

Mobile Instant Messaging Uses and Technostress: A Qualitative Approach

Alberto Ardèvol-Abreu^{1,2,3}
Patricia Delponti^{2,4}
Helena Bonache¹
Carmen Rodríguez-Wangüemert⁴

¹ Department of Cognitive, Social, and Organizational Psychology, Universidad de La Laguna, La Laguna, Spain

² Laboratorio de Investigación sobre Medios y sus Efectos, Universidad de La Laguna, La Laguna, Spain

³ Instituto Universitario de Neurociencia, Universidad de La Laguna, La Laguna, Spain

⁴ Department of Communication Sciences and Social Work, Universidad de La Laguna, La Laguna, Spain

Address correspondence to:

Alberto Ardèvol-Abreu
Departamento de Psicología Cognitiva, Social y Organizacional
Universidad de La Laguna
C/ Prof. José Luis Moreno Becerra
38200 La Laguna, Spain
Email: aardevol@ull.edu.es

ORCID: 0000-0001-8722-5226

ORCID: 0000-0001-9694-867X

ORCID: 0000-0002-4554-5202

ORCID: 0000-0001-5903-3913

The work was supported by the Universidad de La Laguna (ULL) under grant code 2020/1833. The first author is funded by the ‘Viera y Clavijo’ Program from the Agencia Canaria de Investigación, Innovación y Sociedad de la Información and the ULL.

Mobile Instant Messaging Uses and Technostress: A Qualitative Approach**Abstract**

A growing number of people use mobile instant messaging (MIM) apps for a variety of purposes—most commonly related to social interaction, but also to coordinate work-related activities, fulfill informational needs, and discuss politics and public affairs. Despite its convenience for daily life, MIM may also act as an environmental antecedent of technostress due to users' inability to cope with the demands of the app in a healthy manner. We conducted two qualitative studies ($N_1 = 26$; $N_2 = 147$) to examine why people use MIM apps in their daily life and if diverse uses relate to MIM stress differently. This research 1) develops a general catalogue of MIM uses; 2) suggests a four-dimensional construct of MIM technostress consisting of overload, ambiguity, invasion, and urgency; 3) outlines several differences across age groups and between genders; and 4) describes possible relationships between MIM uses and stress.

Keywords: Mobile Instant Messaging Uses, Technostress, Overload, Ambiguity, Invasion, Urgency.

Mobile Instant Messaging Uses and Technostress: A Qualitative Approach

Mobile instant messaging (MIM) apps are changing the way people communicate with family, friends, or coworkers (Valeriani & Vaccari, 2017). Similar to other social media, people seem to be using MIM for diverse purposes, primarily for *social interaction*, but also as a *source of news* and information, a platform for *political talk* (Gil de Zúñiga et al., 2014; Valeriani & Vaccari, 2017), or a tool for *work-related activities* (Thomas, 2018). Recent research on the consequences of MIM use show a somewhat mixed picture: While some studies suggest a variety of individual and social benefits arising from MIM-mediated interactions, such as improving subjective well-being and social connectedness (Bano et al., 2019; Chan, 2015); others point to MIM as an antecedent of stress (Blabst & Diefenbach, 2017; Shin, et al., 2018). Given the mid- and long-term consequences of stress on psychological health and well-being (Lazarus, 1991; Lazarus & Folkman, 1987), a better understanding of the link between MIM uses and stress is needed.

The permanent flow of incoming alerts, combined with on-screen prompts to interact ('last seen' and 'read receipts'), and social pressures to reply in a timely manner (Blabst & Diefenbach, 2017; Lee et al., 2016) may lead some users to feel they are not able to cope with the communicative demands of the app, what we argue as MIM stress (see Lazarus, 1990; Tarafdar et al., 2007, 2019). Based on a processual perspective of stress (Lazarus, 1990; Lazarus & Folkman, 1987), this article explores the role of MIM as a potential antecedent of technostress. To do so, we build on and extend previous research on technostress that identified five stressors associated with information and computer

technology (ICT) use in the organizational domain: overload, invasion, complexity, insecurity, and uncertainty (Tarafdar et al., 2007, 2019).

Using two different sources of data collected in Spain (focus group discussions with 26 adults and a qualitative survey of 147 undergraduates), we analyze people's interaction with MIM in their daily life and propose a comprehensive, specific, and updated taxonomy of uses. Moreover, we extend and systematize previous findings into a theory-driven, multi-dimensional construct of MIM technostress and explore its association with different uses of MIM. Finally, we also examine gender- and age-related differences in MIM uses and associated technostress. Hence, this study is intended to contribute to both the literature on uses of MIM and technostress.

