(Re)Capturing the Spirit of Ramadan: Techno-Religious Practices in the Time of COVID-19

NADIA CAIDI, University of Toronto, Canada
CANSU EKMEKCIOGLU, University of Toronto, Canada
ROJIN JAMALI, University of Toronto, Canada
PRIYANK CHANDRA, University of Toronto, Canada

Ramadan is an important and blessed month for Muslims around the world. It is both a time of spiritual contemplation as well as an opportunity for reinvigorating communal bonds. The COVID-19 pandemic, however, disrupted many of the rituals and traditions of Ramadan. In this exploratory study, we present findings from 22 young Muslims' experiences with Ramadan and fasting during the pandemic. Our article sheds light on the techno-religious practices and information strategies used to mitigate isolation, share information, and celebrate Ramadan. We examine the sociotechnical configurations of religious rituals and highlight the resilience of these rituals even in the midst of a global pandemic. Our paper contributes to CSCW scholarship on technology appropriation and non-use as they relate to religious practices in the face of exogenous shocks such as the pandemic, and how design can better cater to the religious lives of individuals and communities.

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

Additional Key Words and Phrases: Religion, technology appropriation, ramadan, rituals, pandemic, meaning making, techno-religious

ACM Reference Format:
Nadia Caidi, Cansu Ekmekcioglu, Rojin Jamali, and Priyank Chandra. 2023. (Re)Capturing the Spirit of Ramadan: Techno-Religious Practices in the Time of COVID-19. *Proc. ACM Hum.-Comput. Interact.* 7, CSCW2, Article 249 (October 2023), 25 pages. https://doi.org/10.1145/3610040

1 INTRODUCTION

The COVID-19 pandemic (or the coronavirus pandemic) began in November 2019 and has since led to major disruptions in the social, cultural, and economic lives of communities around the world. Major events around the world have been cancelled or postponed, as communities grapple with loss and an uncertain future. Unlike other crises, the pandemic is unique in that it advocates for isolation and social distancing for the greater good. The closure of public spaces and in-person events posed significant barriers in maintaining a communal life. This was especially true when it came to religious practices that were by their very nature social. Ramadan represents such a practice - it is the holiest month for Muslims, and is a time for reinvigorating communal bonds along with spiritual contemplation.

Authors' addresses: Nadia Caidi, University of Toronto, Toronto, Canada, nadia.caidi@utoronto.ca; Cansu Ekmekcioglu, University of Toronto, Toronto, Canada, cansu.ekmekcioglu@mail.utoronto.ca; Rojin Jamali, University of Toronto, Toronto, Canada, rojin.jamali@mail.utoronto.ca; Priyank Chandra, University of Toronto, Toronto, Canada, priyank.chandra@utoronto.ca.

2573-0142/2023/10-ART249 $15.00
https://doi.org/10.1145/3610040

Recently, there has been increased attention on the emergent practices of Muslim youth's expressions of religious identities online, and how information in its multiple forms (textual, spiritual, corporeal, digital) has mediated and shaped their spiritual and informational journey [15, 16]. In this article, we examine the ways in which young adult Muslims (ages 18 to 35) were affected by the COVID-19 pandemic in the context of their observance of the month of Ramadan in 2020 and 2021. We build on the theories of everyday lived religion to examine the experiences of selected individuals who self-identify as Muslims and who recount their Ramadan-related experiences of fasting (or not) during a pandemic. In contrast to institutional religion, lived religion is embodied, social, and interwoven with the everyday practices of individuals [55]. This article illustrates the diversity of strategies adopted and adapted by individuals as they make sense of their experience of Ramadan and observe their religious obligations during a pandemic.

We further analyze the role of digital technologies in these strategies as our participants found ways to reimagine Ramadan and its various rituals during COVID-19. We focus on technology appropriation, or how they made various technologies part of their religious practices. This paper builds on existing HCI and CSCW literature on technology appropriation [19, 31, 58, 73, 84] to document the role of religious practices and adds to scholarship that documents the sociotechnical practices of understudied communities of practice [89] - in this case Muslim youth in transnational contexts. Our aim is to examine how the pandemic shaped the ways in which these individuals sought, accessed, used and shared information about religious practices through a range of channels and formats, the role that digital technologies played in the individuals' meaning- making around fasting, and the ways in which socio-technical practices shifted and were adapted to sustain the sense of engagement and commitment to the values generally associated with the month of Ramadan (i.e., the spirit and the rituals of Ramadan). Our findings address the following research question:

- How were the religious practices around Ramadan mediated and reshaped by technologies during the pandemic?

Our article documents the religious practices and information strategies used to mitigate isolation, sustain community, share information, and celebrate Ramadan, and how technologies shape both material and embodied experiences. We examine the sociotechnical configurations of these religious and cultural rituals and highlight the resilience of these rituals even in the midst of the global pandemic. We finally outline how, in the midst of isolation, a sense of community was maintained and the role that technologies played.

2 RELATED WORKS

2.1 Technology Appropriation and Non-Use

Technology adoption, as a process, involves users becoming aware of a technology, assessing it, developing attitudes towards it, and subsequently deciding whether to use it [21]. Technology acceptance models have been used to relate how the acceptability of technologies shape their adoption, generally focusing on individuals' psychological perceptions [6]. However, a common criticism of technology acceptance models has been their insensitivity to different contexts [82]. In contrast, technology appropriation considers users to be active agents who adapt technologies to meet their specific goals in specific contexts. HCI and CSCW research has studied technology appropriation in diverse contexts ([19, 31, 58, 73]. Technology appropriation can be defined as the ways in which a technology is not just adopted by people, but also integrated into everyday social, economic, or cultural practices. Previous research has highlighted the situated and social nature of technology appropriation [32] and how it can often happen in ways that are unanticipated by designers [30]. Scholars have also documented the creative tensions that are inherent in this process

[4]. Studies have also shown how, in the process of technology appropriation, technical practices interact with non-technical practices [58] and existing cultural traditions shape how technologies are appropriated [4]. In response to findings of people adapting technologies to meet their needs or altogether rejecting them, design research has begun to examine how designers can and should account for appropriation [18, 30, 91], emphasizing the need to allow a user to explore, interpret, and adapt a technology.

Related to technology appropriation is the idea of nonuse, where people might choose to not use a technology despite it being readily available and accessible. Prior research has identified the various reasons that contribute to non-use, including active rejection and disenchantment, among others [34, 84]. A typology of non-use has been proposed by Wyatt [102] which contrasts the institutional reasons of non-use with people exerting individual agency to voluntarily not use a technology. Understanding non-use helps in evaluating technology appropriation as we can identify the barriers that prevent a technology from being integrated with everyday practices.

2.2 Technology Use and Religion

Despite its extensive prevalence in the everyday lives of communities around the world, research on technology appropriation and technical practices related to religion and spirituality has not received enough attention. In HCI and CSCW research, scholars have begun to explore the relationship of technologies with religion and spirituality, or "techno-spirituality" [5]. Wyche and Grinter [104] used the term "extraordinary computing" to describe how faith-related artifacts, routines, and technology use are imbued with personal meanings and shape daily routines. Buie and Blythe [9] identify three main non-mutually exclusive themes of techno-spiritual HCI - 1) institutional: how religious organizations and groups adopt new technologies, 2) practical: how technologies shape existing religious and spiritual practices, and 3) experiential: how technology use contributes to spiritual and religious experiences.

Studies have documented how religious groups and leaders have begun using technologies to support religious activities or disseminate religious information [57, 61, 67, 99]. Religious organizations have begun to use digital media as a means to both build communities and engage with their members more effectively. Meena, et al.'s study of online religious communities shows that activities undertaken in these communities include worship, making request for prayers, seeking advice/information, sharing experience/opinions, and bestowing blessings and reprimands [61]. Recent studies have explored the role (and evolution) of these online activities during the Covid pandemic: for instance, Ganiel [39] examined the role of Christian online ministries and the ways in which the clergy used digital channels to sustain its presence in the lives of individuals, and also retain its significance. Bussing et al. [11, 12] ask whether this mediated approach to religiosity and engagement will lead to a loss of faith and/or a decrease in trust in religious authority in a post-pandemic world.

Communities have leveraged technologies more organically to strengthen existing religious practices [43]. Studies have also investigated how technologies become integral to the spiritual experience while also integrating themselves to traditional religious customs [100] . Caidi et al. [15, 16] examined selfie-taking practices during the Muslim pilgrimage of Hajj . It was concluded that in addition to capturing memories and documenting their religious experience at Hajj, Muslim pilgrims view social media platforms as spaces where they could express their own religious identities (i.e., performing or 'doing' religion) rather than relying on others to speak on their behalf about what it means to be a Muslim.

Design projects have also looked at how existing techno-religious practices can be facilitated – for example, the use of mobile phone applications in supporting Islamic prayer practices [103]. Recent studies in the Global South have particularly emphasized how designers can leverage the

importance of religious practices. For example, Rifat et al. [75] outline the interplay between technologies and religious forces, and the potential of using religious institutions to implement technology interventions. Mustafa et al. [63] argues for a design approach that situates itself in existing belief systems to be local and effective.

2.3 Information, Religious Practices, and Meaning-making

Beyond social computing, there has been an emerging interest in the nature of information and meaning-making in profound and transcendental experiences, or "higher things in life", as opposed to task-oriented or work-related contexts [52]. Kari [52] was among the first to study information practices and activities in the religious and spiritual arenas as experienced by individuals. Subsequently, studies have examined the information behaviour of clergy leaders in the context of preparing sermons, or engaging with their community [28, 62, 67]. Other studies have documented the lived experiences of individuals engaged in spiritual or religious experiences, e.g., Buddhists [40, 42], Roman Catholics [42, 47] or Islam [13, 14, 44]. Hickey et al. [47] link religious pursuits to technology, and the internet as a space where religion is defined, challenged, and negotiated. This idea is also captured in Caidi's examination of pilgrimage as an information context [13, 14]: the search for a variety of trusted information sources is often related to one's negotiation of religious identities. The young Muslims in her study refer to prevailing media portrayals of Muslims (often negative, especially in the post 9/11 West) resulting in heightened wariness and awareness about the information sources selected, the adoption of triangulation strategies, and careful curation of one's public identities online [16, 17].

The rapid expansion and modification of cyberspace is also changing the way that religion is perceived or practiced [29]. The new form of religiosity facilitated by the web is bringing people together through the promotion of religious experience online [29]. Religious identities are also becoming multi-faceted, frequently encompassing various traditions and trends [78]. The term "spiritual seeker" has been coined to refer to the emergence of a novel religious sensibility characterized by individuals scanning through the web hoping to find an all-embracing constructed notion of spirituality [101].

