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Video conferencing during emergency distance learning impacted student emotions during COVID-19

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ABSTRACT

Research during the pandemic has demonstrated that the rapid shift to emergency distance learning has impacted students' emotions. What explains this link remains a sparsely explored question. Because many students report negative experiences while video conferencing during emergency distance learning, one avenue that has yet to be explored is whether students' attitudes towards video conferencing may explain the link between video conferencing and students' emotions. As such, to explore this question, a total of 558 college students and 219 parents or guardians of K-12 students completed a survey about their video conferencing attitudes while emergency distance learning and their positive and negative emotions while video conferencing during emergency distance learning. Across both samples, even after controlling for student learning and teacher evaluations, when students held the attitude that video conferencing during emergency distance learning felt like a forced interaction, students reported greater negative emotions. Because instructors can use the lessons learned from the COVID-19 pandemic to improve distance learning in the future, video conferencing attitudes that are most strongly related to negative emotions should continue to be explored.

1. Introduction

Because of the COVID-19 pandemic, more than a half billion students were forced to abruptly adapt to emergency distance learning via video conferencing to safely continue with their schoolwork (Cohen & Kupferschmidt, 2020). Emergency distance learning is different from traditional remote learning as it is meant to be a temporary shift that occurred due to the pandemic, while traditional remote learning involves foresight and planning (Whittle et al., 2020). Furthermore, the switch to online education occurred suddenly, with little to no preparation, which could negatively impact students emotional experiences, especially while simultaneously coping with a global pandemic (Khlaif et al., 2021). Although moving to emergency distance learning has been shown to protect the health of students and teachers, research prior to the pandemic has found that when compared to face-to-face learning, online learning is linked to worse motivation and academic outcomes (Stark, 2019). As such, although the shift to emergency distance learning via video conferencing may have helped to protect the *health* of students, families, and teachers, there may have been unintended negative consequences to students' *emotional experiences* while learning due to the rapid change to a video conferencing learning environment.

1.1. Emotions

The Positive and Negative Affect Scale (PANAS; Watson et al., 1988) measures two orthogonal dimensions of emotion: Positive and negative affect (i.e., emotion). Positive affect is the extent to which an individual reports feeling positive emotions such as feeling interested, alert, or excited, while negative affect is the extent to which an individual reports feeling negative emotions such as feeling irritable, upset, and scared. Research has consistently identified that positive emotions are related to a host of beneficial social, financial, cognitive, and health outcomes (Isen, 2001; for review, see; Lyubomirsky et al., 2005). On the other hand, negative emotions have been linked to a plethora of undesirable outcomes such as worse health outcomes and the narrowing of one's attention (for review, see Fredrickson, 2000) and has been linked to worse learning outcomes (Pekrun, 2006).

Although learning outcomes are not explored in this paper, understanding the link between emergency distance learning and emotions is vital because research prior to the pandemic has shown that emotions

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ranging from enjoyment, anger, pride, boredom, or anxiety have important consequences for students' motivation and learning (Pekrun, 2006; Pekrun et al., 2002). That is, positive emotions (e.g., enjoyment, pride) often facilitate motivation, self-regulation, and thus improve academic learning, while negative emotions (e.g., anger, anxiety) reduce motivation, consume cognitive resources, and thus negatively impact motivation, self-regulation, and academic learning (Daniels et al., 2009; Pekrun et al., 2009, 2011). Importantly, negative emotions may be especially relevant during emergency distancing learning because many students have reported frequent anxiety (Mseleku, 2020; Son et al., 2020) and greater negative emotions in general (Janssen et al., 2020) during the pandemic. As such, understanding how video conferencing during emergency distance learning impacts students' emotions is vital due to the important correlates associated with both positive and negative emotions.

1.2. Emotions during emergency distance learning

The COVID-19 pandemic has caused many emotional challenges for individuals. In a large-scale study that followed 2,000 people from June 2019 to June 2020, the researchers found that positive emotions like happiness and optimism declined, while negative emotions like stress and sadness increased (Foa et al., 2020). When examining the experiences of college students during the pandemic, many students reported increases in negative emotions like anxiety and stress as well as had poor access to technology and the internet, which impeded their academic success and concentration (Mseleku, 2020; Son et al., 2020). Additionally, in a study of students in primary, middle, and high school, although all students reported being behaviorally engaged in learning (e.g., completing tasks and requirements), they also reported being less cognitively (e.g., drive to learn outside of the classroom) and emotionally (e.g., positive emotions while learning) engaged, which the researchers say may indicate that during emergency distance learning, students are less committed to learning and are putting in less intellectual effort (Mingzhang et al., 2021). The results of this study highlight the tumultuous relationship between emergency distance learning and emotions. However, although this link is present, little is known about why the link exists between emergency distance learning and worse emotional outcomes.