MIM Uses

MIM apps allow people to communicate with virtually everyone, from anywhere, at any time, potentialities that have only become more important since the Covid-19 outbreak. Although they are primarily intended for text messaging, they also offer voice and video calls and file sharing. WhatsApp is the major player in the market: More than 2 billion active users in more than 180 countries exchange roughly 100 billion WhatsApp messages every day (Cathcart, 2020; WhatsApp, n.d.). In Spain, recent figures from the Reuters Institute indicate that 81% of those surveyed use WhatsApp, which makes it the top MIM app in the country (Newman et al., 2020). Other messaging services that are growing market share around the world in recent years are Telegram and Line. Although MIM apps seem to be used more and more by people of all ages, research suggests that their intensity and type of usage varies across age groups and between genders (see Costa-Sánchez & Guerrero-Pico, 2020; Kircaburun et al., 2018; Rosales & Fernández-Ardèvol, 2016), an observation that deserves further exploration.

A general orientation to study how audiences use the media is the uses and gratifications (U&G) framework. This paradigm posits that individuals use the media actively, and their selection of media channels or sources is an attempt to fulfill specific needs (Quan-Haase & Young, 2010; Rubin, 2009). Within this theoretical framework, a relatively small body of literature has approached the uses that people (or, more commonly, specific social or professional groups) make of MIM apps. An important precursor of this literature was an influential study on motives for chatting on the *desktop* instant messenger ICQ (Leung, 2001, revisited by Quan-Haase & Young, 2010). Leung's gratifications sought from ICQ included, among others, affection, inclusion, sociability, entertainment, and escape.

More recent studies on *mobile phone-based* IM apps suggest that people use them mainly for *social interaction*, that is, to keep in touch with friends and family and coordinate daily and leisure activities. This use of MIM apps may be driven by their ability to create a “heightened sense of presence” (Karapanos et al., 2016, p. 892) and connects with the social needs of affiliation and intimacy (see Reeve, 2009). In this vein, a recent study found that individuals' motivation to maintain existing relationships is positively related to WhatsApp use (Kircaburun et al., 2018). In another study that focused on affiliation motivation, Makki and colleagues (2017) found that undergraduate students use Snapchat for maintaining and developing relationships, expressing positivity, and telling their loved ones “how important they are to [them]” (p. 415). This motive seems to be relevant for both women and men, although there may be differences in its behavioral expression: Women may tend to use MIM—and other ICTs—for maintaining existing relationships and building bonding social capital, while men's use may be more associated with meeting new people and socializing (Kircaburun et al., 2018; Piwek & Joinson, 2016; see also Costa-Sánchez & Guerrero-Pico, 2020; Vidales-Bolaños &

Sádaba-Chalezquer, 2017). The few existing studies that involve samples with wide age ranges suggest that social interaction uses are common across age groups, even though exchanging personal affective information seems to be more frequent among late teens (e.g., Martínez-Comeche & Ruthven, 2021).

MIM is also increasingly adopted for *work-related* information exchange (Thomas, 2018). For example, a survey study among health professionals at five British hospitals found that 33.1% of doctors and 5.7% of nurses used MIM apps to share patient-related information (for example, to seek a colleague's opinion) (Mobasher et al., 2016). Relatedly, Chou and Liu (2016) reported “application” motives for using LINE such as talking about business or executing commercial transactions.

Other apparently less common uses of MIM include *news* gathering and sharing and *discussing politics* in one-on-one or group chats—mainly in private groups with close ties, but increasingly more in large ‘public’ groups that may contain strangers— (Newman et al., 2019; see also Canavilhas et al., 2019; Pont-Sorribes et al., 2020; Valeriani & Vaccari, 2017). Thus, one of the motivations of elderly adults in Taiwan for using LINE is to acquire and update information (e.g., news or traffic information) (Chou & Liu, 2016). More recently, Gil de Zúñiga et al. (2021) adapted previous measures of social media U&G and found WhatsApp use for political discussion to be an important antecedent of conventional participation and protest. Previous studies also suggest gender differences in this type of use such that men may be more likely to exchange “messages about politics” (Martínez-Comeche & Ruthven, 2021, p. 6).

Building on these previous reports, our first step is to create a catalogue of MIM uses that is not focused on specific social or professional groups and may be

comprehensive, MIM-specific (but not tool-specific), updated, and adapted to the national context of our study. We therefore ask our first research question:

RQ1: What are the reasons why adults currently use MIM apps?

MIM Stress

Transactional-based models describe stress not as a single construct, but as a dynamic system in which specific environmental conditions create demands that the individual evaluates as damaging or taxing on their resources. This transactional account has provided a theoretical foundation for a large part of studies of technostress, especially at the organizational level (Ragu-Nathan et al., 2008; Tarafdar et al., 2019). But technostress may not be limited to the work setting: Tarafdar and colleagues have drawn attention to “the pervasiveness of IS [Information Systems] in the non-work context” (2019, p. 27), and encourage the examination of technostress in other environments—for example, the personal life.