While it is difficult to predict the direction of religious trends, it is clear that technological changes have had an effect on religious activities. Relevant to this paper are prior studies on technology and Islam that have shown that religion manifests in diverse forms in digital spaces such as online liturgy, cybermosques, and online religious communities [48]. In this paper, we seek to understand how the pandemic reshaped Ramadan and how technologies mediated the Ramadan rituals and practices. Ramadan provides an unique space for research, as it is a recurring (yearly) religious event completed by a diverse and global Muslim community, and that carries its codes and set of practices.

3 BACKGROUND AND CONTEXT

Fasting during Ramadan is one of the five pillars of Islam [1, 41]. For one month each year, any physically able Muslim refrains from drinking or eating from sunrise to sunset. There are exemptions for children, the elderly, pregnant and menstruating women, people who are travelling, and anyone who are too ill or frail to fast. Since the month of Ramadan is based on the lunar calendar, its dates change every year. Muslims consider Ramadan to be a blessed month, partly because they believe that the Quran (the holy book of Islam) was revealed to the Prophet Muhammad during this time. Muslims use this month to deepen their religious practice through activities such as prayers at the mosque after the break of the fast, reading of the Quran on evenings during tarawih, and reflection and empathy. Fasting is viewed as a means of attaining empathy with those of lesser means –by experiencing hunger and thirst, as well as a time for engaging in gratefulness and charity [87, 92].

Rippin [76] noted that for many contemporary Muslims, even if they do not comply with the requirement of the five daily prayers, observance of the fast may still be practised. This partly due to the fact that Ramadan is not only a religious observation but also a communal cultural practice. During Ramadan, mundane activities that are usually private and solitary become a collective act. Muslims visit families and engage within their communities into acts of worship, charity, and bonding [10, 87]. Ramadan is about reinvigorating the bonds of family and community, showing solidarity and regenerating a sense of collectivity. Examples of community-building include sharing food, helping the needy, praying for one another, and reconnecting through this altered schedule of waking up very early for suhoor (early meal) and staying awake late for worship (known as taraweeh) after one breaks the fast (iftar).

The main practices associated with Ramadan include Suhoor, the act of waking up before dawn for a meal before the start of the fast (which begins with the Fajr (dawn) prayer); Iftar, the breaking of the fast at sunset when Muslims also engage in the Maghrib (sunset) prayer; taraweeh, an additional prayer performed each day at the end of the nightly prayer of Isha, often performed in congregation at a local mosque; and finally, the Itiqaf, a form of retreat where Muslims engage in devotion and worship (usually at the mosque) during the last ten days and nights of Ramadan.

3.1 Fasting and Feasting

Communal eating is a hallmark of Ramadan across time and geographies of the Muslim world [10]. As Hellman [46] puts it, "there are no explicit norms that compel people to gather together for meals, except during Ramadan." While the practice of fasting and feasting is experienced differently across class, space/place, and other social divisions, there seems to be a constant in the ways in which people gather around potluck iftars and invite each other to share meals at the time of breaking the fast. Some mosques and aid organizations set up tents and tables to offer free iftar meals for people in need [65]; companies increasingly organize iftar or suhoor events at restaurants for their employees to build an organizational culture [64]. The gatherings are less likely to be open for people who are non-fasting (or not practising at all) in religiously conservative rural areas compared to more secular big cities, where people tend to invite tourists or non-Muslims to experience an authentic Ramadan experience.

Moreover, the economic value that Ramadan bestows on the consumer marketplace (especially the food and advertising sectors) is significant. Consumer research studies indicate a sharp increase in food purchasing during Ramadan [53, 66, 83]. The commercialization of Ramadan may seem at odds with the religious and discipline-minded tenets of the fasting month; however, food is best understood (in the context of Ramadan) through the lens of social solidarity whereby sharing a meal, opening your doors to your neighbours, or giving to the needy is deemed a virtue in addition to fulfilling one's religious obligation.

3.2 Control and Community

The essence of fasting lies in discipline and the exercise of self-control (nafs) to overcome human desires such as satisfying hunger or sexual desire. For a Muslim living in a Muslim-majority country, this notion of discipline during Ramadan comes with a certain dose of community control in the form of social pressure against those who are visibly not fasting (i.e., publicly eating or drinking during daytime can be frowned upon). Strategies and social arrangements have emerged to overcome this stigma. Yocum [105] illustrates instances when "...eating establishments [in Turkey] hang curtains in their windows during the month so that fasters need not observe people eating who are not fasting and so that non-fasters can eat without being identified." People who miss fasting days because of strenuous travel or sickness are expected to pay compensation (fidyah) in the form of a donation of money to those in need. Similarly, menstruating women and those

who are child-bearing are considered unfit to fast, and their fast is therefore not obligatory during those times, but they face societal (and internally-motivated) pressures at times to continue fasting nonetheless [95]. It is generally understood that those unable to fast usually compensate for their inability to complete this obligation by doing ajr (actions such as almsgiving) [10].

There are other ways in which forms of control are exercised during the fasting month of Ramadan. Economic activities, for example, tend to slow down in Muslim countries during Ramadan, with reduced services and staffing across sectors -with the exception of grocery purchases that tend to increase during that month [66, 83]. Tourists visiting a Muslim country during Ramadan are often confronted with the harsh reality of not being able to reliably access public and private institutions (including restaurants) as companies adapt their working hours to lessen the hardship on fasting employees. Another instance of social control is manifested in the expectation that men regularly attend the mosque after the iftar (or sometimes even break the fast with others at the mosque) during Ramadan. Women are much less expected to attend the mosque for the taraweeh prayers than their male counterparts. During Ramadan, the mosque plays a central role in the practice of everyday Muslims, and by extension, faith leaders (imams and associated community figures) become central figures and exercise a certain authority over the local community. This became more difficult during the pandemic, as confinement and social distancing prevented Muslims from attending the local mosque. The turn to a virtual alternative reshaped somewhat the centrality of the mosque (and the imam) in the everyday practices of Muslims.

3.3 Giving and Generosity

As mentioned, Ramadan is a time for giving, and people are expected to show generosity not only to family and relatives but also to the broader community in the form of donations of food or money -almsgiving [3]. This generosity reaches its peak with the approach of the festival of Eid, which marks the end of Ramadan [94]. During Eid, people exchange gifts and pay visits to family and relatives. Some sectors of society also rely on donations and generosity to survive during Ramadan. Besides food and money, volunteering and giving one's time to help others is also viewed favourably during Ramadan as a means of strengthening one's social capital [87].

3.4 Ramadan During the COVID-19 pandemic

As the global COVID-19 pandemic coincided with Ramadan, many researchers examined health issues associated with fasting, especially for vulnerable groups. Topics included diabetes management, immunity, and general health tips for those considering fasting over the month-long Ramadan [93, 98, 106]. The World Health Organization released several guidelines on "Safe Ramadan practices in the context of the Covid-19" [68]. In addition to the global public health awareness around fasting during the pandemic, there were specific questions that revolved around whether vaccines were halal (or permissible, based on the ingredients they contained). Experts, including community-based organizations, were swift in carrying the message about the halal nature of the vaccines. In Toronto, Canada, a Canadian Muslim Covid-19 Task Force was established to guide the Muslim community around pandemic-related matters. Bringing together doctors, community leaders and religious leaders, this taskforce developed infographics, interactive information sessions, online campaigns, and tried to provide community-appropriate and reliable information [22, 77]. With measures being taken to fight the spread of Covid-19, many Muslims turned to news outlets, news websites and social media platforms to stay informed and find solace. Many mosques started offering virtual khutbas (sermons) for the Friday prayers (See Soundvision [38]'s YouTube channel; Serebrin [86]). Various digital iftar programs were organized, such as the Edge of Sunset festival that was organized by a collective of artists and included various cultural offerings for iftar nights [59]. Others developed toolkits [49], along with countless blogs, vlogs, and Instagram accounts that

catered to the needs of isolated Muslims during Ramadan. In addition to online offerings, offline initiatives abounded. In Montreal, for example, the As-Salam mosque offered takeaway meals to those in need (instead of hosting the traditional iftar meals inside the mosque) [86].

Several studies examining religiosity and faith under Covid have appeared in recent years [11, 12, 39, 50]. A 2022 study by Jones-Ahmed [51] examined the experiences of British Muslims completing Ramadan under the 2020 lockdown. In it, the author explores the strategies deployed by the participants to mitigate isolation (including online activities), and articulates the notion of socially-dependent spirituality to highlight the importance of the communal and the constant quest of individuals to try and come together (see also Gauxachs et al. [80] and Vekemans [97]). Our article contributes to this line of research and examines the extent to which the socio-technical practices linked to Ramadan shifted and adapted (or not) during the pandemic years.

4 DATA AND METHODS

This study is part of a larger project examining the emergent practices of young people's (defined as those between the ages of 18 and 35) expressions of religious identities online, through an everyday lived religion lens. This exploratory study examines specifically the ways in which young Muslims have been affected by the pandemic in the context of their lived practices of fasting during the 2020 and 2021 Ramadan months (corresponding to the year 1441 and 1442 in the Muslim calendar). Our aim was to examine the ways in which COVID-19 shaped how individuals sought, accessed, used, and shared information through a range of channels and formats, and the role that digital technologies played in the individuals' meaning-making around completing (or not) Ramadan during COVID-19. We also paid attention to the socio-technical practices linked to Ramadan, and how they developed and evolved during the Covid pandemic.

Our study adopts a qualitative research methodology to examine how intersecting factors shape the Ramadan experiences of the participants [74], especially given that the group of interest (Muslim youth) and the phenomenon (Ramadan) have not been adequately represented in information and HCI research. The protocol for the study has been approved by the ethics board of the authors' home institution.The study consists of in-depth interviews with 22 individuals. All interviews took place online via a range of video-conferencing tools (Zoom and Skype or other applications such as FB Live or WhatsApp video). Each session lasted between 50 and 90 minutes and was recorded with participants' consent. Individuals were not compensated for their participation. We identified and recruited participants using purposive sampling techniques to ensure a diverse range of individuals, recruiting participants through social media and community outreach, through professional and personal networks, and occasionally, by snowballing of participants [45, 69, 96]. While this approach has some limitations in that our participants may not be representative of the diversity of Muslim youth experiences, we were able to attract recruits on the basis of self-identifying as Muslims, being between the ages of 18-35, and being willing to share their experience of Ramadan during pandemic. The interviews took place from May to November 2021 and were conducted using an interview guide developed by the team. Our interviews focused on lived experiences of our participants through two rounds of fasting during the COVID-19 pandemic (April 24th-May 23rd, 2020 and April 13th-May 12nd, 2021). The semi-structured interview guide included four categories of data: demographic information, memories of Ramadan and fasting (rituals and affective dimensions), everyday life situations and coping strategies during pandemic (decision-making), as well as media and technology-related habits and practices pre- and post-pandemic.

