

“It’s About Missing Much More Than the People”: How Students use Digital Technologies to Alleviate Homesickness

Ryan M. Kelly
University of Melbourne
Melbourne, VIC, Australia
ryan.kelly@unimelb.edu.au

Yueyang Cheng
University of Melbourne
Melbourne, VIC, Australia
yueycheng@student.unimelb.edu.au

Dana McKay
University of Melbourne
Melbourne, VIC, Australia
dana.mckay@unimelb.edu.au

Greg Wadley
University of Melbourne
Melbourne, VIC, Australia
greg.wadley@unimelb.edu.au

George Buchanan
University of Melbourne
Melbourne, VIC, Australia
george.buchanan@unimelb.edu.au

ABSTRACT

Homesickness, which refers to feelings of distress caused by separation from home, is prevalent among university-aged students. Chronic homesickness can exacerbate mood problems, erode academic performance and lead to dropout from school. The present research examines how students use digital technologies to resolve the experience of missing home. Qualitative interviews and diaries with 50 students at major Australian universities revealed that technologies play a significant role in alleviating homesickness. Specifically, students use technologies to acquire social contact, find help and support, build co-presence to recreate their home, connect with culture, experience distant places, and regulate emotions. However, the use of technology sometimes led to increased emotional labour, frequent exposure to homesickness triggers, and heightened perceptions of distance. We conclude by discussing possible design implications for new technologies that allow students to alleviate homesickness by experiencing their home from afar.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**.

KEYWORDS

Home; Homesickness; Migrants; Students;

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1 INTRODUCTION

According to the World Health Organisation [45], more people are moving away from their home than ever before, and there are now an estimated 1 billion migrants in the world today. Although

moving away from home can be an exciting experience, it often gives rise to stresses that affect an individual’s ability to acclimatise to their new surroundings. One common side effect of migration is *homesickness*, which refers to the psychological distress that arises due to separation from home [63]. The hallmark features of homesickness are recurrent and intrusive thoughts of home [5] along with a sense of yearning to return to one’s place of origin [56]. While it is often seen as a relatively benign phenomenon, homesickness has been linked to depression and anxiety [63] and can impact the wellbeing of people from all walks of life, including international migrants, refugees, and military personnel [66].

Homesickness is especially prevalent among university-aged students [16]. Significant numbers of students move away from home in order to further their education [5] and research has shown that up to 94% of students feel homesick at least once during their first university semester [14]. Homesickness is often regarded as a normal part of adjusting to university life, but severe cases can be debilitating, with sufferers reporting withdrawn behaviour and difficulty concentrating on work [5, 61]. Cases of homesickness tend to spike in times of stress, and students who feel homesick are three times more likely than others to drop out of university [63]. These problems emphasise the importance of exploring ways to help students address homesickness when it arises.

While the psychological literature provides practical guidelines for the prevention and treatment of homesickness, these are not always sufficient to address the problem [56]. The most obvious solution for homesickness is to simply visit one’s home, but such a solution may be impractical and costly for those moving long distances. Moreover, regular visits home may not be developmentally appropriate for students, who need to learn how to live independently of their families [63].

Contemporarily, students have access to a plethora of digital technologies that might conceivably be used to address homesickness. Information and communication technologies (e.g. video chat, phone calls, instant messages) can help people to maintain relationships following a residential move [52], and several studies have examined how students use these technologies to access social support during the college transition [53, 54]. Understanding how students address homesickness with technology is conceptually and practically useful given that some students are reluctant to use support services due to language barriers or anxiety in speaking to health professionals [62]. Others may be afraid to discuss their

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feelings with caregivers because of stigma around mental illness in their culture [51]. At the time of writing, many students are separated from their home due to the COVID-19 pandemic, and the long-term impacts on migration (and hence students' ability to routinely visit home) remain to be seen. Studying how students currently resolve homesickness through technology, as well as the challenges they face when using these tools, can help to provide advice to newly relocated students while identifying opportunities for future solutions.

In the present research, we examined the ways in which university students cope with being away from home, focusing on the following research question: *How do students use digital technologies to alleviate homesickness?* We explored this question through interviews and diaries with students at major Australian universities. Based on an inductive analysis, we found that students alleviate homesickness by using digital tools to acquire social contact, find help and support, build social co-presence to recreate the feeling of home, connect with culture and places, and regulate their emotions. Although technologies were valued for their ability to provide temporary relief from homesickness, students recognised a need to carefully manage their use of particular channels in order to avoid emotional experiences, exposure to homesickness triggers, or heightened feelings of distance from family and friends.

Overall, this paper contributes to the literature in three ways. First, we extend prior work on understanding technology use by students, going beyond studies on the transition to college to focus on episodic homesickness. Second, we show how the wide variety of technologies available to students support different ways of coping with separation from home. Third, we identify ways that future technologies can better support connections with home, based on students' own perspectives.

2 BACKGROUND & RELATED WORK

Our investigation builds on prior work related to homesickness and the use of digital technologies to support student wellbeing.

2.1 Conceptual Foundations of Homesickness

Homesickness occurs from the stress of acclimatising to a new environment following a geographical move [65]. Research shows that homesickness is especially prevalent during the transition to university, occurring as students go through a process of adaptation to their new circumstances [14, 61]. However, homesickness is recognised as an episodic phenomenon that waxes and wanes over time [16]. The intensity of experienced homesickness is also known to vary individually [14]. Some students may never feel homesick, others may experience mild feelings, and others still may find it so overwhelming that basic functioning is affected [5, 56]. The consequences of homesickness are varied, giving rise to emotional, cognitive and somatic complaints [56]. However, research suggests that homesickness can be prevented and alleviated through the design of supportive interventions [63].

Conceptually, homesickness has been characterised as a type of 'mini-grief' that arises due to separation or loss, similar to a relationship breakup or death in the family [56]. This grief is thought

to be caused by separation from attachment objects, including people and places, and results in a longing for home and difficulties adjusting to the new environment [57].

Although there is some evidence to suggest that geographical distance is associated with homesickness [19], Stroebe et al. [58] argue that the perceived accessibility of home is more important than distance *per se*. It has also been posited that psychological distance—i.e. the perception that one is in some way disconnected from the place of origin, irrespective of how far the place is—holds greater influence than geographical distance [61]. In theory, both of these issues have the potential to be ameliorated by digital technologies, at least to some extent. For example, communication technologies may help to make the 'grief' of moving away less apparent by allowing people to retain an awareness of events at their home [8]. Communication tools also afford ample opportunities to maintain connections with loved ones from afar, while enabling the development of new relationships [52].

Prior research has examined how people develop strategies to cope with homesickness in the absence of digital technology. In a 1997 study, van Tilburg et al. [67] found that a sample of homesick adult women adopted four strategies: seeking social support, positive thinking/distraction, turning to religion, and mental escape. Notably, their research predates the widespread availability of smartphones and other digital technologies that we live with today, and so it is unclear whether these strategies remain prevalent. A more recent study by Saravanan et al. [51] used interviews to explore coping strategies in a sample of nine international students who had recovered from homesickness and depression in Malaysia. Their participants reported using five strategies, which included discussing feelings with others, keeping busy, physical exercise, positive thinking, and religious activities. However, the study did not elaborate on whether and how students used digital technologies to enact these strategies. Our research addresses this limitation by examining how students use a wide range of technologies to alleviate the experience of missing home.

2.2 Homesickness and Digital Technology

A handful of studies have described how specific technologies can help people respond to homesickness. A 2003 study by Tognoli [64] suggested that regular telephone calls and email with family were associated with lower homesickness among college students. In 2009, Watt & Badger [72] found that students often made phone calls home in response to feeling homesick. More recently, Billedo et al. [3] found that international students in the USA experienced less short- and long-term homesickness when they used Facebook to interact with host-country contacts [3]. The researchers suggested that experiencing social difficulty (i.e. homesickness) may act as a motivator to use technology and, in turn, the technology can help to alleviate this difficulty [3].