1.3. Video conferencing during emergency distance learning and emotions

While there are likely many reasons why emergency distance learning was challenging for students, one important reason may be due to the emergency use of video conferencing to facilitate learning like never before. Prior to the pandemic, classes were near exclusively conducted in-person, but in a short span of time with little preparation, both classes and students (whether suited or prepared for online learning or not) were abruptly shifted to online learning. The rapid shift to the emerging technology of video conferencing was evident from the spike in Zoom users which went from 10 million to an impressive 200 million users per day in just the first four months of the pandemic (Yuan, 2020). Therefore, although video conferencing is not a new technology, the drive with which people of all backgrounds (e.g., students, doctors, employees) used video conferencing and heavily relied on the technology to facilitate learning in a new capacity has made video conferencing blossom into an emerging technology.

Because of the learning curve involved in adjusting to anything new, research has found that emerging technologies, such as using video conferencing for school, often has a large impact on students' learning environments (Czerkawski & Lyman, 2016). This is evidenced in a small survey study of college students during the first two weeks of remote learning at the beginning of 2020, whereby 76% of students reported some anxiety about the switch to remote learning (Unger & Meiran, 2020). Moreover, at the three-week follow-up, more than half of students (51%) still reported anxiety about remote learning, demonstrating the impact that the change in students' learning environments has had on their emotions. As such, although separately video conferencing and learning are not novel, when coupled together quite abruptly into video conferencing during emergency distance learning, the experience is quite foreign and anxiety-inducing.

Along with the large-scale shift to using video conferencing, college students simultaneously began reporting more negative than positive experiences during emergency distance learning, with the most common negative experiences being unstable Wi-Fi, difficulty interacting with peers, and the lack of practice to fully grasp material (Shim & Lee, 2020). Additionally, a study of college students who were engaged in emergency distance learning during COVID-19, many students reported feeling negative emotions such as anxiety and nervousness (Murphy et al., 2020). Similarly, students interviewed about their emergency distance learning experience reported stress, fear, or anxiety, which, in some cases, were linked with uncertainty surrounding remote learning (Petillion & McNeil, 2020). As such, the frequency with which students engaged in video conferencing for school grew exponentially during the pandemic along with reports of many negative experiences, perhaps due to the novel and instantaneous nature that video conferencing was paired with learning during the pandemic.

1.4. Attitudes towards video conferencing during emergency distance learning

Because many students have been struggling emotionally while video conferencing during emergency distance learning, many students may be forming negative attitudes towards video conferencing. In fact, research during the pandemic has identified that among a small sample of surveyed students, when asked about their "enjoyment using ZOOM during the class," "(comfort) using ZOOM in the class," whether they "would like to use ZOOM in other classes," whether "the use of ZOOM allowed flexibility in (their) learning schedule," and whether "overall, (they) enjoyed using ZOOM in the class" the average rating of each of the 5-items from this study's Attitudes Towards Using Zoom scale ranged from 2.29 to 3.10 on a 1 (*Strongly disagree*) to 5 (*Strongly agree*) scale (Serhan, 2020). This illustrates that the attitudes towards Zoom for students who are video conferencing during emergency distance learning skews negatively. Similarly, in a quantitative and qualitative study of college students during the pandemic, students reported that they preferred face-to-face learning more than online learning (Patricia Aguilera-Hermida, 2020). These results demonstrate that attitudes towards Zoom, or video conferencing, are quite poor, especially when compared to traditional face-to-face learning.

Although it is vital to understand students' enjoyment of video conferencing, it is also important to understand students' attitudes towards video conferencing that goes beyond enjoyment. Furthermore, linking these attitudes to subsequent emotions is valuable as well because past research has shown that emotions are tied to learning, health, and social outcomes, to name a few. As such, our research will examine attitudes towards video conferencing that involve students' experiences to this *rapid* and *forced* shift to video conferencing during emergency distance learning. That is, whether students hold the attitude that it is: (1) their decision to use video conferencing for school, (2) whether their school requires the use of video conferencing, (3) if in order to do school effectively, they must use video conferencing, or (4) whether using video conferencing in order to complete classwork feels like a forced interaction. Because students were forced quite precipitously to transition to emergency distance learning, understanding how this change has impacted students' attitudes towards video conferencing may help to uncover the links with negative emotional outcomes.