Our participants' ages ranged from 18-35 and included 9 women and 13 men. Our interviewees represent a diverse sample of respondents in terms of cultural, linguistic and socio-economic backgrounds, representing different geographies of Islamic tradition and practices including Turkey, Morocco, India, Iran, Bangladesh, Iraq, as well as Muslim migrants residing in non-Muslim majority

Table 1. Participants List

Participant	Age	Gender	Ethnic Background	Employment	Residence
P1	30-35	Male	Middle Eastern/Arab (Morocco/France)	Legal counsellor	Canada
P2	30-35	Female	West Asian (Turkey)	Student	Canada
P3	18-24	Female	Middle Eastern/Arab	Part-time employed	France
P4	18-24	Female	Middle Eastern/Arab	Self-employed	Morocco
P5	25-29	Female	South Asian	Literacy Tutor	Canada
P6	25-29	Female	South Asian	Employed	Canada
P7	18-24	Female	Middle Eastern (Iran)	Teaching Assistant	Canada
P8	25-29	Female	Middle Eastern (Iran)	Teaching Assistant	Canada
P9	30-35	Male	South Asian	Teaching Assistant	Canada
P10	25-29	Female	Middle Eastern/Arab (Iraq)	Digital Marketing Professional	Canada
P11	30-35	Male	West Asian (Turkey)	Data Scientist	Turkey
P12	25-29	Female	South Asian	Finance Professional	United States
P13	25-29	Male	South Asian	Math Teacher	Canada
P14	18-24	Male	Middle Eastern/Arab	Teacher	Canada
P15	30-35	Male	Middle Eastern/Arab	IT Professional	Iran
P16	30-25	Male	Middle Eastern/Arab	Facilitator	Iran
P17	25-29	Male	South Asian	Technical Supervisor	Canada
P18	30-35	Male	South Asian	Technical Supervisor	Canada
P19	18-24	Male	Middle Eastern/Arab	Software Developer	Canada
P20	18-24	Male	South Asian	IT Professional	Canada
P21	25-29	Male	South Asian	Teacher	Canada
P22	30-35	Male	South Asian	Legal Counsellor	Canada

societies such as France, Canada and the United States. It must be noted that we did not ask the participants for their specific Muslim tradition or affiliation, opting instead for an approach that would account for subjective experiences and a diverse set of religious practices. Participants came from a range of backgrounds and lived experiences (see Table 1). Ramadan is inherently a communal event, so the social isolation during the pandemic made for a unique case study of how individuals adapt rituals, and the role that technologies play. Prior to the pandemic, the cohort of young Muslims were usually more mobile compared to older people during the month of Ramadan, spending their days outdoors socializing and partaking in Ramadan-specific practices. In this paper, we focus on the experiences, feelings, and coping strategies of participants in times of pandemic. Data collection was carried out primarily in English, with some supplementary data and clarification collected in either French, Moroccan Arabic, Turkish, and Persian (three of the authors were fluent in these various languages). Interviews were recorded with participants' consent.

All interviews were coded and analyzed using line-by-line inductive analysis [24]. Using this iterative data-driven approach, the study identified several themes that address the relationship between participants' accounts of their Ramadan experiences and their related and shifting information and technological practices over time. Data analysis was carried out through an iterative process of thematic coding. Interview transcripts were first coded by the three first authors independently. After the initial coding was completed, the coding scheme was discussed and revised

before an agreement was reached. Through constant comparison, we built up from basic, open codes to develop selective thematic codes related to the characteristics, situations, and experiences of our 22 participants. The codebooks were iteratively expanded upon and validated by co-authors, with any differences among coders resolved via discussion. Whenever appropriate, we include selected quotes from the data (in English, or in their English translation, if applicable). The focus of the analysis was on the descriptions and constructions of the participants' accounts of completing (or not) Ramadan, while locating their stories in specific times, places and contexts. This participant-centered focus provides space for the 22 participants to articulate the meanings and activities associated with Ramadan and fasting (both during and outside the pandemic) along with their motivations, emotions, needs, and strategies. During the analysis, the focus shifted from the experiences of individuals to the collective experience.

It must be noted that we conduct this research through the lens of critical reflexivity to acknowledge our positionality as information scholars and CSCW researchers. While we are collectively located in Canada (as students and researchers at R1 universities), our backgrounds stem from diverse milieux (Turkey, Iran, Morocco, France, and India) and therefore reflect our diasporic experiences. Although we identify as visible minorities (or people of color), there are some intersections of race, ethnicity, and marginalization that we do not experience equally. While we are three women and one man, we are all cisgender and middle class generally, despite some variance between the status of two of the authors as international students and two as faculty members; three out of four of us are also first-generation immigrants, with English as a second or third language. While we choose not to address the broader and complex discourse around Islamophobia and the political aspects of Islam in a post 9/11 environment, we acknowledge the critical importance of these broader conversations in shedding light on the complexity involved in the formation of contemporary Muslim identities [15, 17, 71, 90, 107, 108]. By framing Ramadan in times of the COVID-19 pandemic as an instance of everyday lived religion, we intend to link religious performance and the power of global networks in that they embody those alternate spaces of intimate interactions that can give Muslims agency in how they want to represent themselves and their rapport to Islam.

5 FINDINGS

5.1 Digital Information Practices during the pandemic

Fasting is a bodily experience that is very demanding. The participants all reported at length on their strategies to support their bodies from dawn to sunset, and discussed the role social media platforms and mobile phone apps played in supporting these strategies. The knowledge of what and how much to eat or drink during iftar and suhoor is key to caring for one's body. Several participants mentioned engaging in taking naps during the day, ensuring that they got enough sleep, taking proper breaks during work hours, taking walks after iftar meals, and making the time to cook (or purchase) Ramadan-specific foods.

One of the participants shared that she was constantly checking her mother and grandmother's daily intakes over WhatsApp to make sure they were well. All participants stated that they were following several news sources along with social media to stay on top of vaccine updates and fasting guidelines:

> *"I have been anxiously following the news on the national broadcasting channels as well as on social media both in Ontario and back home (...) Being so close to the border, and with the spikes in cases in the region, I was really concerned about how my father, who was in his mid-eighties and with various ailments (including a heart condition) would fare (...) My siblings and I were in constant contact over WhatsApp monitoring the situation, assessing my father's ability to fast this year."*

As the account above describes, Ramadan during a global pandemic was also an informational activity that entailed assessing and managing various risks for oneself and others (at times acting as a proxy for others, as is the case for P1). In participants' accounts, there is evidence of information seeking and sharing, but also other strategies such as selective exposure or even avoiding information altogether, which is a known strategy in human information behaviour, presumably to mitigate for possible information overload and any anxiety that may result [27, 81, 85, 88]. P2 reports having to take a call on whether to share or withhold information with her extended family based on the relevance and appropriateness to their situation. The decision to share or not information depended heavily on the context. P2 recounts:

> *My family back home don't have access to social media and they only watch state-funded TV networks, so they weren't aware of the seriousness of the situation. Through our video calls, I fact-checked the infamous virus conspiracies, corrected misinformation about the health risks, and simply shared and discussed with them what I was seeing on social media about the real impact of the pandemic.*

The COVID-19 situation raised several key issues for Muslims and their families, many of them informational in nature: is it safe (especially for older adults) to fast? Can people congregate at the mosque, or meet family and friends? How does one build and sustain a community when social distancing has become the norm? Our participants heavily used social media platforms and messaging platforms, such as Facebook, Instagram, WhatsApp or Telegram. Some of the uses included: to "*catch up with people sharing tips, experiences online*" (P8), "*to see how others are doing*" (P2), "*to ask people about their opinions and views about fasting during the pandemic*" (P10).

Our participants also reflected on information overload and misinformation online. For example, P14 discussed their implications for his family's health:

> *"The amount of information is overwhelming. A lot of people would believe immediately the first thing they read. People would trust. My family, including aunts and uncles are older and are like in a bubble, mostly on their Facebook pages and connections. So they have scattered sources and no diversity of information. So they are more susceptible. My uncle just got vaccinated 2 months ago. He thought there was no reasons for it and believed the rumors [about vaccines]. He just got vaccinated because the vaccinal pass that makes it impossible for him not to, only because the government forced him.."*

For P13, the ability to use social media to connect with others was deemed essential, however they pointed to the possible language niches that can lead to marginalization and exclusion:

> *"It is nice to see people organize things voluntarily for religious purposes, but there are weaknesses: in Canada, small mosques were formed based on what demography lives nearby. And those mosques go to Youtube and use their own language. For example, I don't know Urdu or Arabic, so I can't watch those channels. [There is] No Bangla [language from Bangladesh] mosque presence on Youtube. So I go to Bangla-speaking Youtube mosque channels from Europe. I don't think YT has a large database for Bangla so I follow language programs whether or not YT provides translation. Also I don't do replay, only the live streams. Even when live chats are enabled, I don't chat there. But when I see people type words like 'alhamdullillah' (a commonly used expression used to thank God and express gratitude), it feels nice."*

The above statement from P13 illustrates how technology enables closeness and intimacy, whether it is with local audiences or global ones, but there remain barriers that technology has not crossed yet - language barriers, being an example, in this case.

The World Health Organization (WHO) declared COVID as not only a health pandemic but also an infodemic, which they defined as "an overabundance of information – some accurate and some not – that makes it hard for people to find trustworthy sources and reliable guidance when they need it" (WHO, 2020). Ramadan 2020 coincided with those early instances of COVID lockdown, as authorities adjusted policies. Participants engaged in intensive information work both locally and transnationally, as they monitored their families' situation back home.

> *"I felt utterly confused by the level of ambiguity of the language used at leadership levels about Ramadan during the pandemic. State authorities delayed to declare explicitly whether mosques will be closed or not. Instead, the few statements we could find hinted that Ramadan activities 'may be' affected due to COVID. At the local mosques, imams encouraged people to take their personal precautions if choosing to attend mosques. One of the imams, who is regular on TV programs, mentioned that 'the judgement belongs to God', meanwhile the World Health Organization made an announcement on social media and invited Muslims to gather virtually during this Ramadan; eventually, a few nation-wide public health associations called on the Turkish government to take more serious actions. Whom to believe? We were all confused."* (P2)

Finding accurate information to perform religious rituals while remaining safe was not an easy task. Often formal (or state-run) sources of information were not trusted. Instead, information from informal sources (such as social media groups) had to be used. Searches in other languages became important to get a complete picture of what was happening. Information had to be actively triangulated through multiple sources to verify its veracity. In the face of this, many "experts" became active on social media. While some experts were public health officials or official organizations such as the WHO, others were faith leaders or 'imams' who through social media platforms, such as YouTube, Twitter or Tik Tok disseminated information on how to perform rituals related to Ramadan while also adapting to a new socially distanced reality. Information search and assessment was thus shaped by relationships of trust. In this instance, information related to faith-based practices became intertwined with the information about the pandemic and brought to the fore the important role that faith leaders have in shaping information flows in religious contexts.