A similar idea was evident in a study by Wadley et al. [68], who found that international students sometimes use music streaming services to cope with the emotional consequences of leaving home. The use of technology to deal with homesickness has also been identified in other populations, including sailors [15, 21], expatriates [24] and diaspora communities [7]. However, each of these studies focused only on the role of a single platform, e.g. Facebook

[21], and hence understandings of technology use in alleviating homesickness are still limited. Our study extends this literature by providing insight into a broader range of behaviours that are enacted by homesick students using digital tools.

Looking beyond the lens of homesickness, researchers of human-computer interaction (HCI) have previously studied how technologies can help students when transitioning to university. Gray et al. [22] showed that the ability for college students to form and maintain relationships through the Internet may contribute to successful acclimatisation. Yuan et al. [76] found that students make extensive use of sites like Facebook to maintain connections with friends at university and back home. Similarly, Smith and colleagues described the ways that students use communication technologies to maintain contact with their family [53], noting that students balance the value of obtaining social support against the desire to become independent from their parents [54]. Bales & Sellen [2] found that students often brought physical mementos (e.g. printed photos) to university to act as reminders of home. These objects helped to convey "the character of the distant home while supporting a sense of continuity with it" [2, p. 1138].

Focusing on connections to domestic settings, there is a large HCI literature on the design of technologies for use in and around the home (see [12] for a review). There has also been a long-standing interest in creating technologies to help people remain connected to their home when they are away from it. Classic studies on the design of lightweight awareness systems have shown that people may experience affective benefits by feeling as if they are psychologically present at a remote site [36] or with distant family members [4]. Studies have also shown that migrants use social media and other communication channels to keep updated on events in their hometown [8] and desire tools that support a sense of connection with places of origin [1, 74]. However, studies within this literature highlight the difficulties of staying in touch with one's home, whether due to the effects of communicating across time zones [6], the lack of technical infrastructure in rural areas [39] or the difficulty of socialising over distance [41]. These works have typically been conducted within a frame of understanding technology use over time and space, and so the challenges they describe might reasonably give rise to feelings of homesickness as well.

2.3 Supporting Student Wellbeing

Our investigation of homesickness contributes to the HCI literature on technology use by students for wellbeing and mental health. Prior work has investigated the design of technology to support the wellbeing of students, focusing on topics such as social interaction during mealtimes [73], collaborative expressions of mood [50], improving sleep quality [49] or enhancing stress management capabilities [34]. Other studies have explored the design of tailored solutions including mobile games to address frustration and anxiety [35] and virtual reality systems to encourage exercise [48]. There has also been significant interest around predicting college students' mental health based on smartphone usage logs [70, 71] and creating early interventions based on these predictions.

This literature has acknowledged the potential for technology to support students' wellbeing and keep them connected with others. Nevertheless, there is a need to maintain a balance between

supporting a sense of connection and avoiding over-dependency on technologies [53]. While judicious use of communication tools may help to prevent and alleviate homesickness, it is still important for students to avoid becoming overly reliant on these outlets [63]. Likewise, family members may not want to interfere in their childrens' lives [20]. These considerations stress that, while digital tools may be useful for alleviating homesickness, there is a need to understand their potential drawbacks, such that students can develop a healthy relationship with them. In our study, we attend to this concern by exploring students' perspectives about the strengths and limitations of current solutions when alleviating homesickness, along with the emotional consequences that can arise through their use.

3 METHODS

We designed a qualitative study to explore the ways students use digital technologies to address homesickness. We chose semi-structured interviews to understand students' own reasons for turning to technology and how it helps them to alleviate the sense of missing home. We complemented the interviews with diaries to obtain time-dependent accounts of technology use, capturing temporal variations in homesickness and addressing the limitation of studies based solely on retrospective recall [33]. All of our procedures received approval from our institutional ethics committee.

3.1 Impacts of COVID-19

For context, this study was conducted in Melbourne, Australia, after the onset of the COVID-19 pandemic in March 2020. Our data was collected from May to September 2020 during city-wide lockdowns, which involved widespread social distancing, campus shutdowns and mandatory stay-at-home orders.

The pandemic had two implications for our research. First, social distancing meant that no face-to-face contact occurred between participants and the researchers. All of our procedures were administered via email and video conferencing software, both of which have been shown to be valid platforms for conducting qualitative research (e.g. [10, 38]). Second, it is likely that feelings of homesickness were stronger than usual during the pandemic, and so the prevalence and intensity of missing home in our sample may not be representative of a typical university semester. However, the aim of our research is to understand how students use technology to alleviate homesickness, irrespective of how it occurs. Thus, even though some of the homesickness experiences in our data may be unusual, the use of technology is still sufficiently general to understand the wider phenomenon of interest. The participants also discussed experiences that had occurred before the pandemic, meaning that our data is not solely about the lockdown period.

3.2 Participants

We recruited a total of 50 students (38 women, 11 men, 1 non-binary) through university noticeboards and mailing lists. The students had an average age of 24.3 years (*Range* = 18–37, *S.D.* = 4.5). Our eligibility criteria required participants to be aged 18 years or above, be currently enrolled at any Australian university, have experience of at least mild to moderate homesickness, and not be living with a diagnosed mental health condition. We decided to recruit only

those without mental health conditions because the planned discussions inevitably touched on subjects of loneliness and isolation, and we wanted to reduce risks given the prevalence of mental health concerns within the student body [55].

All of our participants were enrolled at major public research universities in Melbourne. All had experienced at least mild homesickness, having relocated from their home to attend university. Forty-five participants were international students and 5 were domestic (Australian nationality). The international students had been in Australia for an average of 1.3 years, with some arriving just 3 months prior to the study.

The sample was diverse in terms of country of origin, degree type and disciplinary major. A total of 24 nationalities were represented, with 31 participants from Asian countries and regions, 7 North American, 5 Oceanic, 4 South American, 2 European and 1 African. This mixture of nationalities reflects the multicultural demographic at our study site. Ten participants were PhD students, 22 were Masters, and 18 were Bachelors. Twenty-five participants were first year students, 20 were second years, and 5 were in their final year. Degree subjects spanned science, engineering, medicine, business, and the arts.

3.3 Procedure

We recruited participants in three rounds, using each round to follow up on data collected in the earlier phases [9]. Those in the first and second rounds (N=25 and N=13, respectively) completed a questionnaire and an in-depth interview. Participants in the third round (N=12) completed the same questionnaire and interview before going on to fill out a diary to record instances of technology use during homesickness. The diary phase lasted four weeks and we conducted an exit interview with each participant to discuss their diary's content. There were no major demographic differences between rounds. We ceased data collection at the point where no new ideas were being uncovered.

3.3.1 Questionnaire. All participants began by filling in an online questionnaire hosted using Qualtrics. After reading a Plain Language Statement and providing informed consent, participants entered demographic information and were asked to select technologies that they had previously used to deal with homesickness from a pre-defined list (see top row of Table 2). We based this list on work by Smith [53], adding channels and tools that have recently gained in popularity, e.g. audio messages and wellbeing apps. Participants were asked to indicate who they used each technology with (if applicable) and were able to enter other tools using a free text field. Finally, the questionnaire asked participants to self-score their feelings of homesickness using an established scale [18]. Participants rated themselves as either *not homesick*, *mildly homesick*, *moderately homesick*, or *extremely homesick* across three different time periods. These periods comprised the six weeks after the most recent COVID-19 lockdown, which began in March 2020, two months prior to the onset of our data collection; the six weeks prior to the lockdown; and the first semester of the student's current university degree. Participants were instructed to rate periods equivalently in cases where they overlapped, e.g. for recently arrived international students.

3.3.2 Interview. After completing the questionnaire, participants booked an interview slot using an online calendar. All interviews were conducted by the first author using Zoom. The interviews lasted 24–55 minutes (*Mean* = 35 minutes) and were audio recorded. The researcher began by asking participants about their home and how that place compares to Australia. This led into a discussion of the participant's homesickness experiences, using their questionnaire responses as prompts to discuss different time periods. Participants were asked to provide a personal definition of homesickness and to share a specific time when they had been homesick, allowing us to move beyond general accounts into specific occurrences [30]. The researcher then read aloud the list of technologies used by the participant, and asked them to elaborate on how each one helped to alleviate homesickness. After this discussion, participants were invited to suggest their own ideas about how future technologies could tackle homesickness. Finally, participants were asked to reflect on their most positive experience since moving to Australia, to avoid leaving the study in a depressed mood state. After the interview, all participants were sent a \$20 gift card over email. The email included a debriefing sheet that provided links to free-to-access mental health and counselling services, in case students felt affected by the topics discussed during the research.