1.5. Study aims

In light of the evidence demonstrating that students, both college-level and K-12, had emotional difficulties during emergency distance

learning (Mingzhang et al., 2021; Mseleku, 2020; Son et al., 2020) and have reported negative attitudes towards video conferencing (Serhan, 2020), the main goal of our research was to examine *why* students reported poor emotional outcomes during emergency distance learning. To answer this question, we recruited a sample of college students to respond to our survey about themselves and a sample of parents/guardians of K-12 students to respond to questions about their children in an informant-report style questionnaire.

Because one of the most novel and key aspects to this instantaneous shift to emergency distance learning was the *video conferencing* piece, our research focuses on students' attitudes towards this rapid change to video conferencing. To explore this goal, we have multiple research questions.

1.5.1. RQ #1

To replicate prior research which has found decreased positive affect and increased negative affect during emergency distance learning (Murphy et al., 2020; Petillion & McNeil, 2020; Shim & Lee, 2020; Unger & Meiran, 2020), we will examine the overall positive and negative emotions of students while video conferencing during emergency distance learning (as assessed by the PANAS).

1.5.2. RQ #2

Because research has shown that students' attitudes towards video conferencing during emergency distance learning were quite negative (Serhan, 2020) and the shift to emergency distance learning was rapid and novel, we created our own measure of video conferencing attitudes (as outlined in our materials). As such, we aim to explore students' agreement (or disagreement) with our items measuring attitudes towards video conferencing (as assessed by the four video conferencing attitudes items).

1.5.3. RQ #3

To examine whether there is a link between any of the items measuring students' attitudes toward video conferencing and positive and negative emotion, we will explore the correlations among students' attitudes toward video conferencing (as assessed by the four video conferencing attitudes items) and positive and negative emotions (as assessed by the PANAS).

1.5.4. RQ #4

Finally, we will examine whether students' attitudes toward video conferencing (as assessed by video conferencing attitudes items) predicts positive and negative emotion (as assessed by the PANAS).

2. Method

2.1. Participants

We recruited participants during the heart of the pandemic (during the Fall and Spring 2020 semesters) from various California community colleges, a university in San Francisco, and from Amazon's Mechanical Turk. Participants from the colleges and university were compensated with extra credit. The study was approved by the Institutional Review Board (2020-060). Participants from Amazon's Mechanical Turk were paid $0.50 to complete our survey. All participants were told they would be answering questions about their feelings during remote learning due to the COVID-19 shelter in place (SIP) measures. Participants were asked to select any of the following situations that had occurred in the last month: (1) they were a college student whose classes were now completely over remote instruction, (2) they were a worker who's meeting were all via video conferencing, (3) they were a parent or guardian of a child who's classes were now completely over remote instruction, or (4) they are video conferencing in a new domain of life (e.g., for church, socializing, communicating). All participants then selected which situation best applies to them.

For this study we only analyzed the data of the college students and parents of a K-12 students who passed our three attention checks. In a recently published paper, researchers examined how video conferencing attitudes related to emotions such as video conferencing anxiety, with average correlations in of $r = 0.35$ (25th percentile $r = .24$, 75th percentile $r = .47$; Okabe-Miyamoto et al., 2021). Thus, we used G*Power (Faul et al., 2007) to determine the minimum sample sized based on the 25th percentile effect size of $r = 0.24$ with an alpha of .05 and power of .95. With this effect size, we need a minimum of $n = 215$, as such we decided to keep the study open until both samples of college students and K-12 parents or guardians reached this sample size.

A total of 558 college student participants ($M_{age} = 24.84$, $SD_{age} = 7.96$, 69% Female, 71% Single, 38% have 1+ children, 65% have a household income of $59K or less) participated in our study. Most of the college students were either seniors (39%) or juniors (30%) with the remaining students being sophomores (21%) or freshman (11%). As expected, 83% of the students had taken at least one online class in the past. That said, over half of the college students strongly agreed (51%) or agreed (23%) that if COVID-19 was not happening, they would rather have taken all their classes face-to-face. In addition to being fully remote students, 11% were also working at an institution whose meetings were all conducted using video conferencing, 7% were also a parent or a guardian of a child whose classes were over remote instructions, and 27% had to move to video conferencing for some other aspect of their life. Nearly all students (81%) were using Zoom as their video conference software, with other students either using Skype (7%), Google Hangout (6%), Slack (1%), or various other types of software.