5.2 The Digital Reimagining of Ramadan

When asked about their memories of Ramadan, participants spoke about the meaning of Ramadan for them in sensory terms (feelings, sounds, touch, smells, and taste). One participant described how he remembered "*hearing adhan [prayers] from all the mosques at once.*" The loud sounds pouring out of the speakerphones during suhoor and iftar times were as important to them as the smells of Ramadan: *"you smell food everywhere while you're going to mosque for tarawih prayers" (P9).* Another participant shared his recalling of Ramadan as a child, and the mysterious aura it had for him:

> *"It was an extremely mysterious period of time. I mean, you're a kid and your family keeps waking up in the middle of the night, eating things and you're not there. You just hear the sounds of forks and knives. So my excitement about Ramadan started with those "enigmatic suhoor". And then, the smell of the food, the noise from the kitchen while mom is preparing food. (P11)"*

One participant described the traditional Ramadan bread common in Turkey, Ramazan pidesi: "*The moment you touch its crust at the first iftar meal and feel the warmth, you get the Ramadan spirit.* (P2)" Another participant, a Bangladeshi immigrant who used to live in the USA, illustrated the role that freshly prepared food played in their experiences of Ramadan while abroad:

> *"I used to live in a dorm, we had some friends from Saudi Arabia who were also fasting. There was a chef cooking for 50-60 people in the dorm and the chef knew that we were fasting. It was one of the nicest experiences in the USA because she was making fresh pizza for us and kept it in the refrigerator, and called us, saying to just warm it. She was making sure that we had the best fasting experience and ambiance possible (P9)".*

Other elements that were integral to the experience of Ramadan included the sounds of nafar (a bugle-like musical instrument) in Morocco (P4) and their Turkish drum equivalent, both of which are used to wake up people for suhoor during Ramadan; the taste of güllaç (P2), a Ramadan-specific dessert in Turkey; the soups typical of Ramadan as well as the variety of dates (P1, P3, P4). All participants also spoke of the indescribable feeling one gets after sipping the first gulp of water at the break of the fast. This was indeed a recurring theme that illustrated the nostalgia, but also the embodied ways [26] in which Ramadan is experienced -both through the diverse sensory experiences as recounted by participants, and in the way in which the body becomes a sign that can be read by others (the Ramadan daze and fatigue, the exhilaration at iftar time, the coming together for taraweeh).

As part of capturing or (re)creating the atmosphere of Ramadan, our participants resorted to various digital practices. P1, for example, Google-searched and bookmarked the call for prayer that he listened to at the end of the day as a marker of the break of the fast. Another participant, P11, watched Ramadan-specific programs on YouTube: *"I like to watch Ramadan TV programs! You know, the iftar and suhoor special TV programs. I enjoy watching those on YouTube, like LiveStreams (...) Other than that, things like Ramadan Lists on Spotify. YouTube may recommend those kinds of things. Because that ambiance..I know many people go to YouTube for that ambiance, deepening that experience, you know".*

As is evident from P11's account, recreating the "ambiance" of Ramadan was a big aspect of experiencing Ramadan during the pandemic (especially when one is already cut off from the family and/or community). As a matter of fact, the recreation of the Ramadan ambiance was a very personal affair. P2, for instance, shared that she prefers YouTube videos over Spotify when listening to religious prayers and chants (also called ilahi), since the former provides a more natural, less "digital" experience:

> *"I often use the "Ramadan" term or hashtag to retrieve relevant content. I don't like Spotify for religious chants and prayers. I really don't like to hear them digitally. It sounds too perfect on Spotify while I like to hear the imam's own sounds and grunts and emotions. These are the sounds of prayers, like what we hear at the [a very famous mosque in the city where she used to live] where the imam has such a unique style. Maybe there are recordings where such sounds exist but I haven't found them. Instead, I go to YouTube, especially for "ilahi", which has videos of chants available and playing specifically on Ramadan TV programs. It is cheesy but emotional for me and I feel deeply connected to the sounds and the chants." (P2)*

While most participants use technology in significant and different ways, those participants who lived in non-Muslim majority countries reported searching for content with either an affective component: soundscape, recipes or pictures of favourite childhood dishes, images of specific locations or in-language TV shows and programs; or else content for logistical purposes. For example, participants turned to websites and mobile applications to confirm the exact times for prayers, or the cutoff time for fasting (sunrise and sunset, as these times change almost daily) both locally and for their home country, to allow them to plan their communication with family accordingly. P9 downloaded apps on his phone: "*What is the iftar time? What is the suhoor time? In Bangladesh whenever you hear adhans (prayer calls) you know that is the time. Since we don't*

have mosques here, I installed some apps on my phone about schedules". For many participants, these various platforms are critical for their everyday lived experience of fasting.

5.3 Coping strategies during Ramadan

We asked participants to compare their experiences fasting twice during pandemic. The first Ramadan in 2020 took place between April 24th and May 23rd (relatively early into the COVID-19 pandemic) while Ramadan 2021 was held between April 12th to May 12th. Like millions of Muslims the world over, the 22 participants reported feeling a variant of the doom scenario during the first Ramadan in 2020. Several asked themselves what that first Ramadan would look like, as "*this is not the way Ramadan is supposed to be*" (P1). As a result, the participants' practices seemed to revolve around managing stress and anxiety, checking on loved ones, engaging in self-care, and adapting to the new reality. P2's account illustrates the affective tension and mixed feelings of that early period:

> *"After they broke their fasts in the evenings, my [Turkish] cousins, on our WhatsApp cousins-group-chat, were curious to know how Canada was doing daily (...) It had taken a few WhatsApp conversations for me to realize how these conversations could transform into bitter compare and contrast scenarios between our two situations. And deep down, I felt guilty. Guilty for being here, away from home, and living in relatively safer conditions -and all this during the holy month of Ramadan. So I tried to avoid sharing any details about the exact conditions here so as not to put my relatives in distress or dismay." (P2)*

A common theme that ran throughout participants' accounts (and across contexts) was the sense of isolation that the pandemic created. The discourse of "isolation" frames the experiences of most participants, including their resulting activities and the ways they interacted with others in this new environment (which included an extensive use of digital media).

One participant, P8, described her experiences: "*Last year it was the beginning of COVID-19, so it didn't sync with me, everything kind of revolved around COVID-19. This year I was more realistic, it was more tangible for me and also more difficult for sure to be alone. I had to come to terms with this and accepted that this is our new reality. So that would be the main difficulty. Last year's pandemic was just too new.*" The pandemic-as-spectacle was a recurring theme in many of the participants' accounts of the first Ramadan under COVID-19. At that point, it was a distraction that they thought would be short-lived, but as weeks turned into months and the second Ramadan came in the throes of the pandemic once again, the participants' feelings and states intensified and evolved. P5 spoke of planning better her second Ramadan under pandemic: "*This year [Ramadan 2021], it was more planned in terms of spending more time with family and with [Ramadan-related] preparations. My siblings and I read the Quran together and it was an interesting experience hearing them read it out loud.*"

While P5 was able to spend time with her family, others who were not able to do so spoke at length about the sense of isolation that lockdowns and "social bubbles"' created or amplified. Isolation was not only harmful to the mental health of participants but also to the spirit of Ramadan. P11 described his momentary lapses in performing rituals connected with Ramadan:

> "*Last year, I kept forgetting Ramadan and drank water in the morning when I woke up. This happened perhaps the first 4-5 days. I think the reason is we didn't engage with people, we were just at home. The fact that we weren't seeing people, not interacting with others created the perception that we are not experiencing Ramadan and this was just a normal day. Because usually what naturally happens is you start talking about Ramadan, about fasting etc. with people around you (...) But last year, we had no one around to talk*

to, and I think I didn't get the mental prep and kept forgetting my fast. But this year, I think I got used to it. I adapted more easily."

P11 provides another example of meaning-making around Ramadan under pandemic, that led to a reframing:

> *"I think Ramadan became something more individual and spiritual rather than communitarian. That's why I like fasting by the way. You just do your worldly things for 11 months, but that one month you go to your inside world, disciplining your ego. (...) Before COVID-19, Ramadan to me was about gathering, you know, you make big iftar tables, you are together with others. But now, it is more about myself, something that I experience alone. People do like virtual tarawihs, prayers etc. I heard about it. But it's not for me. Those digital platforms are not enough for me. I mean they don't satisfy my expectations of living in the Ramadan zone, mentally. I've never wanted to see them. Never been curious." (P11)*

Among the verbs used by many of the participants to describe observing Ramadan 2020 are 'making do', 'figuring out', 'making up for', 'doing without', and 'fasting despite.' Indeed, for several participants, 2020 was a learning experience that either prepared them for Ramadan 2021, or else conditioned it. One participant, P1, referred to the difference in their experience of the two Ramadan under pandemic:

> *'Last year, the focus was more on news about the pandemic so I didn't feel that I was enjoying the sacred aspect of Ramadan."*

Similarly, P12's account drew a clear parallel to the spirit of resilience which is very much at the heart of Ramadan: "*...last year was a shock to everybody. (...) There was a shift this year [2021], even though on a day to day basis it was really difficult to do, but for some reason there is something in the air that makes people want to do it. (...) Overall, I feel that we're learning to handle it a little bit better now.*"

5.4 Ramadan Beyond the Individual

Mitigating isolation was undertaken through the action of enabling community despite the pandemic, and in the spirit of the month of Ramadan, as expressed by the participant below:

> *"Both this year and last year, we had to learn the community aspect, the togetherness, closeness and the congregation. Obviously that did not happen as much, especially last year because everything was closed and was not allowed. So being able to celebrate as a community, was through having a Facebook group. (...) Last year, because it was the first year of this pandemic, everyone was very active and interested in doing something that made them feel the same experience as if we weren't in the pandemic. So with this Facebook group we wanted to focus on the community aspect and meet people from all over the world. On top of sharing content related to Ramadan, we played games and answered questions and got to know each other. We had a great time together." (P10).*

As Ramadan coincided with COVID-19, it stimulated the evolution of new online mediated practices: groups on social media were forming, and existing groups were becoming more inclusive. P1 mentioned reaching out to more people in his contact list than he used to. P2's existing groups in WhatsApp evolved by acquiring all-inclusive group names, and distant cousins were added to these groups. Also, the family group began utilizing features including voice, picture, and video messages in communicative apps. P3 started following local businesses (an Islamic bookstore; the community center where her family lived in another city), as well as the accounts of faith leaders and young Muslim influencers. Intergenerational encounters were facilitated by social media (e.g.

the Telegram app allows people to make phone calls to family members, send video messages and quickly share information about Ramadan), and older adults became more receptive to social media out of convenience. Zoom was used to participate in virtual khutbahs and even reading groups. Local mosques' websites were used to make appointments for the limited, in-person, spaces.