3.3.3 Diaries. The 12 participants in the diary phase were sent an electronic diary via email after their interview. We used Microsoft Word to administer the diary for simplicity. Appendix A shows an example page from a participant's diary. We designed the diary to be easy to complete, basing the structure on previous examples [11, 33]. The diary was event-contingent with no minimum or maximum required number of entries.

Participants were requested to fill out the diary whenever they felt homesick for the next four weeks. When filling out a diary page, the participant had to provide the date, time of day, and describe the strength of their feelings. They were asked to write short passages to describe what the experience involved, whether they had used technology to address their feelings, how the technology had helped, and what they were planning to do next. Participants were encouraged to complete the diary however they liked, and were free to record instances of things that were not homesickness. Overall, participants made 154 diary entries (*Range* = 6–28 entries, *Mean* = 12.8). Of these, 75 were instances of slight homesickness, 32 were moderate, 25 were extreme, and the remaining 22 were listed as things other than homesickness.

At the end of the four-week period, each participant was asked to email a copy of their diary to the lead researcher, before meeting the researcher on Zoom to conduct a short exit interview. These interviews lasted 10–27 minutes (*Mean* = 18 minutes) and were audio recorded. The interviews followed up on the diary entries and sought to unpack the use of technology in more detail. Participants were invited to pick entries that they wanted to discuss themselves. At the end of the interview, participants were thanked and sent an additional \$20 gift card. Following best practices for event-contingent diaries [33], payment was not reliant on the quality or quantity of responses.

3.4 Analysis

All of the interviews were transcribed by a paid transcription service. The interview data (830 pages of conversation) was pooled with copies of the participants' diaries (154 pages). We used the constant comparison method [9] to explore the data and search for answers to our research question. The first author began by reading the entire corpus to identify initial concepts, moving from open coding to axial coding to develop concepts into categories [9]. Codes were created through inductive interpretation and labelling of text, theoretical coding [9] and by the use of participants' words to create in-vivo codes. Constant comparison was used to develop concepts and consolidate examples in memos. Multiple rounds of coding were supported by whiteboard sketching and reflection to develop a tentative theoretical scheme. The scheme was iterated until the first author was satisfied that it reflected participants' experiences of using technology to address homesickness.¹

In a second phase of the analysis, the theoretical scheme was deductively applied to the diaries and 30 of the interviews by the second author, supporting dependability [27]. The scheme was refined through discussion among all five authors.

The findings we report here converge around two central ideas. The first is the use of technology to alleviate homesickness by accessing different aspects of the home from afar, including people, pets, places, food and culture. Technologies were also used to recreate social activities that normally occur 'back home' (such as by playing games or watching television with others over distance) or to support emotion regulation when the home was perceived to be inaccessible. The second idea is the notion of a "double-edged sword", an idiom used by several participants to reflect the concept of a tool that has both favourable and unfavourable consequences. In our data, participants described how technologies required careful management to avoid provoking homesickness or making emotional experiences feel more intense. The following sections explicate these perspectives, providing illustrative quotations alongside an ID number and nationality in cases where it is relevant.

4 HOMESICKNESS EXPERIENCES AND DEFINITIONS

We first characterise our participants' feelings of homesickness before providing more detail about their use of technology. Table 1 shows how the participants rated their homesickness according to the three time periods listed in the questionnaire. All of the participants had experienced homesickness during their time at university, allowing them to speak directly to the topic at hand. However, their individual experiences were different in duration and time of onset. Some had found the transition to Australia to be fairly easy, whereas others described feeling homesick due to difficulties in adapting to a foreign culture and way of life. Common complaints included differences in weather, food and lifestyle. Participants also recounted personal challenges including social isolation, language difficulties or falling victim to crime, all of which had caused them to miss the comfort of home.

¹The dataset contained numerous comments that were related to the impact of the COVID-19 pandemic on homesickness and how technologies helped the students during the Melbourne lockdowns. We partitioned these comments into a separate document during the analysis and we intend to present them in a future paper.

Table 1: Percentage of participants (N=50) who had experienced homesickness in the three time periods surveyed by the questionnaire.

Time period	Homesickness intensity			
	Not homesick	Slight	Moderate	Extreme
first semester of current degree	18%	28%	32%	22%
before COVID-19 lockdowns	18%	62%	16%	4%
after COVID-19 lockdowns	2%	20%	56%	22%

The psychological literature often focuses on homesickness during students' first academic semester [e.g. 14]. Table 1 shows that the majority of participants had indeed been homesick during this time, although a minority did not experience homesickness because of the initial excitement associated with moving away. For these people, homesickness occurred much later, either part-way through a semester or even years into their degree. P1 discussed how he did not feel homesick at the beginning of his master's degree, stating: *"I was making new friends. I was meeting all of these new people, but I think towards middle of my degree I started missing weird things. Things I didn't think I'd missed, like speaking in my own language."*

There was also variation in the intensity of participants' homesickness [56]. Some described a gentle sense of missing family and friends, whereas others described stronger feelings that had at times become problematic. P31, for example, recalled that she had *"cried three times in one day"* after moving from Iran to Australia, making her want to leave university altogether. Participants also recognised the episodic nature of homesickness, which P7 described as having *"ebbed and flowed"* over time.

Participants' personal definitions of homesickness revealed that although feelings were different across the sample, the overall character of these feelings was consistent with prior studies [16, 17]. Definitions included missing family, friends, and other attachment objects; missing the cuisine or comfort of home; missing the 'vibe' of home; or missing the home environment and wanting to return to it. P37, a freshman student who had been experiencing moderate homesickness after relocating to Melbourne from the north of Australia, described her feelings as *"an intense longing to go home. Just missing everything about every aspect of home [and] just the vibe, I guess. Yeah, the vibe of my home. That's what I miss."*

4.1 Technologies Used to Address Homesickness

All of our participants reported using at least one kind of digital technology to alleviate their homesickness. Table 2 shows the technologies listed in the questionnaire, alongside the percentage of participants who reported using each one. The table also shows the self-reported frequency of use and the people with whom each one was used. The most commonly used tools were instant messaging (IM) apps and video calls, which all 50 participants mentioned using to deal with homesickness. Specific apps included Whatsapp, Facebook Messenger, Line and WeChat. Dedicated video apps included FaceTime and Houseparty, which were used in addition to native video calling functionality within the aforementioned IM apps.

The popularity of IM and video calls was followed by phone calls and social media. Platforms used by our participants included

Table 2: Percentage of participants (N=50) using particular categories of technology to alleviate homesickness. Participants selected the technologies shown in the top row from a list in the questionnaire. (n.b. AU=Australia.)

	Phone Calls	Email	Instant Messages	Audio Messages	SMS	Video Calls	Social Media	Online Games	Work Tools	Music Streaming	Video Streaming	Wellbeing App
Used to deal with homesickness:												
Multiple times	78%	18%	100%	38%	46%	94%	78%	28%	14%	46%	52%	14%
Once	6%	10%	-	8%	10%	6%	2%	16%	4%	4%	-	14%
Never	16%	72%	-	54%	44%	-	20%	56%	82%	50%	48%	72%
Used with:												
Family outside AU	70%	14%	94%	34%	22%	94%	62%	10%	4%	2%	6%	2%
Family in AU	24%	8%	28%	2%	20%	16%	24%	-	-	2%	-	-
Friends outside AU	54%	12%	88%	32%	20%	78%	66%	24%	6%	16%	14%	4%
Friends in AU	56%	14%	70%	28%	44%	56%	66%	24%	10%	10%	6%	2%
Romantic partner	26%	-	34%	14%	12%	30%	32%	14%	-	6%	10%	2%
Someone else	6%	4%	22%	12%	4%	14%	12%	2%	4%	2%	-	2%
By myself	-	-	8%	4%	-	2%	26%	14%	-	36%	38%	24%

Snapchat, Facebook, Twitter and Instagram. Compared to previous studies [72], email was less commonly cited as a tool for addressing homesickness. Those who did use email discussed it as a tool for practical matters such as exchanging files, or for connecting with older family members who did not use IM applications [54].

