion (Elbogen et al., 2022; Kushner, 2021).

Students also indicated they refrained from participating in breakout rooms (particularly lower division undergraduate students) with unfamiliar peers, a learning strategy aimed at generating discussion and creative problem-solving (Read et al., 2022). We cannot determine whether students' lack of participation reflected discomfort in the forced closeness of breakout rooms or the cognitive load demands in interpreting non-verbal behavior. However, our study indicated that active teaching strategies routinely utilized by faculty such as asking questions and organizing small group discussion to promote critical analysis, did not appear to translate well to virtual settings in our study (Bailenson, 2021; McCabe et al., 2023; Reidl, 2021).

The fact that students noted willingness (or preference) to using videoconferencing for meetings with professors, office hours, and peer tutoring may indicate the overall convenience of videoconferencing and some level of comfort in videoconferencing meetings with individuals with whom they are familiar. These findings support Abbasi et al.'s (2020) findings on positive interactions with professors who use videoconferencing effectively. In fact, for discrete activities, agreement was split regarding the use of videoconferencing for exams and group projects, possibly due to the convenience of decreased travel time between home and across campuses.

Finally, students in this sample appeared to experience "Zoom Fatigue" as reflected by reports of physical fatigue, irritability, stress, and lack of motivation to attend classes (Bailenson, 2021; Fauville et al., 2021). This finding reflects earlier studies related to the stressors from lack of movement, focus, and potential cognitive load. While our study did not address the specific factors related to their environment (distraction, chair comfort) or class content (interest in class, chunking content, length of lecture), these would be important to discuss for future recommendations (McCabe et al., 2023).

Future Research

This study utilized an expanded definition of social participation that enabled a broad view of the use of videoconferencing technology for student experiences on college related to their personal health, social communication, and classroom participation. This approach provided a deeper analysis of benefits and costs of videoconferencing related to the entire student experience rather than just the academic component. Future research may address a more specific dose-response related to the impact of videoconferencing on health by tracking the number of hours of use as associated with physical health changes. Future research may also compare student cohorts across other majors, identify relationships between videoconferencing preference and learning outcomes, examine professor perceptions of student engagement and student performance, and expand student recruitment to include students of diverse ages and backgrounds in the study.

Implications for Occupational Therapy Education

This study expanded our understanding of specific aspects of videoconferencing use as a pedagogy and raised the question of the best means to take advantage of the efficiencies but recognized the limitations of videoconferencing as a learning strategy. As universities consider the benefits versus costs of videoconferencing, some specific indications for use may be considered based on this study. These suggestions pertain to primarily in-person programs using videoconferencing for delivering some program content.

Based on student responses related to challenges in knowledge retention, engagement in classes, and reticence to asking and answering questions in videoconferencing classes, faculty may consider using in-person means to clarify students' understanding of key content taught during a videoconferencing class. This may include encouraging students to attend office hours or providing low-stakes evaluative opportunities. Since

students were divided among preferences for the delivery mode (in-person as compared to videoconferencing) for office hours, tutoring, and meetings, instructors may offer options for delivery model when possible.

For videoconferencing pedagogies, instructors should be aware that freshman and sophomore students may be less comfortable in activities using breakout rooms with nonfamiliar peers. Therefore, instructors may seek feedback from students on use of this instructional technology prior to use. Instructors should also consider limiting the duration of lectures, chunking material to ensure ease of understanding, linking content to students' future goals, and creating visuals to retain students' attention (McCabe et al., 2023). For campus organizational meetings, advisors may encourage periodic face to face experiences (in addition to virtual meeting) to encourage member satisfaction with quality of meetings.

To promote students' personal health during videoconferencing classes, OT programs may consider shorter durations of videoconferencing classes and limit multiple classes per day. Since this study did not collect data on the duration of their videoconferencing classes or number of classes per week, recommendations cannot be made relative to the ideal duration of classes or maximum number per day. However, instructors may follow best practices for ergonomic recommendations for seated computer work. Instructors may insert a stretch break every hour for 2-3 minutes (based on seated ergonomic recommendations) for classes longer than one hour (Marangoni, 2010; McCabe et al., 2023). Instructors may teach students to use the 20:20:20 rule during videoconferencing class to minimize eye fatigue: every 20 mins, look 20 feet away, for 20 seconds.

Finally, given students' high reported use of videoconferencing for personal social interactions with close friends and family during the COVID-19 pandemic, advisors may encourage use of videoconferencing with friends/family to manage stressors or anxiety.

Limitations

This study cannot be generalized to all OT student populations due to convenience sampling from one university in the Northeast. The findings of this study may not represent experiences of students from universities with a more diverse OT student body, different approaches to the use of videoconferencing, or different organizational policies during the COVID-19 pandemic.

Another limitation of this research study was the unequal distribution between cohorts. The PB-OTD cohort was smaller than other classes; the MOT Senior cohort had slightly less than 50% participation. Most importantly, the study is based on self-report; therefore, the students may respond in such a way they deem as socially acceptable although no names were used to track responses. Additionally, some questions referenced the AY 2020-2021 year, which relied on students' recall.

Conclusion

Student use of videoconferencing during the COVID-19 pandemic enabled social communication with friends and family. However, six cohorts of OT students preferred in-person classes to videoconferencing classes for personal health, knowledge retention and class engagement. Videoconferencing may be a convenient option for class-related tasks but should not substitute for in person learning if available.

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