A total of 219 parents or guardians ($M_{age} = 41.03$, $SD_{age} = 9.35$, 74% Caucasian, 83% married or living with a parent, 76% have one child, 39% have a household income of $59K or less) of a K-12 student whose classes had moved to 100% remote instruction (importantly, all children had been in traditional face-to-face instruction prior to the COVID-19 SIP orders) participated in the study. A total of 21% of parents were also employees who were working remotely, while 6% of the parents were university students taking classes online. However, they reported their primary responsibility was their child's education. The distribution of K-12 grades was evenly spaced across all of the levels of K-12 grades: 12% of the parents provided an observer rating of their kindergarten student; 9% provided an observer rating of their 5th grade student; 5% provided an observer rating of their 12th grade student. As expected, only 30% of the K-12 students had taken at least one online class in the past. That said, again, nearly half of the parents strongly agreed (49%) or agreed (31%) that if COVID-19 was not happening, they would rather their child have taken all their classes in-person. Over half of the K-12 students (55%) were using Zoom as their video conference software, with other students using Skype (15%), Google Hangout (22%), Slack (2%), or various other types of software.

2.2. Procedure

After answering the branching questions to determine which video conferencing situation most applied to their life, participants completed the primary survey questions. All questions were nearly identical with college students answering the questions about themselves and parents/guardians of K-12 students answering most questions about their child. The first set of questions participants answered were the video conferencing attitudes items (e.g., "my school requires the use of video conferencing"). Participants then answered an adapted version of the PANAS-X to indicate the emotions they felt when video conferencing for school. After answering the items concerning video conferencing attitudes and video conferencing emotions, all participants (including K-12 parents) rated their student learning outcomes and teacher evaluations.

2.3. Materials

2.3.1. Video conferencing attitudes

We asked participants to rate four video conferencing attitude items on a scale from 1 (strongly disagree) to 5 (strongly agree). That is, whether students held the attitude that: (1) *it is my decision to use video conferencing for school* ($M_{College} = 2.87$, $SD_{College} = 1.28$; $M_{K\text{-}12} = 3.12$, $SD_{K\text{-}12} = 1.21$), (2) *my school requires the use of video conferencing* ($M_{College} = 3.88$, $SD_{College} = 1.01$; $M_{K\text{-}12} = 3.84$, $SD_{K\text{-}12} = 1.05$), (3) *in order to do school effectively, I must use video conferencing* ($M_{College} = 3.58$, $SD_{College} = 1.18$; $M_{K\text{-}12} = 3.95$, $SD_{K\text{-}12} = 0.90$), or (4) *using video conferencing in order to complete classwork feels like a forced interaction* ($M_{College} = 3.53$, $SD_{College} = 1.15$; $M_{K\text{-}12} = 3.38$, $SD_{K\text{-}12} = 1.17$). In Table 1, we report the mean and standard deviation for each item as well as the intercorrelation between the four items for both college students as well as K-12 students.

2.3.2. Positive and negative emotions

We adapted the PANAS-X (Watson et al., 1988) in order to measure positive and negative emotions while video conferencing during emergency distance learning. We asked college students "*to what extent have you felt the following emotions when video conferencing for school*" and K-12 parents/guardians "*to the best of your ability, rate how your child feels when they are video conferencing for school.*" Participants then rated the same 20 emotions (e.g., interested, upset) from 1 (very slightly or not at all) to 5 (extremely). The average positive affect while video conferencing for school ($M_{College} = 2.30$, $SD_{College} = 1.01$, $\alpha = 0.95$; $M_{K\text{-}12} = 3.04$, $SD_{K\text{-}12} = 0.95$, $\alpha = 0.94$) and the average negative affect while video conferencing for school ($M_{College} = 2.16$, $SD_{College} = 1.01$, $\alpha = 0.93$; $M_{K\text{-}12} = 1.79$, $SD_{K\text{-}12} = 0.97$, $\alpha = 0.96$) can be found in Table 1.

2.3.3. Measurement of student evaluations

We also measured a number of potential positive confounding variables to examine if adjusting for these variables change the association between students' attitudes towards video conferencing and emotions experienced during emergency distance learning. For example, we expected (1) student and course learning outcomes, such as when students feel they are doing poorly in a class, or (2) the evaluation of instructor's teaching methods and practices, such as believing their professors or teachers are not effective, may experience video conferencing differently as well as report fewer positive or more negative emotions while video conferencing.