Approximately 50% of the participants reported addressing homesickness by using music and video streaming services such as Spotify, YouTube, Netflix, or Bilibili. As will be described later, these platforms were used differently to, and sometimes in tandem with, communication technologies. A minority of participants mentioned using wellbeing apps related to activities such as yoga, fitness and meditation. These apps were used to support general mental health and wellbeing, as opposed to the immediate alleviation of homesickness. Seven participants (14%) listed work tools (e.g. Zoom or Google Drive) as things that could help with homesickness. During the interviews, these tools were described as useful because they helped participants to focus on their work and feel connected with other students in Australia or their home country.

The questionnaire included a free-text field where participants could list other items that helped them with homesickness. Answers included looking at keepsakes brought from home, especially pictures, books or letters (as found in [2]). Three participants mentioned physical exercise as a distraction activity. Other tools included Google Maps or Google Earth (N=4), digital photos on a laptop or cloud drive (N=3) or shopping websites (N=2).

5 TECHNOLOGICALLY ENABLED COPING STRATEGIES

Our participants described using technologies extensively in their attempts to alleviate homesickness. In considering participants' selection of technology, we made two notable observations. First, different technologies were interleaved to address a range of emotional, cultural and instrumental needs related to homesickness. Second, each participant created a unique repertoire in accordance with their personal needs and circumstances. While previous studies have mentioned how specific tools such as social media [3] or music streaming services [68] can help to alleviate homesickness, our participants painted a more complex picture in which the role

of technology functioned more like an ecosystem, with different tools serving different purposes that varied for each person. P9, a Chilean woman, explained this as follows:

"I would say technology was key to feel more secure and less homesick. I joined a Chilean group in Facebook to ask for advice, I used Google Maps to familiarise myself with the city, I was connected with my family all the time through Whatsapp and I connected with new friends in social media."

Decisions to use particular technologies were sometimes influenced by constraints at the participant's home. Those from rural areas described how poor internet connectivity meant that they could not always rely on video calls to contact their family members [39]. Specific app choices were also influenced by cultural norms. For example, participants from China used WeChat for calling, texting and browsing updates from friends, whereas this app was rarely used by other nationalities.

Deeper reflection on the data led us to articulate six ways in which digital technologies were used to address homesickness.

5.1 Acquiring Social Contact

All of our participants discussed the extensive role of communication technologies such as IM, video and phone calls in alleviating the sense of missing home. These tools were cited as crucial for enabling contact with geographically distant friends, family and other attachment figures. While the use of these tools for maintaining relationships has been well-documented [e.g. 30, 60], our participants suggested that there were several unique points of value for dealing with homesickness.

The first was that communication tools were used in response to the episodic onset of missing home, which participants discussed as arising spontaneously and without warning. In this way, communication tools became a primary means of alleviating existing bouts of homesickness by providing ongoing access to social contacts. A technology of note here was IM, which was cited as useful due to its immediacy and low obligation for a response. This provided participants with a way of alleviating momentary feelings of homesickness, without feeling as though they were intruding on others.

As P49 said, *“sometimes I just send them a message where it’s only for a couple of seconds and then I just go on with my day”*.

At times when homesickness was stronger, participants described the need to use cue-rich media such as video calls. As P10 stated, *“if I feel slightly homesick I will use text, but when I feel intense homesick I will just go straight to video calls because I want to talk with my friends and family”*. When asked about the particular value of video calls for dealing with homesickness, participants discussed feeling reassured from seeing familiar faces, experiencing a stronger sense of social presence through video, and enjoying the ability to see what was happening at the remote site in real time.

Being able to reach out through different technologies was also described as important for tackling isolation, which is known to be a significant cause of homesickness among students [25]. P25 told us that *“using Whatsapp, Facebook and Twitter makes me feel connected. That I’m not alone, because the sense of being alone is quite old on me right now”*. P39 remembered feeling homesick the first time she was alone in her student accommodation, and chose to reach out with a phone call: *“calling somebody, it makes you feel that you are not as alone, like really alone.”*

Although communication technologies allowed for the alleviation of homesickness through immediate connection, there was a recognition that connections with home must be managed carefully. This was particularly the case for those who felt that parents could sometimes be overbearing. Participants wanted to remain in contact but noted that family could become overly attached: *“if you’re going to do video calls, it’s going to be only one day a week. Because otherwise for them, I will be on video call the whole day. They would call you all the time”* (P9). In this sense, participants valued the on-demand connectivity afforded by communication tools but wanted to manage availability on their own terms, perhaps to ensure independence from their parents [54].

In discussing the use of technologies to acquire social contact, some of our participants mentioned specific challenges associated with existing tools. The first related to maintaining relationships across timezones [6]. Three participants found this difficult and commented that technologies could help to better manage these arrangements by including timezone indicators to help with scheduling and awareness of availability. The second challenge related to the use of communication technologies to feel connected to pets. Twelve participants discussed their pleasure in seeing dogs, cats or other animals from afar, and felt reassured by seeing their pets looking healthy and behaving normally. However, interactions with animals were described as underwhelming due to the inability to connect with pets in a meaningful way [42]. Participants were also wary of upsetting or confusing their pets by making them think they were home, especially during video calls.

5.2 Seeking Help and Support

The second major use of technology involved seeking help and support to tackle problems that either caused homesickness, or which were seen as contributing to it if left unchecked.

As noted earlier, 82% of our participants had experienced homesickness during their first academic semester. Technologies were used during this transition to solve problems, find help or discuss the situation with others. For example, P48 reported experiencing

homesickness due to differences between Australia and China. She described overcoming her feelings by using technology to discuss life challenges with others. However, support-seeking through technology was different to acquiring social contact in that it explicitly involved requests for help, as opposed to simple catch-up conversations: *“I use video call with my friend a lot. We were from the same city, so we have a lot of common topic on that. And he is also like a student in an overseas university. So we like to share a lot of opinion about the hometown thing”* (P48).

Participants discussed the role of technology in providing access to social contacts and groups that helped them acclimatise and tackle worries. Sometimes, help and support was obtained from friends and family, and technologies like IM and video calls played a role in mediating these encounters. P45 recounted an experience of stress that involved trouble with her roommate, and being able to call her mother for emotional support was an important lifeline. Another resource for help and support was the use of groups on social media platforms, which allowed students to acquire support from people with greater life experience: *“Something that I thought was very interesting, I’m on a couple of Facebook pages that are Americans in Australia and whatnot, and people will post fairly often on there, asking for advice on how to deal with homesickness. There’s quite a few comments that I’ve seen from people who have been in Australia for 20 to 30 years saying that it never goes away and all you can really do is learn how to deal with it”* (P46).

Participants also discussed the role of platforms like Facebook in providing access to groups of people affiliated with their home country. South American participants in particular—perhaps because they are a minority group in Australia—mentioned the role of these groups in helping them to address problems and find information that enabled them to acclimatise: *“I remember I was like, Hey, I’m looking for a place to buy Chilean food or to an ingredient or that kind of stuff. They helped me to do their research and then using Google maps and everything, I just went there. So it’s a really good support I guess to have those groups”* (P9). Technology also played a role in enabling students to develop problem-solving skills. P31 described how the extensive availability of instructional ‘how-to’ videos on YouTube enabled her to learn solutions to everyday problems and become self-sufficient.

The role of technologies in mediating help and support was perhaps most noticeable when it was absent. P1 described the difficulty of not having someone to talk to about personal problems. Technology kept him well-connected to his family, but he could not always talk about it because the problem (i.e. homesickness) was about missing them. Being able to discuss his troubles with people outside of the family network helped to alleviate his feelings.

5.3 Building Social Co-presence to Recreate the Home

Beyond maintaining relationships and accessing support, our participants discussed the role of technologies that enable social experiences in helping them to deal with homesickness. These tools—including video chats, online games, and video streaming services—were cited as helpful because they afford a sense of virtual co-presence that makes people feel as though they are ‘together’ in the same space. These experiences were valued because they recreated

the “*small things*” (P36) that participants missed from home, including the everyday sense of togetherness and perception that others are close by. As P21 described, “*anything that gives me a sense of being at home helps me with dealing with homesickness*”.