For P19, the second Ramadan under Covid was an opportunity to capitalize on intimate relationships, and technology was a means to create closeness and break down barriers. As per their account:

> *"The intimate kind of relationships are those that you have with others who fasted; could be someone to share Ramadan content and images with. WhatsApp groups for Suhur were also great to help each other wake up, and to make sure everyone is OK, so we check on each other (with family mostly)."*

By contrast, P3 expressed how, through social media, their Ramadan under pandemic allowed them to become more globally aware, and to feel solidarity with others undergoing hardships (Muslims or not):

> *"The pandemic affected my Ramadan and our vision of things. Social media provided us with a global perspective on Ramadan. Social media rendered more visible BLM and other movements, which are not happening just online but also in person and have led to concrete action everywhere. This is another advantage. Mental health is another interesting example: the anglophone world is ahead of us. There are more conversations about it and more experts too. Less so in France. This was interesting to me."*

New forms of engagement were experimented with, that included digital iftars, Ramadan-themed webinars targeting Muslims, online festivals, and curated content all of which were becoming more readily available. These new technological adaptations had an immense impact on strengthening the communal feel of Ramadan. P8 spoke about the importance of diverse information that was being shared on Telegram, including specific recipes for iftar, Ramadan prayers and tips on staying healthy.

Our participants, for the most part, were well versed in the digital landscape of Ramadan under COVID and, by the second year of Ramadan under COVID, had developed a critical eye toward the data-related practices of several app developers. P5, for instance, recounts: "*...I used to have this app called Muslim Pro that I was using last year and it keeps track of your fast and prayer. I didn't use it this year because it sells your information and I felt that I no longer needed it. I try to avoid using apps that sell my information to third-parties as much as possible.*" Another participant (P6) felt that apps like TikTok did not accommodate a wide range of audience in terms of content and information diversity: "*my mom does not use Instagram because she believes it's for the younger population (people that are trendy). Maybe if they could include some features that would attract the older population it would be great. I mean there are some older people that still use it, but there are some people that are intimidated by it. I downloaded TikTok and even I am intimidated by it, because all I see are kids. I feel like we need inclusivity in all kinds of social media platforms.*" P8 shared that they wished that the groups on Telegram offered English translation for those who cannot read or write in Farsi. For P10, the ads in the various apps were deemed problematic: "*YouTube has increased their ads a lot. It's crazy. We don't have ad-blocks. It's very annoying*". Another participant mentioned the haram (non-permissible) content in those ads which made him uncomfortable. Looking for possible solutions, he suggested "*filters that would be helpful to block haram things when we Google things.*" (P9). P20 concurred: "*Recitation apps should not have ads, and it's unfortunate to have premium/paid versions of these apps. They should be free, or a [religious] institute must sponsor them [to ensure they are affordable].*"

These accounts show the diverse attitudes of participants toward access, mediation and gate-keeping, the role of authority, and the platform economy. P10 shared that she would have liked to see more Ramadan symbols on social media platforms:

> *"One feature I would really want is that they can change the interface or something, putting celebratory things on page, like decoration. You'd feel that, right? You see those things during Christmas. They make things Christmass-y. I mean... confettis, lights. It puts you in the mood. If these applications can do that for us: Warmer colors, light holders, the Crescent. This virtual space telling us that now you're in this. I'd want to have this."* P10

5.5 On limited or non-use of technologies

Not all participants increased their use of technology since the beginning of the COVID-19 pandemic. Indeed, we found instances of non-use among some of our participants. In line with Wyatt [102], we find that the reasons for non-use of technologies ranged from being excluded from technologies to actively choosing to avoid technologies in keeping with the spirit of Ramadan.

One participant explained that living in a village meant not having access to technologies such as the internet and mobile apps. For P17, "*in our village we didn't really have access to technology so we relied on books or knowledgeable individuals, like a preacher at the mosque*". P17 added that despite now living at a place with technological access, they still continue to reject technology use in relation to their faith, but instead prefer books.

Another participant (P19) described that they were actively avoiding certain apps for their mental well being. Taking a pause from social media was deemed critical for several of our participants for a range of reasons. For P3, it was a matter of balance from the previous Ramadan spent online: "*Last year, we started consuming more online content. This year too but less it seems, and we also take a pause from digital media. There is so much information thrown at us, so taking a pause was important for us.*" P7 concurs: "*I deleted Instagram, Snapchat, Tiktok to keep myself calm and keep up the spirit of Ramadan.*"

Others, like P16, swapped some apps for others: "*In Ramadan, at least in my family, using the Instagram app decreased and, instead, our use of religious apps have increased.*" For P18, "*[...] fasting is also about the fasting of eyes and ears.*" This fasting of the senses led P18 to significantly decrease their consumption of Youtube and Netflix during Ramadan.

Even when the design of the app or the platform was not an issue, some individuals were simply not interested. P22 states: "*I tried a variety of things (digital iftars, virtual talks, calendar reminders, etc.). The problem was not the design of the platform, it was that it did not work for me. The connection cannot be replicated.*" The experience of Ramadan under Covid is essentially about re-imagining a community under hardship. Together, these instances bring to attention the various socio-cultural and psychological factors that shape religious practices of technology use and non-use.

6 DISCUSSION

In this paper, we highlight how individuals used digital technologies to recapture the spirit of Ramadan. This includes sociotechnical reconfigurations of Ramadan through integrating and adapting technologies to meet their religious needs. We show how old rituals persisted while new rituals were created through leveraging digital technologies in effective ways. Finally, we document attempts at sustaining the communal side of Ramadan even as individual isolation became the norm. From a CSCW perspective, this paper shifts the analytical focus from individuals to the rituals that are integral to how individuals experience everyday lived religion. Such a shift can potentially enrich our understanding of religious identity and continuity, help us in redefining

the community, and focus on changing practices as a foundation for design of community-driven technologies.

While the uses of digital technologies in religious practices are not new, the pandemic accelerated their use as individuals and communities attempted to find strategies and tactics that would allow them to experience Ramadan while remaining safe. The instrumental uses of technology during Ramadan can be largely divided into three broad categories: 1) Searching for information related to COVID-19, 2) Supporting rituals related to Ramadan, and 3) Connecting with others. As designers build systems that deal with either limited information [37] and/or misinformation[8], it is important to understand that the trust in formal and informal sources of information is highly context-dependent. The need for unique personalized content that is familiar and sparks nostalgia is especially important as individuals travel to new locations, and Ramadan becomes distributed and celebrated through transnational rituals thus forming new, more inclusive groups that better reflect the broader and global 'community'.

6.1 Technology Appropriation and Non-Use

HCI and CSCW research have acknowledged the important role that everyday social and cultural practices play in the process of technology appropriation [58, 79]. We build upon this research to highlight the need to examine techno-religious practices and how existing and new technologies might or might not integrate themselves with these practices. While the COVID-19 pandemic necessitated the use of a wide range of digital technologies, how these technologies were used (or not) provide important insights for designers looking to design more culturally meaningful technologies that are cognizant and supportive of the meaning-making around religious rituals and transcendental experiences.

While "inclusion" has been a criteria that is well-documented and used in technology design, this study highlights that complexity and the situated nature of inclusion and exclusion. While technology use was linked to socio-cultural and religious practices, many of the participants' needs were unique to their observation of Ramadan in a transnational context. This was observed in their use of platforms such as Youtube, which allowed them to recreate the ambiance of Ramadan in the way it was celebrated in pre-pandemic times. Crucially, even as participants used technologies, they actively sought out less "digital experiences".

This paper also adds to existing literature on non-use or actively resisting technologies [84, 102]. Our study shows the crucial role religion plays in non-use. While some did not dissociate religious rituals from technology use, others chose to not use technology in order to hold on to "the spirit of Ramadan." The difficulty of celebrating Ramadan while isolated because of the pandemic brought in some complexities, especially as many tried to look out for their mental health by being more selective of various modalities. This affective nature of technology leading to use and non-use behavior is related to the literature in information science on embodiment and especially the role of the body in information activities as well as the cultural shaping of the senses - as illustrated by our data [25].

Further, despite the use of technologies, isolation remained the most significant barrier in meaningfully observing Ramadan during the pandemic, as per the 22 participants' accounts. Digital tools were never able to fully replace in-person experiences. This study illustrates the extent to which certain contexts (such as religious pursuits) cannot easily be encapsulated digitally. Much like pilgrimages, observing other religious pursuits can often only be fully appreciated and comprehended by the action of being there, or being present together, and going through the rites and motions [23]. This leads us to question what it is about religious experiences that cannot be fully designed for a digital environment: how can one make an experience 'special' rather than another routinized task? Building on Wyche and Grinter's concept of "extraordinary computing," [104],

we ask how does one truly design for transcendental experiences? Future research needs to study the sacredness inherent in rituals, and we invite researchers and designers to investigate design elements that encourage contemplation, introspection, and deeper connection with "something greater".

6.2 Religious Rituals as Sites of Study

Echoing Bell [5], Caidi [15, 16], and others, we argue that studying religious events such as Ramadan allows an exploration into individual and communal practices that shape the everyday lives of billions around the world.

At a broad level, studying technologies being repurposed and adapted to meet religious needs provides designers and researchers with an understanding of the needs and motivations of communities. However, looking beyond the instrumental, goal-oriented actions, we emphasize the importance of studying rituals as complex patterns of formalized actions that are imbued with personal meaning. This closely relates to a practice turn in CSCW and HCI research which moves away from individuals and instead emphasizes the interconnections between mental and bodily activities, the material environment, emotions, and socially shared ideas [20, 56]. While subjective by their very nature, these rituals play an important role in how individuals deal with uncertainty along with building and sustaining communities. In the face of a global pandemic, these rituals often become even more important for the well-being of individuals.