Student and Course Learning Outcomes. College participants and parents/guardians of K-12 students rated five learning and course outcomes from 1 (strongly disagree) to 5 (strongly agree). The five questions college students answered were, "*for the classes I am now taking over video conferencing, the classes*": (1) *Make a contribution to my learning* ($M = 3.36$; $SD = 1.16$), (2) *stimulate my learning* ($M = 3.04$; $SD = 1.27$), (3) *effectively use assignments to promote learning* ($M = 3.24$; $SD = 1.21$), (4) *encourage critical thinking* ($M = 3.21$; $SD = 1.24$), and (5) *motivate me to learn more* ($M = 2.87$; $SD = 1.33$). As with previous items, we adapted the items for K-12 parents/guardians so they could provide evaluations for their children. The five questions K-12 parents/guardians answered, "*for my child's classes that are now over video conferencing, the classes*": (1) *Make a contribution their work* ($M = 3.78$; $SD = 0.89$), (2) *stimulate their learning habits* ($M = 3.62$; $SD = 0.99$), (3) *effectively uses assignments to promote learning* ($M = 3.61$; $SD = 0.98$), (4) *encourage critical thinking* ($M = 3.59$; $SD = 0.98$), and (5) *motivate them to learn more* ($M = 3.51$; $SD = 1.07$). We computed the average of these five student and course learning outcomes items ($M = 3.14$; $SD = 1.07$; $\alpha = 0.92$ for the college students and $M = 3.62$; $SD = 0.81$; $\alpha = 0.87$ for the parents/guardians), with higher scores indicating participants rated their classes as having positive learning outcomes.

Evaluation of Instructor's Teaching Methods and Practices. Participants and parents/guardians of K-12 students rated five items evaluating their teachers' methods and practices from 1 (strongly

Table 1
Means, standard deviations, and inter-correlations among video conferencing attitudes.

		Positive Affect while video conferencing for school	Negative Affect while video conferencing for school	It is my decision to use Video Conferencing for my child's school work.	My child's school requires the use of Video Conferencing.	In order to help my child work effectively, I must use Video Conferencing.	Using Video Conferencing in order for my child to complete his/her work, feels like a forced interaction.
College Students (n = 558; below diagonal) **K-12 Students (n = 219; above diagonal)**							
	Mean (SD)						
Mean (SD)		3.04 (.95)	1.79 (.97)	3.12 (1.21)	3.84 (1.05)	3.95 (.90)	3.38 (1.17)
Positive Affect while video conferencing for school	2.30 (1.01)	–	.27**	.30**	.03	.08	.01
Negative Affect while video conferencing for school	2.16 (1.01)	.44**	–	.16*	.06	-.08	.23**
It is my decision to use Video Conferencing for school.	2.87 (1.28)	.33**	.17**	–	-.29**	-.12	-.09
My school requires the use of Video Conferencing.	3.88 (1.01)	.04	.10*	-.16**	–	.55**	.24**
In order to do schoolwork effectively, I must use Video Conferencing.	3.58 (1.18)	.19**	.15*	-.11**	.54**	–	.17**
Using Video Conferencing in order for me to complete my classwork, feels like a forced interaction.	3.53 (1.15)	-.08	.26**	-.08	.29**	.13**	–

Note. We measured a variety of video conferencing attitudes (1 = strongly disagree; 5 = strongly agree). We report the intercorrelations from both the 558 college students and 219 parents/guardians of a pre-K-12 child. *$p < .05$, **$p < .001$.

disagree) to 5 (strongly agree). The five questions college students and parents/guardians answered were identical with only the sentence stem changing, "*the instructors (teachers) who are teaching my classes (my child's class) over video conferencing*": (1) *Are well organized* ($M = 3.53$, $SD = 1.09$ for the college students; $M = 3.76$, $SD = 1.05$ for the parents/guardians), (2) *provide helpful and timely feedback* ($M = 3.55$, $SD = 1.16$ for the college students; $M = 3.79$, $SD = 0.96$ for the parents/guardians), (3) *express their ideas clearly* ($M = 3.64$, $SD = 1.10$ for the college students; $M = 3.91$, $SD = 0.93$ for the parents/guardians), (4) *are open to various points of view* ($M = 3.79$, $SD = 1.05$ for the college students; $M = 3.77$, $SD = 0.90$ for the parents/guardians), and (5) *demonstrate a strong command of what they are teaching* ($M = 3.76$, $SD = 1.07$ for the college students; $M = 3.80$, $SD = 0.95$ for the parents/guardians). We computed the average of these five instructor's teaching methods and practices items ($M = 3.65$, $SD = 0.90$, $\alpha = 0.89$ for the college students and $M = 3.81$, $SD = 0.79$, $\alpha = 0.88$ for the parents/guardians) with higher scores indicating participants rating their instructors/teacher's method and practices more favorably. While the student and course learning outcomes as well as the evaluation of instructor's teaching methods and practices were separate factors, they were highly correlated with each other: $r(555) = 0.58$, $p < .001$ for the college students; $r(217) = 0.67$, $p < .001$ for the K-12 parents or guardians.