Multiple participants discussed the act of watching television together as something that they often did over distance [43]. This was valued as a response to homesickness because it was “*like being at home and watching a movie together*” (P39). Seven participants discussed their use of Netflix Party, an extension for Google Chrome that synchronises the playback of Netflix videos across browsers and provides text chat for users to converse in real time.² Participants felt that this tool afforded a sense of co-presence that was reminiscent of their home. As P38 described, Netflix Party feels “*like the same vibe, the same feeling, the same energy in the room. It feels like we’re both sitting on the couch and just chilling together, even though we’re obviously not*”.

As with watching videos, playing games was something that students ordinarily did at home and which they recreated in an online setting in order to ‘hang out’ with friends and family. Gaming platforms mentioned by our participants included *skribble.io*, *League of Legends*, *Animal Crossing* and *Psych!*. However, it was the sense of being together with others virtually that alleviated homesickness, rather than playing the game itself: “*I’ve found that games have been a significant part in keeping me, let’s say, sane from homesickness because it lets me play it with my friends and it makes me feel like I’m just at home. Just chatting with guys, playing games*” (P1). Similarly, P35 claimed that “*playing those games, it feels like I’m with them. I feel like I’m closer to them. It feels like the distance is not there, like my friend hasn’t forgotten me. So it alleviates the homesickness, playing with them*”. P27 said that online gaming feels like “*it’s just us hanging out again and gaming together. So it kind of felt that sense of belonging and home. A part of it also feels like home*”.

Participants described how the use of games and videos was interleaved with audio or video chats, constituting what Isaac et al. have described as ‘channel blending’ [29]. Several participants reported placing their phone near the computer screen during a Netflix Party, so that they could watch the programme and see or hear their friends’ reactions in real time. Others mentioned combining video games with video calls or audio chat using Discord. Blending channels together appeared to help with homesickness by creating a situation that is more reminiscent of watching or playing together in the same physical space.

Beyond engaging in co-present shared activities, participants took other actions to recreate the feeling of domestic life at home. Two participants discussed their practice of using video and voice calls even when there was nothing to be said. In these cases, a call was active but the persons involved would not be paying attention to each other. Instead, they would go about their business and focus on other tasks, as if they were co-present in the same room:

“I called my sister all the time. It was very funny. We’d both be studying, but I’d be FaceTiming her at the same time, even though we’re not talking. I guess it just feels like there’s someone else there, although they’re not actually physically there, it just feels like they’re there,

and that feels comforting. It gives you the sense that there’s someone there and I’ve got my friends there, even though they’re not actually there. It feels nice.” (P38)

This behaviour of creating an ‘open channel’ has been noted in other studies of video-mediated communication [31, 60]. For the problem of homesickness, having an open channel may help to recreate the type of conversational flow that exists in the home, where people do not need to attend to each other but can remain in conversation or focus on other activities [60]. An additional and perhaps more interesting outcome of establishing an open channel was the idea that the channel could prevent loneliness while providing a sense of awareness about happenings at the remote site, especially with respect to ambient sounds. As P39 described, “*it makes you feel that you are not as alone, like really alone. There is somebody there, even though in the end we’re not really talking, he’s doing his own thing. He was playing video games or something, but I could still hear that there’s some background sounds*”.

Participants also discussed using video chat for various interactions around food [46]. P13, an international student from Italy, described how his family positioned their laptop at the dining table so that he could virtually join for dinner. This again constituted an attempt to create a sense of co-presence over distance:

“they’re all together, my mom, my stepdad, and my sister. So I kind of get the view of like the table with the three of them, like two on one side and one in front of me, and I’m kind of like the fourth corner of the table... for me it’s like I’m eating at my desk and on the screen I see three sides of the table with me.” (P13)

Other participants discussed experiences of cooking with parents or loved ones while using video chat, and some described receiving tuition on cooking during these calls: “*if there’s anything that I can’t do or something that I want to know related to cooking, [my mother] guides me. Every time I cook, it’s always from scratch, she’ll be telling me what to do, and I’ll be doing that*” (P40).

5.4 Connecting with Food and Culture

The notion of connecting to food and other aspects of culture was a more general activity that participants performed through technology to alleviate homesickness. Home cuisine was repeatedly noted as something that participants missed while at university, and the ‘hunger for home’ has been positioned as an influential factor in sociological accounts of homesickness among international migrants [37]. Yet unlike connecting with family or feeling co-present with others, engaging with food through technology was typically harder to achieve. Our participants described several ways in which they used technology to alleviate their ‘craving’ for home-cooked food. Some mentioned using social media to purchase regional cuisine or find local sellers in Melbourne. For example, P27 recalled how “*I feel like our food is something that is really distinguishable... it kind of makes us remind us where we’re from, remind us where our roots came from... I guess that’s why we purchase food through Instagram or from the Indonesian organization*”.

In cases where participants could not obtain the food of their home, they often turned to watching other people cooking or consuming food on video streaming sites. As P14 described, “*there are a lot of people posting something, like they make some food or even*

²Netflix Party was renamed to Teleparty in October 2020: <https://www.netflixparty.com/>

they eat some food. So I just searched that kind of Youtube videos and watched that. It feels like I'm in my hometown, feels like I'm eating the things". While this can be interpreted as another attempt at using technology to recreate the feeling of home, watching others eating may also help to relieve homesickness by bringing a sense of psychological catharsis or even pleasure through vicarious consumption [47].

A different approach to feeling connected with home culture involved listening to music or watching films. Wadley et al. [68] previously noted how students use music to remind themselves of attachment figures. According to our participants, streaming services were also used to access highly specific music from their home. For example, P42 said "my mother tongue is different from the national language of Pakistan. So the music that I listen is also in my mother tongue. In that sense, these YouTube and other technological stuff also helps me". Others used streaming services to experience cultural connection. P21 described watching old movies when they wanted to indulge in the 'Filipino vibe', stating "I would watch Filipino films, even though I have seen them plenty of times before, just to get that sense of Filipino-ness".

Some participants described their use of music and video for cultural consumption as different to what they would do in their homeland. P44, who was from Kenya, described how she listened to and watched unusual content in Australia to feel connected to her culture:

"It's weird because I noticed when I'm here, I watch a lot of Kenyan YouTube content, but when I go back home, I don't... Also I never used to listen to African music until I came here. And then now I have a lot of African music on my phone and Kenyan music even." (P44)

When asked whether having access to this content helped to deal with homesickness, P44 replied that "it does. I mean, it makes me feel like I'm home. That's the best way that I can put it".

5.5 Experiencing Places

Moving beyond culture, participants also described missing specific places that were meaningful to them. Two discussed feeling strong connections to water as a result of growing up near rivers. They mentioned taking walks to the beach or along nearby creeks in Melbourne in order to feel present with water, as this was a feeling that they could not typically replicate using technology.

Others discussed the affective benefits of linking to distant places by seeing pictures of their hometown on social media, particularly Instagram. P48 stated that these pictures "help me remember where I come from". Some alleviated homesickness by looking at hometown photos they shot by themselves. For example, P10 stated "I got a lot of pictures about my hometown... when I miss my hometown, I will stop the things I'm doing now and go back to review them to see where I came from". He found it was a "very effective way to connect with the place". P14 described 'visiting' her hometown using an overlooking view in Google maps to see places she used to stay: "I can have some street view. It feels like I was in the period of my undergraduate, like walking in the street in the city".

One participant discussed periodically visiting a livestreamed video of her hometown in Europe, which allowed her to experience a sense of presence at the remote location:

"There is two or three cameras in my city and they are connected with the national television. So there is a channel and you can watch it every day, wherever you want... It's a livestream. Yeah, it's really good way, just to open it and for a couple of minutes to see what's happening in your city. When I was watching the livestream, I felt like I was there." (P43)

This use of video may be a useful way for students to maintain a long-term relationship with their place of origin over distance. P42 also said that receiving updates about events about home was helpful for the connection: "News of back home, national television channel. So in that sense, I'm connected with back home". The ability of technology to provide a sense of visiting a place, or feel present with it, may alleviate homesickness by providing an evocative feeling of home. P32 described this as an attempt to "not be in the place, necessarily, but feel the way you feel in that place".