Studying these rituals captures how individuals make sense of themselves and their social lives in the midst of loneliness, precarity and uncertainty, with the sociotechnical configurations of these rituals showing us how technologies can become intertwined with lived religious experiences. Further, understanding how technologies can be integrated with existing rituals is useful when designing for communities that are in the midst of any crisis. While we highlight Ramadan during the COVID-19 pandemic in this paper, this can be extended to communities dealing with other exogenous shocks too.

6.2.1 The Persistence (and Evolution) of Rituals. The sociotechnical configuration of Ramadan thus includes individual actors, their material and embodied experiences, informal social relations, formal religious institutions, the use of digital technologies, and their various linkages. Despite the unprecedented nature of the pandemic, the religious rituals that accompanied Ramadan persisted.

However, they often changed form, suggesting their ability to be fluid and capable of being reconfigured by individuals in the face of exogenous shocks such as pandemics. The communal nature of Ramadan was at odds with the need to isolate during the Covid pandemic. Besides searching for information, mandatory isolation pushed many individuals to look for distractions in digital media and to interact with others through social media. To adapt to their circumstances, the participants utilized a diverse range of social media applications including Facebook, Whatsapp, Instagram, Twitter, Tik Tok, Telegram, Snapchat, and Zoom. Each of these applications played a different role depending on their affordances and user population.

The openness with which Ramadan and the various rituals were talked about on social media applications was of particular interest. For a long time, Muslims tended not to talk about their faith openly on the Internet with conversations happening only in closed private groups or on Muslim-only platforms. This was largely driven by the Islamophobia and anti-Muslim abuse online [36, 70, 108]. However, we observed that our participants felt safe discussing their faith-related personal experiences online. This was accompanied by rich content being created on various social media platforms, and a sense of solidarity as if the community was looking out for each other, especially in a time of fear and uncertainty.

Many of the participants were also seeking the nostalgia and familiar feeling associated with Ramadan on digital media. In this paper, we highlight that religious rituals are often marked by embodied and sensory experiences that are crucial to their performance. Further, when these rituals are cyclical, there is a deep sense of nostalgia associated with these experiences. Sociological approaches to HCI research have already begun to look at the experiential, material, and social elements that constitute everyday practices [72]. We argue that the study of rituals and the subsequent design of technologies to accommodate them need to be informed by deep qualitative research that can parse how different senses -sight, sound, touch, taste, and smell- shape the practices integral to them. In the context of Ramadan, our findings highlight the nostalgia-laden recollections of sensory experiences and how digital technologies were actively used to recreate some of these experiences during the pandemic.

6.3 Making Tech more Culturally Inclusive

In this paper, we expand existing research on HCI/CSCW and religion [9] to consider meaning-making around religious practices, the underlying moral economy, and how these can inform the design of new technologies. We further articulate how designers need to consider how the expression of everyday lived religion through technologies is intertwined with the formation of contemporary religious identities.

6.3.1 Halal/Haram: Negotiating Digital Spaces. The dichotomy of 'halal' and 'haram' came up in our interviews, with participants trying to make sense of these frameworks in digital spaces. What is permissible ("halal") and what is forbidden ("haram") are important classifications in most religious practices. Design research must understand how these classifications relate to technology use and appropriation to truly create inclusive technologies that are integrated with the everyday lives of users. This also relates to the ethics of designing technologies - are they designed to be culturally-inclusive?

A key objective of this research is to contribute to our understanding of techno-religious practices by examining the emergent practices of young people's expressions of religious identities, focusing on young Muslims and their uses of new media as part of everyday lived religion. A question that emerged from this study was: how do Muslims reconcile the tension between interacting with content and apps designed to assist with religious functions, while remaining faithful to some core edicts of their religion? This tension was illustrated in our data with several participants expressing the desire to avoid certain types of content during Ramadan. The participants were not only referring to filters that could shield individuals from seeing any content deemed particularly offensive or not permissible (for example, nudity, content of a sexual nature or dealing with possibly sensitive topics) but also referred to eliminating practices that were deemed counterproductive to fulfilling their religious obligations, such as binging on TV shows, listening to music, or being exposed to pop up ads that could break their mental focus and alter their liminal state as worshippers [33].

It must be noted that the question of what content is deemed haram or not is far from simple, or from generating consensus amongst Muslims depending on their schools of thoughts, socio-cultural contexts and geographical locations (for example, queer content or stories may be acceptable for some Muslims but not others). Similarly, who gets to decide what is halal or haram is not a clear-cut affair as Islam does not have a centralized authority or established mechanism for gauging these matters. Instead, there are several opinions that can pit religious figures against one another without reaching any agreement [35, 60].

The issue of what is permissible and what is forbidden along with the ethical uses of religious-oriented apps have not received due attention in HCI/CSCW circles. Beyond Ramadan, there are

other examples from our data of the ethical dilemmas that Muslims face in their daily interactions with apps that require further analysis: for example, the digitized version of the Quran, or Quran e-readers. Users of such apps are able to read passages from the Quran at their pace, and in their language of choice. The convenience of the smartphone eliminates the need to carry a physical (and bulky) copy of the Muslim holy book. It is a ritual obligation, however, for a Muslim to perform wudu, or ablution (physical cleansing) before holding or reading the holy book. However, the ablution rule is a grey area when it comes to someone accessing the Quran app from their mobile phone: Should one always be in a state of ablution when operating their phone or device (as the Quran is always there) or only when accessing the Quran e-reader? Similarly, many individuals tend to carry with them and use their mobile phones in washrooms and toilets, but this practice would contravene the Muslim rule on ablution and purification if one were to have a digital copy of the Quran on their device (while in the washroom). How then does one reconcile this tension between one's religious/spiritual pursuits and the convenience afforded by technology [2, 54]?

We propose that designers keep in mind that there are "ethical infrastructures" [7] underlying everyday social, cultural, and religious practices. Benussi [7] argues that we need to frame concepts such as halalness "not as an inherent quality of objects or spaces, but as a particular mode of engagement with elements of the material world." Thus how users respond to whether a designed space or technology is permissible or forbidden is highly contextual such as, for example, engaging with technologies during the month of Ramadan. While prior research has shown that infrastructures play an important role in shaping technology [79], we argue that designers need to understand the moral economies that shape everyday lives. Given that no design is culturally or politically neutral, how do we design technologies that better represent the sociocultural values of the communities that use them? Further, how can design navigate the multiplicity of contexts inherent in transnational communities and practices?

6.3.2 Sustaining the Community. Ramadan is a time where individuals, families and communities come together to fulfill a religious obligation and to celebrate the month when the Quran (Islam's holy book) was first revealed to the Prophet Muhammad. As a result, the symbolic dimension of Ramadan is significant for the global Muslim community (or Ummah, as it is often referred to). During the COVID-19 pandemic, muslims worldwide have tried to fill the "communal gap" resulting from confinement and social isolation by connecting up with family, friends and co-practitioners both offline and online.

As the findings have shown, the participants' experiences of Ramadan under pandemic were overshadowed by isolation and loneliness, resulting in hardship in many aspects of religious activities. Digital technologies were instrumental in mitigating some of the social isolation, and ensuring that the fast was as safe and rewarding as possible. Indeed, many individuals turned to technology, including online websites, social media platforms, as well as television, radio and satellite channels as sources of information. Many religious activities also became virtual (or hybrid), including khutbahs, prayers, and iftars. The meaningful discussions, community engagement, personal connection and peer support, created a feeling of camaraderie, safety, and shared accomplishment.

New forms of engagement were experimented with, that included Ramadan-themed webinars, online festivals and curated content, all of which have developed substantially as a result of the pandemic. These technological adaptations had an immense impact on strengthening the communal dimension of Ramadan. Indeed, the collapsing of time and space that digital technologies enable has contributed to rendering visible just how global and diverse the Muslim Ummah truly is. By following instagram accounts of fellow Muslims in other parts of the world, one becomes exposed to different lived experiences of fasting during Covid, along with a broader set of representations about Islam and Muslims in the global social media archive. As Caidi et al. [15] point out, "Social media

platforms are fostering environments where individuals of all faiths can express their ideological and religious identities by performing, or "doing" religion rather than relying on the various "others" to speak on their behalf. The power to represent oneself is critical for Muslims who are constantly spoken for and about and are unable to construct an identity of their own." (p. 24-25). The hashtags and curated content that have become available during the pandemic about the Ramadan rituals and celebrations can therefore be read as a manifestation of Muslims' expression of their everyday lived religion that, in turn, can shed light on the formation of contemporary Muslim identities.

Future research on religion and technology needs to look beyond the individual to the communal dimension of religious practice. Specifically, researchers and designers should explore how technologies can be designed to facilitate the expression of religious identities and the construction of new forms of community. This exploration of the relationship of technologies and the symbolic dimension of religion is important in understanding how religious practices often transcend national and cultural boundaries, as well as in facilitating interfaith dialogue and understanding.

7 CONCLUSION, LIMITATIONS AND FUTURE WORK

The COVID–19 pandemic has had an immense impact on our lives, shifting many activities to the virtual realm. There is a crucial need for further research and re-designing of technology to cope with possible future pandemics (or another global crisis resulting in social isolation). As researchers, we need to pursue the intersections between CSCW and religion through an academic and participatory lens. In this study, we did not delve deeply into the strengths and weaknesses of the social media platforms utilized by participants. Many of the participants used technology daily to connect with others, to stay informed, and share information. Some participants said that their siblings, parents and grandparents also relied more on technological platforms during those remote Ramadans. We hope that this study on technology and religious practices is a stepping stone for HCI and CSCW scholars to embark on.

This study has several limitations. First, we analyzed data from a small sample of fasting Muslims, which could not possibly capture the diversity of Muslims or the richness of Ramadan practices across the Muslim world. For instance, those unable or unwilling to fast during Ramadan for various reasons (including their condition, such as being sick with COVID, being a member of a vulnerable group, or not willing to complete Ramadan during those dire times, as well as those who never fasted Ramadan despite identifying as Muslims) did not participate in our study. Their experiences are therefore not captured. Similarly, our focus on Muslim youth left out older Muslims and those under 18 whose Ramadan experiences may have looked different. Even amongst the youth captured by our recruitment criteria, we tended to attract those young Muslims who were part of a global diaspora and who, for the most part, resided in the global North, primarily in North America or Western Europe. Their experience may not be representative of that of Muslims elsewhere. Further research is required on representation across the diversity of Muslim experiences, accessibility, usability and affordability of technology for all age groups, genders, and ethnicities as well as an investigation of social and racial inequalities as they relate to digital technology. We also need to examine the religious experiences by addressing the participants' feelings of inner connection with the transcendental and the role that technologies play in these processes.