3. Results

3.1. Positive and negative emotion while video conferencing

Because previous research has shown that students reported decreased positive affect and increased negative affect during emergency distance learning (Murphy et al., 2020; Petillion & McNeil, 2020; Shim & Lee, 2020; Unger & Meiran, 2020), we first examined the means and standard deviations from overall positive and negative emotions (RQ #1). Overall, it was clear that college students experienced fewer positive emotions and more negative emotions while video conferencing during emergency distance learning (see Table 1). For example, in the college student sample, we see that, on average, most students experienced only slightly more positive emotions ($M = 2.30$) compared to the negative emotions they experienced ($M = 2.16$). However, using a dependent samples *t*-test, although this difference was statistically significant, $t(556) = 2.87$, $p = .004$, the *d*-effect size was in the trivial difference range ($d = 0.12$). This is compared to K-12 students who experienced, relatively, much more positive emotions ($M = 3.04$) when compared to negative motions ($M = 1.79$) while video conferencing during emergency distance learning, $t(218) = 15.84$, $p < .001$, $d = 1.07$ (with a large *d*-effect size for K-12 students). Thus, K-12 students experienced both more positive emotions, and fewer negative emotions, compared to college students while video conferencing during emergency distance learning.

3.2. Attitudes toward video conferencing

Second, because previous research has shown that students' attitudes towards video conferencing during emergency distance learning were negative (Serhan, 2020), we next examined the pattern of means for the four video conferencing attitudes items (RQ #2). The clear trend that emerged were indications of low levels of choice and autonomy (see Table 1). For example, in both the college student sample as well as the K-12 sample, the lowest mean was agreement with the question "*it is my decision to use video conferencing for school*." Across the two samples, college students disagreed with the statement that it was their decision to use video conferencing for school (47% of college students disagree and 38% of parents disagreed). Furthermore, in both samples, less than 50% agreed with this statement (37% of college students agreed compared to 45% of parents agreed). Also, another indication that students felt low levels of choice and autonomy was that this item had a significantly lower mean than "*my school requires the use of video conferencing*" and "*in order to do my schoolwork, I must use video conferencing.*" Finally, regardless of how much choice and autonomy the students and parents reported, the teaching sessions lacked an authentic feel with 58% of college students and 53% of parents indicating that the video conferencing classes felt like a forced interaction.

3.3. Correlations among video conferencing attitudes and positive and negative emotions

We examined the intercorrelations among the four video conferencing attitude items and positive and negative emotions next (RQ #3). Interestingly, the intercorrelations among the video conference attitude items were relatively weak (see Table 1). This indicated that having a feeling of choice to video conference, feeling required to video conference, and feeling forced to video conference during emergency distance learning were not strongly related to each other. For example, there was no association, in either the college or K-12 sample, between having a feeling of choice to video conference and feeling forced to video conference ($r = -0.08$, ns, for college students; $r = -0.09$, ns, for K-12 students). The only strong intercorrelation was between feeling required to video conference and feeling that they must video conference to do schoolwork ($r = 0.54$, $p < .001$, for college students; $r = 0.55$, $p < .001$, for K-12 sample).

Importantly, when examining the video conference attitudes that correlate with overall positive and negative emotions there were two consistent associations across the two samples: (1) Feeling that it is the student's decision to video conference was associated with more positive affect ($r = 0.33$, $p < .001$, for college students; $r = 0.30$, $p < .001$, for the K-12 students) and (2) feeling forced to video conference was associated with more negative affect ($r = 0.26$, $p < .001$, for college students; $r = 0.23$, $p < .001$, for K-12 students). All other correlations were not significant.

3.4. Predicting positive and negative emotion by feeling forced to video conference

In our final set of analyses, we examined whether students' attitudes toward video conferencing predicted positive and negative affect while video conferencing during emergency distance learning (RQ #4). As such, we conducted regression analyses where all four students' attitudes towards video conferencing predict positive and negative affect while controlling for students learning outcomes and instructor evaluations. Because of a positive correlation between positive and negative emotions in both samples, we also controlled for negative affect when predicting positive affect and controlled for positive affect when predicting negative affect.

There were a few major trends in these regression models between both the college and K-12 student samples. Here we report the findings that are consistent between both samples (see Table 2). First, students' attitudes toward video conferencing did not predict increased positive emotions. Second, students' attitudes toward video conferencing did predict increased negative emotions, even when controlling for students learning outcomes, the evaluation of the instructors, and positive affect. Third, one specific student attitude toward video conferencing item predicted negative affect in both samples. Specifically, when students' reported feeling forced to video conference, this was associated with increased negative affect. These results highlight the unique influence that feeling forced to video conference has on both college and K-12 students' negative emotions while emergency distance learning.

4. Discussion

The goal of our study was to examine whether students' attitudes toward video conferencing during emergency distance learning could explain why students' emotions were poor during emergency distance learning in previous research during the pandemic. Overall, students'

Table 2
Results of video conferencing (VC) attitudes as predictors of negative affect.