5.6 Regulating Emotions

The final strategy used by participants was digital emotion regulation [69], which involves using technology to change the emotions one is experiencing and hence how one feels. Emotion regulation was used in three situations: when other approaches could not alleviate the feeling of missing home; when the concerns could not be discussed with family members; or when the participants simply did not feel like dwelling on it. This strategy was therefore aimed at removing the intrusive thoughts and feelings that characterise homesickness, as opposed to experiencing connection with people, culture or places.

Participants described recruiting music, videos and online games to experience positive emotions. Some used music from their own culture to remind themselves of family [68]. Others discussed combining music with exercise, dance or other activities as a way of making themselves feel better about being unable to return home: "I have a number of Persian music that I really like. They have this dancing bit that because I know the Persian dance, they give me this really good feeling of home" (P31).

Technology was also used to distract from negative emotions, or to occupy attention. In these cases, technology was used as a target for attentional deployment, shifting attention from the negative stressor (homesickness) to create a different inner feeling. Video streaming services were cited by six participants as enabling "binge watching" (P21), which served as a distraction.

P46 introduced the specific case of family birthdays as major events that she was sad to miss. Her response was to "stay in bed and watch the Sopranos all day", which was her main way of coping with homesickness: "Generally it's usually just watching something. I tend to use them very much as a distraction". Some participants described posting on social media as a way to vent emotions: "when I feel homesick, sometimes I post pictures about some places that visit before or places from my hometown or that kind of stuff" (P9). Video games were also a tool for distraction: "Candy Crush or Subway Surf, something like that. I have those on my iPhone. So again, diverting my attention, involving myself in some other thing" (P42).

Wellbeing apps that supported yoga or meditations were discussed as tools for preventing negative mood states that can arise through homesickness: "with meditation and all, how they help me

is that they calm me down and they help me busy myself with some other activity, maybe with studies. So the thought of not being with family, it doesn't become a constant thought" (P42). Participants also discussed collaboration tools such as Zoom as helping them to focus on studies and indirectly reduce homesickness: "it's keeping me busy that I'm not thinking of how I'm back home. I'm just focused on work. So somehow it helped cope with homesickness" (P21).

6 THE "DOUBLE-EDGED SWORD" OF DIGITAL TECHNOLOGY

In addition to discussing the benefits of technology, participants discussed technology experiences that made homesickness difficult to resolve or even exacerbated their feelings.

6.1 Exposure and Emotional Labour

While all of the participants discussed the benefits of communication technologies for contacting remote family members, some reflected on the emotions that could arise from using these channels when missing home. The most prominent concerns were raised in response to video chat. Although it was valued for providing a sense of presence and the ability to see friends and family, participants sometimes described feelings of sadness during calls home: "if when I see their faces up on the screens, I would say it feels like they are here... I would just kind of lose control a little bit" (P16). These feelings sometimes dissuaded participants from using video calls when they felt homesick, particularly with their parents. Participants actively managed their use of these channels to avoid conveying feelings of upset, and to prevent their families from worrying as well.

Other participants discussed how seeing family on video could lead to a heightened sense of longing. In this sense, decisions needed to be made about whether to reach out through technology or take another approach. In her daily diary, P41 described an experience of extreme homesickness that arose during a video call:

"I called my mom through video call with my sister in the evening. At first when I saw my mom's face my homesickness overflowed; the feeling of longing was very overpowering I almost choked haha. But then as we chatted for quite a long time (20+ mins) it eased a little. However, when we said goodbye I had this feeling of longing and didn't want the call to end." (P41)

The sense of longing experienced by P41 at the end of the call was described by others as a more general sense of 'coming back to reality' after episodes of communication: "It also reminds me that there's this degree of separation. And once the computer is off or I put down the phone, I'm still alone and by myself" (P4).

Like P41, other participants described mixed feelings as a result of video calls. P5 described actively avoiding the use of video with family because "when they said that they also miss me, I felt much worse. So then I tried to avoid frequent calls with my family". Some participants described how the emotional labour required to avoid appearing to become upset in these situations dissuaded them from using video: "sometimes I don't like to use a video because I'm worried about when I meet my father and mother, I will cry" (P50).

6.2 Homesickness Triggers

While students valued the fact that technology enabled immediate interaction with distant family members, the ability to contact home came at a cost: other people could also contact our participants at any time. As a result of this mutual connectivity, technology was seen to "backfire" (P22) as a result of receiving unsolicited content that made homesickness spike. P31 discussed seeing a video that triggered a strong experience: "My friend was passing through our house and she sent me this video laughing like, Ha ha, I'm in your neighborhood. And your house is right over there and you are not here. And she wanted to do like this fun thing... But I wish I didn't see that because suddenly I felt this feeling in my stomach." The participants also expected that they would be able to contact their family at any time, causing heightened feelings of worry in cases where connections were missed: "Once they didn't pick up, I got really worried, so that the missing feeling increased and I got worried like, "What is happening? Why are they not receiving my call?" So it has kind of led to developing an anxiety" (P42).

Although platforms such as Instagram helped to make students feel connected with people back home, there were also instances where homesickness was triggered by encountering information while passively browsing social media feeds. When asked to describe the last time she felt homesick, P48 said it was "when I was browsing Instagram and I saw a photo from my hometown and I was like, okay I have been there with my family and I really miss them" (P48). In her diary, P41 recorded an experience of homesickness arising after seeing friends' activity on Instagram: "My friends' stories of their considerations to go back to Indonesia made me also imagine if I go back home and can be with my family. I became more homesick". Participants mentioned hiding such content from their feeds by muting or unfollowing specific contacts.

Encountering imagery unexpectedly could also trigger the bittersweet feeling of separation from places. P32 discussed an experience where an innocuous profile picture on a professional contact's WhatsApp had triggered his feelings: "she had a picture that in the background showed a part of downtown Mexico City. And it was a picture of nothing special at all, like nothing emblematic or nothing that I had a particular relationship with. But just that background picture made me remember how it was to walk around downtown or things that I did around there with my girlfriend. It made me feel a lot of homesickness, a lot of wishing to be back". Likewise, when watching videos from their home culture, participants mentioned how unexpected content could pull at the heartstrings: "I follow this Hong Kong YouTuber, and she speaks a mix of English and Cantonese in her videos. So hearing Cantonese, how they speak it in Singapore, could trigger homesickness. Because at home, my parents speak a mix of Cantonese and English, so sometimes it triggers me" (P47).

6.3 Feeling Uninvolved and Making Distance 'Real'

Digital tools were valued for providing access to the home, but participants mentioned that technologies sometimes increased the feeling of being 'uninvolved' at the remote site. P39 stated that "you do feel sometimes a little depressed as well because you see all these people having fun". Several talked about how the ability to see what others were doing through social media or IM groups

engendered 'FOMO' [28], i.e. the fear of missing out: *"I think like homesickness can sometimes be related to missing friends and feeling like I'm missing out on the experiences that my friends are having in the US and I can't join them because I'm here"* (P7). The sense of missing out was also associated with a lack of expected contact on IM: *"you're not there, but they don't remember about you because they they don't send a message"* (P20).

In a similar vein, the inability to partake in events witnessed via technologies may intensify homesickness. For example, P2 described how: *"when my family send like pictures in the group chat, like they go out and eat and send the pictures of the dogs that I miss, it makes me feel more homesick because I want to be there as well"*. Several participants felt that existing technologies provide limited support for family gatherings, particularly those involving large groups of people. There was also a sense of limited involvement during significant events in the home country. In her diary, P41 described *"Longing for Indonesia"* during the country's Independence Day. She turned to Instagram to look at friends' stories, yet *"in a way, it made me more homesick"*.

The sense of being 'away from home' was sometimes amplified by tools that visualise distance from home, making the distance more salient. In her diary, P43 reported that *"I was doing a research about Australia and suddenly I opened Google Maps and I felt homesick when I saw how far away I am from home"*. Posts on social media were cited as reminding participants about past times in the hometown, and sometimes they tried to avoid these posts. For example, when seeing others posting hometown-related content to a Facebook group, P21 said *"there will be moments that I don't want to be reminded of those things also because I don't want to feel that immense longing for something"*.