ACKNOWLEDGMENTS

We would like to thank participants of this study for their time and insights.

REFERENCES

[1] Zahra Alghafli, Trevan G Hatch, Andrew H Rose, Mona M Abo-Zena, Loren D Marks, and David C Dollahite. 2019. A qualitative study of Ramadan: A month of fasting, family, and faith. *Religions* 10, 2 (2019), 123.

[2] Norah AlQuwayfili, Norah AlRomi, Najla AlZakari, and Hend S Al-Khalifa. 2013. Towards classifying applications in mobile phone markets: the case of religious apps. In *2013 international conference on current trends in information technology (CTIT)*. IEEE, 177–180.

[3] Richard T Antoun. 1968. THE SOCIAL SIGNIFICANCE OF RAMADĀN IN AN ARAB VILLAGE. *The Muslim World* 58, 2 (1968), 95–104.

[4] François Bar, Matthew S Weber, and Francis Pisani. 2016. Mobile technology appropriation in a distant mirror: Baroquization, creolization, and cannibalism. *New media & society* 18, 4 (2016), 617–636.

[5] Genevieve Bell. 2006. No more SMS from Jesus: Ubicomp, religion and techno-spiritual practices. In *International Conference on Ubiquitous Computing*. Springer, 141–158.

[6] Izak Benbasat and Henri Barki. 2007. Quo vadis TAM? *Journal of the association for information systems* 8, 4 (2007), 7.

[7] Matteo Benussi. 2021. Ethical infrastructure: Halal and the ecology of askesis in Muslim Russia. *Anthropological Theory* (2021), 14634996211059724.

[8] J Scott Brennen, Felix M Simon, Philip N Howard, and Rasmus Kleis Nielsen. 2020. *Types, sources, and claims of COVID-19 misinformation.* Ph. D. Dissertation. University of Oxford.

[9] Elizabeth Buie and Mark Blythe. 2013. Spirituality: there's an app for that!(but not a lot of research). In *CHI'13 Extended Abstracts on Human Factors in Computing Systems*. 2315–2324.

[10] Marjo Buitelaar. 1993. *Fasting and feasting in Morocco: Women's participation in Ramadan.* Vol. 1. Berg.

[11] Arndt Büssing, Klaus Baumann, and Janusz Surzykiewicz. 2022. Loss of faith and decrease in trust in a higher source during COVID-19 in Germany. *Journal of religion and health* 61, 1 (2022), 741–766.

[12] A Büssing, L Starck, and K van Treeck. 2021. Wellbeing and digital media usage to strengthen the faith of Seventh-Day Adventists during the Corona pandemic. *Journal of Applied Christian Leadership* 14, 2 (2021), 49–69.

[13] Nadia Caidi. 2019. Pilgrimage to hajj: an information journey. *The International Journal of Information, Diversity, & Inclusion (IJIDI)* 3, 1 (2019).

[14] Nadia Caidi. 2020. "I Was Not Willing to Risk my Hajj": Information Coping Strategies of Hajj Pilgrims. *Journeys* 21, 1 (2020), 41–62.

[15] Nadia Caidi, Susan Beazley, and Laia Colomer Marquez. 2018. Holy selfies: Performing pilgrimage in the age of social media. *The International Journal of Information, Diversity, & Inclusion (IJIDI)* 2, 1/2 (2018).

[16] Nadia Caidi and Mariam Karim. 2022. Mediated Spaces of Collective Ritual. *The Oxford Handbook of Religious Space* (2022), 227.

[17] Nadia Caidi and Susan MacDonald. 2008. Information practices of Canadian Muslims post 9/11. *Government Information Quarterly* 25, 3 (2008), 348–378.

[18] Jennie Carroll. 2004. Completing design in use: closing the appropriation cycle. *ECIS 2004 Proceedings* (2004), 44.

[19] Jennie Carroll, Steve Howard, Frank Vetere, Jane Peck, and John Murphy. 2002. Just what do the youth of today want? Technology appropriation by young people. In *Proceedings of the 35th annual Hawaii international conference on system sciences*. IEEE, 1777–1785.

[20] Priyank Chandra, Syed Ishtiaque Ahmed, and Joyojeet Pal. 2017. Market practices and the bazaar: Technology consumption in ICT markets in the global south. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 4741–4752.

[21] Priyank Chandra and Jay Chen. 2019. Taming the Amazon: the domestication of online shopping in Bangalore, India. In *Proceedings of the Tenth International Conference on Information and Communication Technologies and Development*. 1–11.

[22] CMCTF. 2022. COVID-19 - Ramadan Guide. Accessed Jul, 2022 [Online]. *CMCTF* (Jul 2022). https://www.cmcovidtf.com/ramadan-guide-event

[23] Simon Coleman. 2022. *Powers of pilgrimage: religion in a world of movement.* NYU Press.

[24] Juliet Corbin and Anselm Strauss. 2014. *Basics of qualitative research: Techniques and procedures for developing grounded theory.* Sage publications.

[25] Andrew M Cox. 2018. Embodied knowledge and sensory information: Theoretical roots and inspirations. *Library Trends* 66, 3 (2018), 223–238.

[26] Andrew M Cox, Brian Griffin, and Jenna Hartel. 2017. What everybody knows: embodied information in serious leisure. *Journal of Documentation* (2017).

[27] Keren Dali. 2018. The lifeways we avoid: The role of information avoidance in discrimination against people with disabilities. *Journal of Documentation* (2018).

[28] Jacob Dankasa. 2015. Information-seeking behavior of clergy: The research, the results, and the future. *Journal of Religious & Theological Information* 14, 1-2 (2015), 13–29.

[29] Lorne L Dawson and Douglas E Cowan. 2004. *Religion online: Finding faith on the Internet.* Psychology Press.

[30] Alan Dix. 2007. Designing for appropriation. In *Proceedings of HCI 2007 The 21st British HCI Group Annual Conference University of Lancaster, UK 21*. 1–4.

[31] Paul Dourish. 2003. The appropriation of interactive technologies: Some lessons from placeless documents. *Computer Supported Cooperative Work (CSCW)* 12, 4 (2003), 465–490.

[32] Sebastian Draxler, Gunnar Stevens, Martin Stein, Alexander Boden, and David Randall. 2012. Supporting the social context of technology appropriation: on a synthesis of sharing tools and tool knowledge. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 2835–2844.

[33] Cansu Ekmekcioglu, Nadia Caidi, Priyank Chandra, and Rojin Jamali. 2022. Altered Rhythms of Ramadan: Temporalities of Social Media Non/Use during COVID-19. https://doi.org/10.31235/osf.io/enmd4

[34] Cansu Ekmekcioglu, Priyank Chandra, and Syed Ishtiaque Ahmed. 2023. A Matter of Time: Anticipation Work and Digital Temporalities in Refugee Humanitarian Assistance in Turkey. *Proc. ACM Hum.-Comput. Interact.* 7, CSCW1, Article 22 (apr 2023), 36 pages. https://doi.org/10.1145/3579455

[35] Hamza Elbuhaisi. 2020. The role of consensus in developing the Shura process to reform the legal and judicial system in the Islamic state. (05 2020).

[36] Anver M Emon. 2023. *Systemic Islamophobia in Canada: A Research Agenda*. University of Toronto Press.

[37] Jana Fieselmann, Kübra Annac, Fabian Erdsiek, Yüce Yilmaz-Aslan, and Patrick Brzoska. 2022. What are the reasons for refusing a COVID-19 vaccine? A qualitative analysis of social media in Germany. *BMC Public Health* 22, 1 (2022), 1–8.

[38] Sound Vision Foundation. 2020. Virtual Khutba: Making the Most of Juma During Covid-19 Crisis. Accessed May, 2021[Online]. https://www.youtube.com/watch?v=jYAhFWzk5b8&list=PLpKQIgEUOIfPQ-bAqE_T1mJkLLC14pIwP&index=24

[39] Gladys Ganiel. 2021. Online opportunities in secularizing societies? Clergy and the Covid-19 pandemic in Ireland. *Religions* 12, 6 (2021), 437.

[40] Nicole Gaston, Dan Dorner, and David Johnstone. 2015. Spirituality and everyday information behaviour in a non-Western context: sense-making in Buddhist Laos. (2015).

[41] Cyril Glasse. 1989. *The concise encyclopaedia of Islam*. Stacey International.

[42] Tim Gorichanaz. 2015. Online Religion? The Evolving Religious Information Landscapes of Zen Buddhism and Roman Catholicism. *Advances in the Study of Information and Religion* 5, 1 (2015), 2.

[43] Carma R Gorman. 2009. Religion on demand: Faith-based design. *Design and Culture* 1, 1 (2009), 9–22.

[44] Elysia Guzik. 2018. Information sharing as embodied practice in a context of conversion to Islam. *library trends* 66, 3 (2018), 351–370.

[45] Mark S Handcock and Krista J Gile. 2011. Comment: On the concept of snowball sampling. *Sociological methodology* 41, 1 (2011), 367–371.

[46] Jörgen Hellman. 2008. The significance of eating during Ramadan: Consumption and exchange of food in a village in West Java. *Food and Foodways* 16, 3 (2008), 201–226.

[47] Katherine A Hickey. 2017. The information behavior of catholic women discerning a vocation to religious life. *Journal of Religious & Theological Information* 16, 1 (2017), 2–21.

[48] Shirley S Ho, Waipeng Lee, and Shahiraa Sahul Hameed. 2008. Muslim surfers on the internet: Using the theory of planned behaviour to examine the factors influencing engagement in online religious activities. *New Media & Society* 10, 1 (2008), 93–113.

[49] Digital Iftars. [n. d.]. Toolkit | Digital Iftar. Accessed May 22 2021. https://www.digitaliftars.ca/toolkit

[50] Alexander Paul Isiko et al. 2022. Covid-19 and its Impact on Religiosity: Reflections on Religious Life and Practice in Uganda. *Journal for the Study of Religion* 35, 1 (2022).

[51] Laura Jones-Ahmed. 2022. Isolation, community and spirituality: British Muslim experiences of Ramadan in lockdown. *Religions* 13, 1 (2022), 74.

[52] Jarkko Kari. 2007. A review of the spiritual in information studies. *Journal of Documentation* (2007).

[53] Kevin L Keenan and Sultana Yeni. 2003. Ramadan advertising in Egypt: A content analysis with elaboration on select items. *Journal of Media and Religion* 2, 2 (2003), 109–117.

[54] Muhammad Khurram Khan and Yasser M Alginahi. 2013. The holy Quran digitization: Challenges and concerns. *Life Science Journal* 10, 2 (2013), 156–164.

[55] Kim Knibbe and Helena Kupari. 2020. Theorizing lived religion: introduction. , 157–176 pages.