Predicting Negative Affect while Video Conferencing	R^2 change	*b*(SE)	95% CI	β	*t*	*p*
College Students						
Step 1	.49**					
Student learning outcomes		.50 (.04)	[.43, .57]	.53	13.99	<.001
Evaluation of teaching methods		.05 (.04)	[-.04, .13]	.04	1.08	<.001
Negative affect while VC		.40 (.03)	[.34, .46]	.40	12.91	<.001
Step 2	.02**					
My decision to VC for school		.11 (.03)	[.06, .16]	.14	4.42	<.001
School requires VC		.03 (.04)	[-.04, .10]	.03	.80	.427
I must use VC for school		.05 (.03)	[-.02, .10]	.05	1.47	.143
VC feels like a forced interaction		-.06 (.03)	[-.11, .00]	-.06	−1.93	.054
K-12 Students						
Step 1:	.41**					
Student learning outcomes		.47 (.08)	[.30, .63]	.39	5.57	<.001
Evaluation of teaching methods		.28 (.09)	[.12, .45]	.24	3.33	.001
Negative affect while VC		.25 (.05)	[.14, .35]	.25	4.73	<.001
Step 2:	.01					
My decision to VC for child's schoolwork		.08 (.05)	[-.01, .17]	.11	1.72	.087
Child's School requires VC		-.01 (.06)	[-.13, .12]	.13	-.09	.930
I must use VC for my child to work effectively		-.01 (.07)	[-.14, −.13]	-.16	-.12	.906
VC feels like a forced interaction		.03 (.05)	[-.07, .12]	.21	.57	.570
College Students						
Step 1	.25**					
Student learning outcomes		-.16 (.05)	[-.26, −.06]	-.17	−3.25	<.001
Evaluation of teaching methods		-.18 (.05)	[-.27, −.08]	-.16	−3.51	<.001
Positive affect while VC		.58 (.05)	[.49, .67]	.58	12.91	<.001
Step 2	.06**					
My decision to VC for school		.06 (.03)	[-.00, .12]	.08	1.88	.060
School requires VC		-.03 (.04)	[-.11, .06]	-.03	-.57	.569
I must use VC for school		.05 (.04)	[-.02, .13]	.06	1.42	.157
VC feels like a forced interaction		**.22 (.03)**	**[.15, .28]**	**.25**	**6.52**	**< .001**
K-12 Students						
Step 1:	.10**					
Student learning outcomes		-.08 (.11)	[-.30, .14]	-.06	-.69	.492
Evaluation of teaching methods		-.19 (.11)	[-.40, .03]	-.15	−1.73	.085
Positive affect while VC		.38 (.08)	[.22, .54]	.38	4.73	<.001
Step 2:	.08*					
My decision to VC for child's schoolwork		.12 (.06)	[.01, .23]	.15	2.20	.029
Child's School requires VC		.13 (.07)	[-.01, .28]	.15	1.85	.066
I must use VC for my child to work effectively		-.17 (.08)	[-.34, −.01]	-.16	−2.10	.037
VC feels like a forced interaction		**.18 (.05)**	**[.07, .29]**	**.22**	**−3.32**	**.001**

Note. All consistent predictors bolded. *$p < .05$, **$p < .001$.

attitudes towards video conferencing explained 1–2% of the unique variance of the positive emotions reported while video conferencing during emergency distance learning while students' attitudes towards video conferencing explained 6–8% of the unique variance of the negative emotions reported while video conferencing during emergency distance learning. As such, based on our results, it appears that video conferencing attitudes uniquely impact negative emotions more so than positive emotions in our college student and K-12 sample.

Notably, when students reported feeling forced to video conference (a video conferencing attitude) they reported more negative emotion. Importantly, this single-item measure of video conferencing attitude replicated across two very different samples with two unique measurement types—558 self-reporting college students and 219 parents acting as informants for their K-12 children. Although we used parents as a convenient source of information into the experiences of K-12 students during COVID-19 emergency distance learning, prior research has demonstrated that informant-reports are valid sources of psychological information, which includes insights into personality and emotion (Schneider & Schimmack, 2009; Vazire, 2006). Additionally, parents or guardians are a common source of information when trying to understand the experiences of adolescents because of the amount of time spent parents or guardians spend with their child (Cantwell et al., 1997). However, some evidence suggests that the agreement between parent and child on outcomes such as mental health are low (e.g., $\kappa_{mean} = 0.12$; Roberts et al., 2005), which demonstrates the robustness of our results as we found replicating evidence across both college and K-12 student samples. As such, the replication of results found in both our college student and parent as informants for K-12 student sample provide strong evidence across two measurement types that feeling forced to video conference leads to worse emotional outcomes.