Likewise, watching relevant videos may evoke old memories and facilitate thinking of the distance both geographically and temporally. P10 discussed a YouTuber who *"showed some videos from her country, like how she made food from traditional Chinese way and how she like deal with everything by herself... I used to live there living that kind of life and I'm so far away from that kind of life now. So I mean like sometimes technology can reduce this distancing by some, sometimes it can expand the distancing because it reminds me of how far away I am from my old life now"* (P10).

7 DISCUSSION

The aim of this study was to investigate how students use digital technologies to alleviate homesickness. Overall, our analysis suggests that students use a variety of technologies to address their feelings of missing home, and do so by enacting a nuanced set of strategies that support connections to people, places and things. These uses of technology may help to reduce the perception of psychological distance that arises when away from home [61], allowing students to retain a sense of continuity by accessing their home from afar. Given that prior research suggests that those with strong ties to home experience greater homesickness [32], the ability of technologies to mediate an ongoing connection for these individuals may help to make the sense of separation less stark. Yet the findings also suggest that certain tools can intensify the sense of longing, or even make separation from home more apparent due to the perception of being uninvolved.

These contrasting perspectives were encapsulated in our conversation with P49, who provided the quote that titles this paper. Like others in the study, she told us that:

"to me, it's about missing much more than the people, but also the place and the shared experiences with the people at home. Earlier I mentioned it was my friend's birthday and they called me when they brought out the cake and sang happy birthday. Normally, a call would instantly lift my mood, but I think in this situation, technology really emphasized the differences between being there in person and being there through a video call. It was missing that feeling of authenticity and honestly, it felt a bit awkward."

Taken together, these ideas suggest that technologies stand to play an important role in mediating connections with home, but there is still significant room for improvement. In the remainder of this section we consider how our findings extend current knowledge on the use of technology for alleviating homesickness, alongside their implications for the design and use of technologies that allow people to connect with home.

7.1 Coping with Homesickness Through Digital Technology

Our findings show that students use a range of digital technologies when they feel homesick. Some of the strategies mentioned by our participants align with claims made in previous work. For example, using technology to find help and support is similar to Saravanan et al.'s notion of a 'talking cure' [51], and the use of technology to regulate emotions is akin to the approach of dealing with homesickness through distraction [67]. Our study shows how digital technologies are employed by students to enact these strategies, allowing them to alleviate the sense of missing home when it arises spontaneously and periodically.

Intuitively, one might expect that technological solutions for homesickness should support communication with people back home. Previous studies have shown that technologies enable students to maintain existing relationships while away [3, 64], find new friends [22] or acquire social support from parents during the college transition [53, 54]. Our findings specify two additional details on the value of communication tools for resolving homesickness: first, the ability to acquire immediate social contact, and second, the ability to see distant relatives and gain a sense of being present at the remote site. These uses of technology may help students to counteract homesickness by generating positive affect [72], and appear to prevent feelings of loneliness and isolation, both of which are common problems when living away from home [25].

In addition, our findings emphasise that homesickness arises due to separation from many other aspects of home—pets, places, cuisine, and so on—that may not be easily accessible at the host site. Students in our study exploited digital technologies to either experience a sense of connection with these components of home, re-create them while away, or stop thinking about them if they were perceived as inaccessible. The implication of these behaviours for HCI is that technologies for alleviating homesickness need to offer more than just connections with people. There is a need to

consider how future technologies can bridge different aspects of psychological distance from home.

The present study also suggests that students value technologies which provide a sense of feeling ‘at home’. Social activities such as online gaming, watching television and communal cooking were all enacted through technology, and were valued because they allowed participants to experience something approaching the ‘vibe’ of home life. Similarly, creating open communication channels or watching video streams of remote places helped participants to remember multiple facets of what their home was like. These uses of technology may quell the sense of longing that is experienced when missing the remote location, perhaps by instilling a feeling of psychological presence, i.e. that one is somehow ‘there’.

We suggest that the widespread desire to feel the ‘vibe’ of home points towards an opportunity for technology designs that provide a stronger sense of being back at home. Homesickness is known to arise when the home is perceived as inaccessible [58] and so the ability for technology to replicate the experience of being in the home environment may be particularly valuable for those who cannot physically go there. This could be done by actively replicating the home (such as in virtual reality [26]), by providing a sense of presence at the home, or by allowing people to access home from afar. Exploring the design of such tools might allow researchers to understand their potential value for lessening perceptions of separation and longing. New technologies that enable students to remotely experience their home may also contribute to wellbeing by easing the need to return, preventing the kinds of intrusive thoughts that contribute to academic dropout [63].

7.2 Challenges of Using Technology to Alleviate Homesickness

Despite the positive roles for technology noted by our participants, the findings draw attention to the limitations of existing technologies for responding to homesickness. In particular, our participants noted that technologies sometimes triggered homesickness, raising the question of whether technology alleviates or amplifies the longing for home.

This question has been raised previously in the psychological literature on homesickness, and the existing evidence is mixed. While one study showed that homesickness in first-year students was highest when using video chat or during interactions with attachment figures [40], other work suggests that contact with home does not perpetuate homesickness but is instead made in response to feeling homesick [72]. Thus, interactions with home through technology may act as “a comfort when homesickness is strong” [72, p. 12], rather than as a trigger for homesickness *per se*. However, this does not explain why our participants noted that technologies did sometimes lead to feelings of homesickness.

One explanation is that it is not the mere use of technology that provokes homesickness, but rather the *type* of technology along with the situation at hand. Participants in our study primarily discussed problems in relation to two communication channels: video chat and social media. Specific tensions emerged around the use of these ‘rich’ communications media because they give rise to uncontrolled exposure to cues from the home, and because they required ‘face work’ by participants during emotional conversations.

These findings echo earlier responses to media-richness theory which argued that high-fidelity audio and visual connections are not ideal for all types of communication [59]. We found using these media can sometimes lead to rumination and increase the perceived psychological distance from home, triggering or exacerbating homesickness.

From an interaction design perspective, this suggests that technologies for connecting to home need to balance the experience of connection with the recognition that homesickness can be an intense emotional experience. Technologies might therefore afford users with meaningful ways of being involved at the remote site, while providing opportunities to control exposure to potentially upsetting content. The fact that technologies can trigger homesickness also suggests that students need to develop healthy relationships with these technologies. Our participants discussed actively limiting their use of social media or muting contacts to prevent exposure. Research has shown that limiting social media use, e.g. to 30 minutes per day, can lead to improvements in wellbeing and a reduced feeling of missing out [28]. Caregivers should consider these issues when trying to cultivate healthy relationships between students and their digital tools [63].

7.3 Design Opportunities

In addition to revealing how technologies are currently used by homesick students, this study points towards ways that future technologies could help to resolve homesickness.

Given our preceding discussion, we see an opportunity for novel technologies to better mediate connections with aspects of home that go beyond ‘people’. Although interpersonal communication was important, our participants wanted to connect with pets, food and culture, and valued technologies that provided the feeling of sociality experienced at home. Table 3 lists the different aspects of home missed by our participants; the technologies by which they are currently fulfilled; and the limitations of these technologies. The table also includes rationale for new technologies, based on the ideas shared by participants during our interviews.

As Table 3 suggests, there are myriad ways in which digital technologies could support new kinds of interactions with home. Many of these opportunities provide a potential use case for systems that have been proposed in the HCI literature. For example, during discussions of food from their culture, participants imagined that the ability to experience home cooking would help to alleviate homesickness. Emerging technologies that mediate the perception of taste, touch and smell [44] could be meaningfully applied in this context, especially given their ability to induce positive affect [13]. Novel interactions that involve sensory stimulation may help to alleviate the ‘cravings’ that our participants described as difficult to resolve without returning home. Likewise, Table 3 illustrates that participants often desired gentle physical intimacy or hugs with family members, providing a use case for devices that mediate social touch over distance [23].

The potential to tackle homesickness by instilling a sense of virtual co-presence is another area in which emerging technologies could be applied. During the interviews, some of the participants expressed an interest in creating an even stronger sense of presence, using terms such as ‘teleporting’ or ‘holograms’ to describe what

Table 3: Aspects of home missed by students, tools currently used to experience these aspects, and limitations of said tools. Technology ideas were suggested by participants as ways to address current limitations or offer new experiences.