[56] Kari Kuutti. 2013. 'Practice turn'and CSCW identity. *ECSCW 2013 Adjunct Proceedings* (2013), 39–44.

[57] Frank Lambert. 2010. *Religion in American Politics*. Princeton University Press.

[58] Silvia Lindtner, Ken Anderson, and Paul Dourish. 2012. Cultural appropriation: information technologies as sites of transnational imagination. In *Proceedings of the ACM 2012 conference on computer supported cooperative work*. 77–86.

[59] MABELLEarts. [n. d.]. Edge of Sunset. Accessed May 22 2021. https://virtualiftarnights.ca/edge-of-sunset-2021/#about

[60] Andrew F March. 2007. Islamic foundations for a social contract in non-Muslim liberal democracies. *American political science review* 101, 2 (2007), 235–252.

[61] Azhagu Meena, Varuni Bhatia, and Joyojeet Pal. 2020. Digital divine: technology use by Indian spiritual sects. In *Proceedings of the 2020 International Conference on Information and Communication Technologies and Development*. 1–11.

[62] David H Michels. 2012. Seeking God's Will: The Experience of Information Seeking by Leaders of a Church in Transition/À la recherche de la volonté de Dieu: L'expérience de recherche d'information des dirigeants d'une Église en transition. *Canadian Journal of Information and Library Science* 36, 1 (2012), 16–27.

[63] Maryam Mustafa, Amna Batool, Beenish Fatima, Fareeda Nawaz, Kentaro Toyama, and Agha Ali Raza. 2020. Patriarchy, maternal health and spiritual healing: Designing maternal health interventions in Pakistan. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–13.

[64] NBDLEmirate. 2022. Danube group hosts Iftar Programme for 4,000 people serves100000 meals to blue collared workers during the holy month of ramadan. https://nbdelemirate.com/en/2022/04/28/danube-group-hosts-iftar-programme-for-4000-people-serves100000-meals-to-blue-collared-workers-during-the-holy-month-of-ramadan/

[65] CBC News. 2022. How respecting ramadan at work means more than asking 'not even water?' | CBC radio. "Accessed April, 2021 [Online]. https://www.cbc.ca/radio/costofliving/why-finding-an-electric-vehicle-is-like-finding-a-live-dinosaur-1.6410858/how-respecting-ramadan-at-work-means-more-than-asking-not-even-water-1.6415744

[66] Yavuz Odabasi and Metin Argan. 2009. Aspects of underlying Ramadan consumption patterns in Turkey. *Journal of International Consumer Marketing* 21, 3 (2009), 203–218.

[67] Funmilola Olubunmi Omotayo. 2017. Adoption and use of information and communication technologies by Pentecostal churches in Ibadan, Nigeria. *Journal of librarianship and information science* 49, 2 (2017), 222–233.

[68] World Health Organization. 2020. *Safe Ramadan practices in the context of the COVID-19: interim guidance, 15 April 2020*. Technical documents. 3 p. pages.

[69] Charlie Parker, Sam Scott, and Alistair Geddes. 2019. Snowball sampling. *SAGE research methods foundations* (2019).

[70] Barbara Perry. 2014. Gendered Islamophobia: hate crime against Muslim women. *Social Identities* 20, 1 (2014), 74–89.

[71] Barbara Perry and Ryan Scrivens. 2019. *Right-wing extremism in Canada*. Springer.

[72] Sarah Pink, Kerstin Leder Mackley, Val Mitchell, Marcus Hanratty, Carolina Escobar-Tello, Tracy Bhamra, and Roxana Morosanu. 2013. Applying the lens of sensory ethnography to sustainable HCI. *ACM Transactions on Computer-Human Interaction (TOCHI)* 20, 4 (2013), 1–18.

[73] Rebecca Randell. 2004. Accountable technology appropriation and use. In *Proceedings of the third Nordic conference on Human-computer interaction*. 161–170.

[74] Lyn Richards and Janice M Morse. 2012. *Readme first for a user's guide to qualitative methods*. Sage.

[75] Md Rashidujjaman Rifat, Jay Chen, and Kentaro Toyama. 2017. Money, God, and SMS: Explorations in Supporting Social Action Through a Bangladeshi Mosque. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. 5941–5953.

[76] Andrew Rippin. 2003. *Muslims-Vol 2: Their Religious Beliefs and Practices Volume 2: The Contemporary Period*. Routledge.

[77] Jeremiah Rodriguez. 2021. *These are the Canadian Muslims dispelling fake news about COVID-19 vaccines*. https://www.ctvnews.ca/health/coronavirus/these-are-the-canadian-muslims-dispelling-fake-news-about-covid-19-vaccines-1.5388836

[78] Wade Clark Roof. 2001. *Spiritual marketplace*. Princeton University Press.

[79] Sarah Rüller, Konstantin Aal, Simon Holdermann, Peter Tolmie, Andrea Hartmann, Markus Rohde, Martin Zillinger, and Volker Wulf. 2022. 'Technology is everywhere, we have the opportunity to learn it in the valley': the appropriation of a socio-technical enabling infrastructure in the Moroccan high atlas. *Computer Supported Cooperative Work (CSCW)* 31, 2 (2022), 197–236.

[80] Alba Sabaté Gauxachs, José María Albalad Aiguabella, and Miriam Diez Bosch. 2021. Coronavirus-driven digitalization of in-person communities. Analysis of the catholic church online response in Spain during the pandemic. *Religions* 12, 5 (2021), 311.

[81] Anu Sairanen and Reijo Savolainen. 2010. Avoiding health information in the context of uncertainty management. (2010).

[82] Antti Salovaara and Sakari Tamminen. 2009. Acceptance or appropriation? A design-oriented critique of technology acceptance models. *Future interaction design II* (2009), 157–173.

[83] Ozlem Sandikci and Sahver Omeraki. 2007. Islam in the marketplace: Does Ramadan turn into Christmas? *Advances in Consumer Research* 34 (2007).

[84] Christine Satchell and Paul Dourish. 2009. Beyond the user: use and non-use in HCI. In *Proceedings of the 21st annual conference of the Australian computer-human interaction special interest group: Design: Open 24/7*. 9–16.

[85] Reijo Savolainen. 2007. Information behavior and information practice: Reviewing the "umbrella concepts" of information-seeking studies. *The library quarterly* 77, 2 (2007), 109–132.

[86] Jacob Serebrin. 2021. 2nd pandemic Ramadan is a time of hope and sadness for Canadian Muslims - National. Accessed April, 2021 [Online]. https://globalnews.ca/news/7752230/canadian-muslims-second-pandemic-ramadan-covid/

[87] Nurus Shalihin, Firdaus Firdaus, Yulia Yulia, and Ujang Wardi. 2020. Ramadan and strengthening of the social capital of Indonesian Muslim communities. *HTS Teologiese Studies/Theological Studies* 76, 3 (2020).
[88] Kate Sweeny, Darya Melnyk, Wendi Miller, and James A Shepperd. 2010. Information avoidance: Who, what, when, and why. *Review of general psychology* 14, 4 (2010), 340–353.
[89] Theresa Jean Tanenbaum and Karen Tanenbaum. 2018. Steampunk, survivalism and sex toys: An exploration of how and why HCI studies peripheral practices. In *New Directions in Third Wave Human-Computer Interaction: Volume 2-Methodologies*. Springer, 11–24.
[90] Lisa K Taylor and Jasmin Zine. 2014. *Muslim women, transnational feminism and the ethics of pedagogy: Contested imaginaries in post-9/11 cultural practice*. Routledge.
[91] Pierre Tchounikine. 2017. Designing for appropriation: A theoretical account. *Human–Computer Interaction* 32, 4 (2017), 155–195.
[92] Habib Tiliouine, Robert A Cummins, and Melanie Davern. 2009. Islamic religiosity, subjective well-being, and health. *Mental health, religion & culture* 12, 1 (2009), 55–74.
[93] Ali Tootee and Bagher Larijani. 2020. Ramadan fasting during Covid-19 pandemic.
[94] Mourad Touzani and Elizabeth Hirschman. 2011. Minority religious rituals in the post colonial world: Ramadan in France. *ACR European Advances* (2011).
[95] Elif Uludağ and Sinem Göral Türkcü. 2022. Ramadan Fasting as a Religious Obligation: A Qualitative Study on Opinions and Experiences of Muslim Pregnant Women about Fasting in Turkey. *Journal of Religion and Health* (2022), 1–15.
[96] Fons JR van de Vijver. 2015. Methodological aspects of cross-cultural research. (2015).
[97] Tine Vekemans. 2021. Crisis and Continuation: The Digital Relocation of Jain Socio-Religious Praxis during the COVID-19 Pandemic. *Religions* 12, 5 (2021), 342.
[98] Salman Waqar and Nazim Ghouri. 2020. Managing Ramadan queries in COVID-19. *BJGP open* 4, 2 (2020).
[99] Donald A Wicks. 1999. The information-seeking behavior of pastoral clergy: A study of the interaction of their work worlds and work roles. *Library & Information Science Research* 21, 2 (1999), 205–226.
[100] Allison Woodruff, Sally Augustin, and Brooke Foucault. 2007. Sabbath day home automation: " it's like mixing technology and religion". In *Proceedings of the SIGCHI conference on Human factors in computing systems*. 527–536.
[101] Robert Wuthnow. 1998. *After heaven*. University of California Press.
[102] Sally ME Wyatt. 2003. Non-users also matter: The construction of users and non-users of the Internet. *Now users matter: The co-construction of users and technology* (2003), 67–79.
[103] Susan P Wyche, Kelly E Caine, Benjamin K Davison, Shwetak N Patel, Michael Arteaga, and Rebecca E Grinter. 2009. Sacred imagery in techno-spiritual design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 55–58.
[104] Susan P Wyche and Rebecca E Grinter. 2009. Extraordinary computing: religion as a lens for reconsidering the home. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 749–758.
[105] Glenn Yocum. 1992. Notes on an Easter Ramadan. *Journal of the American Academy of Religion* 60, 2 (1992), 201–230.
[106] Seyed Reza Hosseini Zijoud and Alireza Jalali Farahani. 2020. Ramadan coincides with the Covid-19 pandemic: What should be done? *Disaster medicine and public health preparedness* 14, 3 (2020), e7–e8.
[107] Jasmin Zine. 2012. *Islam in the hinterlands: Muslim cultural politics in Canada*. UBC Press.
[108] Jasmin Zine. 2022. *Under Siege: Islamophobia and the 9/11 generation*. McGill-Queen's Press-MQUP.

Received July 2022; revised January 2023; accepted March 2023