Although there was a great deal of overlap between college and K-12 students on the main results of our study, one difference we found were the mean differences reported for positive and negative emotions (see Table 2). This falls in line with previous research demonstrating that parents might have a positivity bias when reporting about their children's emotional well-being. That is, parents often overestimate children's optimism (i.e., positive emotions) and underestimate their worry and anxiety (i.e., negative emotions; Lagattuta et al., 2012), which may explain the disconnect in our findings.

Additionally, our results indicate that the positive and negative emotions associated with feeling forced to video conference are not only felt internally by the student but can also manifest and be perceived by parents. Because of the contagiousness of emotions (Hatfield et al., 1994, 2014; Wild et al., 2001), the negative emotional outcomes related to feeling forced to video conference may not just be limited to the individual feeling negative emotions, but these emotions may also permeate to those around them. As such, future research should aim to understand ways to make students feel less forced to video conference because it is vital to the health and well-being of students and those around them. For example, researchers may be able to find strategies for professors and teachers to make students feel less forced to video conference, such as not requiring students to have their video on all of the time (see Okabe-Miyamoto et al., 2021).

When examining the video conferencing attitudes for both college sand K-12 students (see Table 1), we found that although each item

appeared semantically similar, some items were not significantly correlated. For example, the item "*it is my decision whether or not my private information is divulged online*" was not significantly correlated with *"using video conferencing in order for me to complete my classwork, feels like a forced interaction.*" Despite these items appearing very similar, they did not predict the same outcomes. That is, the only item that was consistently related to worse emotional outcomes for both college and K-12 students was the video conferencing attitude item that asked whether students felt that video conferencing felt like a forced interaction (see Table 2). As such, future research may benefit from understanding the construct of something feeling forced because of the consistent associations with negative outcomes that have been found not only in this college and K-12 student sample but also among remote workers during COVID-19 (Okabe-Miyamoto et al., 2021).

5. Future directions

Although we have outlined some future direction above, there are many other avenues of research to explore. For example, researchers may want to examine other well-being related outcomes, such as life or school satisfaction, or behaviors such as disruptive classroom behavior or absence from class. Furthermore, researchers may want to pinpoint whether the negative emotions associated with feeling forced to video conference impacts students' GPA, learning outcomes, or disruptive classroom behavior (for K-12 students). Because of the tight link between emotions and physical health (Fredrickson, 2000), researchers may also want to explore the health outcomes associated with the negative emotions reported when feeling forced to video conference as maintaining good health is of upmost importance, especially during a global pandemic.

Additionally, researchers may be able to add on measurements of emotion to research that have previously been published to gain a richer understanding of the student experience. For example, researchers have found evidence for the importance of instructor quality, course design, instructor's prompt feedback, and students' expectations on student satisfaction and performance (Gopal et al., 2021). By measuring emotions within this experience, researchers may be able to understand why instructor prompt feedback is related to student satisfaction, for example (e.g., praise during instructor feedback may lead to positive emotion which leads to greater satisfaction). Furthermore, other research has explored additional learning options such as using virtual reality to better facilitate learning (Chessa & Solari, 2021). By understanding how any emerging technology not only impacts learning but also students' emotions will be vital in determining the overarching success of new programs.

Additionally, researchers can better understand the *context* of learning via video conferencing during emergency distance learning. That is, researchers can examine whether video conferencing feeling like a forced interaction is a function of the technology, individual differences (e.g., personality), their teacher/professor, the learning environment, or a combination of the like. As such, if video conferencing feeling like a forced interaction is driven by the user experience with the video conferencing software, then teachers or professors would be unable to change their pedagogy to remedy the problem. By pinpointing what makes video conferencing during emergency distance learning feel forced to different students can help identify best practices for learning over video conferencing. Because the learning environment is crucial for student success, it is vital that researchers identify how to make the online learning experience better for students. Especially because remote learning may be widely used even once the pandemic is over.

6. Conclusion

College students and parents informing on their K-12 children reported feeling more negative emotions when they felt forced to video conference during emergency distance learning. Importantly, this link still remains when controlling for positive emotions while video conferencing, student evaluations of the class, and student evaluations of their instructors. Because of the existing literature on the influence of emotions on student motivation and achievement, it is vital to ensure that students attitudes towards video conferencing for school are positive and, specifically, students are not feeling forced to video conference. Furthermore, given that video conferencing for school might be a lasting practice, researchers and school officials should strive to better understand what impacts students' attitudes towards video conferencing to ensure that students' emotional experiences are not negative during emergency distance learning.

Declaration of competing interest

The authors have no conflict of interest.

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