Aspect of home	Currently fulfilled by	Limitations of current tools	Technology ideas (N mentioned)	Example
Communicating with people	Audio calls IM, SMS Social media Video calls	Lack of physical presence	"Holograms" and virtual reality (12)	<i>"The initial thing that went to my mind is hologram. Because you can see the person sort of in the flesh. It can help because you have this physical presence of the person that you wanna talk to."</i> (P21)
		Lack of physical intimacy	Mediated social touch (9)	<i>"[On video] you can see their face, but then sometimes you just need to hold hands or something like that. I just wish that existed, you know?"</i> (P24)
		Coordination challenges	Timezone indicators (3)	<i>"A time difference calculator thingy incorporated into FaceTime or whatever would make it easier to be like, oh yeah, this time would work for both of us."</i> (P7)
Interacting with pets	IM (pictures) Video calls	Risk of confusing the animal	N/A	<i>"We are on video call and then I call out my dog's name. He doesn't know that the voice is coming from the phone. So he just starts running around in circles."</i> (P23)
		Lack of reciprocal interaction	N/A	<i>"The dog is there and it looks at me and it just barks. Then I just feel happy that okay, it recognizes me, but then I can't really touch the dog, you know? I just feel bad."</i> (P24)
Feeling co-present and enjoying social experiences	Audio calls Online games Video calls Video streaming	Conflicting sounds and video feeds	Improved social TV (3)	<i>"Netflix Party could be improved. I want to watch and talk, rather than typing, but the audio gets really bad when you have the video call and watching Netflix at the same time, so I have to just talk to them via text."</i> (P29)
		Effort of managing multiple apps	"All-in-one" social apps (3)	<i>"One app where you can do games, streaming songs together, or watch movies. So I guess connectivity to a lot more people, you can do a lot more stuff."</i> (P35)
		Lack of support for large gatherings	Better group calls (2)	<i>"We had a family get together on Zoom and there were almost 50 of us. But it got chaotic, everybody was trying to speak and nobody knew who they were talking to."</i> (P45)
		Unable to share certain tasks	Social virtual reality (1)	<i>"At home me and my mom cook together sometimes. So if I can teach my mom how to use the VR, like 'simulate' the process in the kitchen, maybe we can use VR to cook together and solve the homesick 'missing' feeling."</i> (P48)
Experiencing food and culture	Music streaming Social media Video calls Video streaming	Lack of sensation	Sensory stimulation of Smell (9)	<i>"Maybe a smell, you know, like if your mother cooks something, maybe you can smell that from your phone."</i> (P17)
			Touch (5)	<i>"If you increase your sense of touch, it will feel more real. So it kind of gives you a sense of satisfaction after you've finished having the experience."</i> (P27)
			Taste (4)	<i>"Wouldn't it be nice if you could somehow convey sense of taste through technology? Today it's actually a Muslim holiday and my friend sent me a picture of food and then I was just thinking, 'Oh, I miss the food back in Malaysia'. It would have been really nice if somehow she could send me some or I can have a tiny slice in any way."</i> (P49)
Being in places and the home environment	Google Maps IM (pictures) Video calls Video streaming	Limited feelings of presence and immersion	Virtual reality visits or "teleporting" (5)	<i>"Maybe in the future you could actually have a virtual visit or something. It would be like putting on some glasses and then you can actually walk there. It's like playing video games, I guess, like VR."</i> (P39)
			Mediated touch & sensory stimulation (1)	<i>"The feeling of the couch, of the family room. I would say that's a feature that's not enabled. Probably the taste and touch and smell senses to get the vibe of a place."</i> (P32)

these systems might afford. Practically, immersive virtual reality might be leveraged to fulfil these goals, providing homesick persons with a sense of presence and making them feel as if they are ‘there’ with family. This could be operationalised as an experience that either attempts to recreate the home, such as through 3D scanning, or which provides an extension of it in virtual space [26]. These types of technologies might also help to better mediate connections to places [75] by allowing people to ‘virtually visit’ distant sites. Virtual experiences could also address the problem of emotional labour discussed by our participants by enabling socialisation through digital avatars.

7.4 Limitations and Future Work

As a qualitative investigation, this study provides evidence of salient experiences rather than absolute counts. The strategies used by our participants should generalise to other student populations, provided that they have access to similar technologies. However, we cannot say how frequently particular coping strategies are enacted, nor how often students turn to particular technologies to exercise these strategies. Future studies could overcome this limitation by logging app use and combining this with experience sampling (c.f. [40]) to provide further understanding of technology use.

The majority of the behaviours discussed by our participants were oriented towards the home or leveraging existing relationships. It has been recognised that social connection is a moderator of homesickness; students are less likely to miss home when they have more friends in their host culture [25] and when they interact with these friends on a routine basis [3]. Our findings focus primarily on alleviation, but there is also potential for digital technology to contribute to prevention. The types of social contact described by our participants may help to prevent feelings of disconnection from home, but are unlikely to result in the formation of new friendships. Future studies could explore the potential for technologies to prevent situations that give rise to homesickness, such as by helping students to form new networks when arriving at university. Future work could also help to better understand the role of technology in helping students to acclimatise to their new environment, which some of our participants appeared to do through tools like Google Maps and Facebook.

Our study relied solely on the opinions of students who had not been diagnosed with mental health issues. Future work should seek to incorporate a broader range of perspectives from the student body. Discussions of homesickness might also be informed by surveying those responsible for pastoral care, providing insight into how technology can usefully augment their caregiving practices. Parents or friends of the homesick might have other lessons to share about how they work to express caring through mediated communication tools.

8 CONCLUSION

Homesickness is a common side-effect of being away from home that can give rise to cognitive, emotional and somatic complaints [56]. This research investigated the role of digital technologies in helping students to resolve homesickness. We found that multiple technologies are used to address homesickness, and that students develop an individualised approach to addressing homesickness

based on their own feelings and circumstances. Students use digital technologies to alleviate homesickness by acquiring social contact with family and friends, finding help and support, building co-presence to recreate their home, connecting with culture, experiencing places, and regulating emotions. These findings show that homesickness is about more than connecting with people, suggesting that technologies which provide connections to multiple aspects of home may help to bridge the psychological distance that is experienced while away. Overall, this research contributes a better understanding of the ways that students use technology to self-regulate complex emotional responses, and can inform the design and use of future digital technologies intended for supporting students’ wellbeing during their time at university.

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APPENDIX A

Example entry from a participant's homesickness diary.

Diary Entry			
Date:	2 August 2020		
Day:	Sunday		
Time:	AM	4	PM
Could you explain what happened? What were you feeling or thinking about?			
<p>My couple of my friends in Melbourne messaged me asking whether I had plans to go back to my home country, Indonesia, in the near future. They told me they were thinking about it and they wanted to go back to Indonesia because uni is all online anyway and they can be with their family. When they told me about their considerations, I started to also think about what if I went back and I can be with my mom and family. I started feeling homesick imagining what I could do back home, but also what the restrictions would be back home (timezone, also not able to go out)</p>			
What triggered this, if anything?			
<p>My friends' stories of their considerations to go back to Indonesia made me also imagine if I go back home and can be with my family. I became more homesick</p>			
Did you use any technology to address the feelings/thoughts?			
If yes, how did this help? If not, why not?			
<p>I called my mom through video call with my sister in the evening. At first when I saw my mom's face my homesickness overflowed; the feeling of longing was very overpowering I almost choked haha. But then as we chatted for quite a long time (20+mins) it eased a little. However, when we said goodbye I had this feeling of longing and didn't want the call to end. Also, my mom told us that she was going to do a PCR test on Tuesday and that made us all the more worried.</p>			
Did you do anything else?			
-			
How would you describe this experience?			
Not homesick	Slightly homesick	Moderately homesick	Extremely homesick
What will you do next?			
<p>I thought more often about the possibility of coming home to Indonesia.</p>			



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Author/s:

Kelly, R; Cheng, Y; McKay, D; Wadley, G; Buchanan, G

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