In the current networked society, certain characteristics of “not primarily work-related” IS (e.g., social media) seem to be associated with feelings of overload and fatigue (Lee et al., 2016, p. 54). More germane to this work, a study conducted among young and ‘stressed by MIM’ South Korean participants found that these apps are sometimes perceived as being “too close and too crowded” (Shin et al., 2018, p. 1). For example, strangers or unwanted persons can use MIM to contact anyone without previous acceptance, creating pressure on recipients to respond (too close). The crowdedness alludes to perceptions of having too many contacts and getting an excessive number of notifications, which frequently result in fatigue, distractions, and stress (Shin et al., 2018). However, findings on this area are mixed and reveal many nuances in the effects of MIM. Some work suggests that WhatsApp-based interactions increase psychological well-being (Bano et al. 2019, in a study with Pakistani undergraduates) and social

connectedness (Chan, 2015), while other evidence indicates that this positive association with well-being occurs only with passive uses (reading MIM *without* engaging in direct exchanges; Beyens et al., 2020).

These previous findings make it seem likely that *specific* uses of MIM create stressful situations where individuals perceive some of the characteristics of the app (MIM stressors) as damaging. Some of the already defined techno-stressors may also be relevant for our understanding of the MIM stress process. This applies to *overload* and *invasion*, which have been negatively associated with job satisfaction, productivity, and psychological well-being (see Lee et al., 2016; Ragu-Nathan et al., 2008; Schieman & Young, 2013; Tarafdar et al., 2007).

Concerning *techno-overload*, MIM apps typically provide users with large amounts of information from their contacts, especially when they are part of groups or chat rooms. A recent report indicates that growing numbers of WhatsApp users are joining large ‘public’ chat groups with people they do not know, in which they discuss about “news and politics” and “local community” issues (Newman et al., 2019, p. 20). More generally, users’ chat window may be filled up with text messages, links, and audio and video files about work shifts and pending work tasks, kids after-school activities, neighborhood association meetings, news, etc. All this information may accumulate in (some) users’ chat interface and feed their perception of “being burdened” (Misra & Stokols, 2012, p. 739) or force them “to deal with excess of information” (Tarafdar et al., 2019, p. 9). *MIM overload* resembles Tarafdar et al.’s (2007) techno-overload dimension of technostress, described as “situations where ICTs force users to work faster and longer” (p. 315). This is what Blabst and Diefenbach (2017) found in an exploratory survey of university students: The number of one-on-one WhatsApp conversations in the previous days was positively associated with feelings of stress (single-item measure). They also found that

users who made an active use of ‘last seen’ and ‘read receipts’ (i.e., checking when their contacts were last online or if they read their messages) reported higher levels of stress than those who did not pay attention to this information.

Invasion may also be relevant to explain the MIM stress process. This dimension of technostress is commonly understood as the perception that the use of ICTs increases the permeation of work into the personal life (Bucher et al., 2013; Tarafdar et al., 2007, 2019). A similar argument may be applied to more personal uses of MIM apps: ‘anytime anywhere’ MIM conversations have potential to infiltrate every moment of users’ lives, pushing them into permanent multitasking and reducing their attentional and cognitive resources to other tasks (Reinecke et al., 2017). MIM (over)use may therefore interrupt people’s daily routines, making it difficult to fully focus on other personal, interpersonal, social, or professional activities. This suggests that some MIM users will be burdened with feelings of *MIM invasion*. Indeed, a survey study conducted among Spanish students found that almost 63% of them “definitely agree” with the assertion that using WhatsApp and BlackBerry Messenger can become a real nuisance, “especially when one is engaged in another activity” (Fondevila-Gascón et al., 2014, p. 9).

Besides these more classical dimensions of technostress, MIM users may evaluate other characteristics of MIM apps as harmful to their well-being. We aim to extend and systematize previous observations and studies under the theoretical framework of MIM technostress, which we theorize as a multi- rather than a single-dimensional construct. Moreover, we aim to examine how distinct patterns of MIM use contribute to the different dimensions of MIM-associated stress. More formally:

RQ2: What characteristics of MIM are evaluated as harmful (MIM stressors)?

RQ3: What specific uses of MIM apps are associated with the different dimensions of MIM stress?

Methods

Study 1

We conducted a first qualitative study based on focus group discussions. This approach helped us answer RQ1 and RQ2 (uses of MIM and MIM stressors). Because stressors—or distressors—“are stress creators *appraised* by the individual as threatening” (Tarafdar et al., 2019, p. 10, italics are ours), it is important to listen to MIM users’ evaluations as to why they perceive certain conditions, associated with MIM use, as harmful. The Ethics Committee of ANONYMIZEDXXX (registration # 2020-0419) reviewed approved the study. The public opinion company ANONYMIZED used their panel of respondents and social media channels to recruit a sample of 26 Spanish adults who reported using MIM every day. In the light of the epidemiological situation at the time, we opted for videoconference meetings. Discussions were conducted between December 15, 2020, and January 19, 2021. Each discussant received €18 as compensation.

All participants used WhatsApp daily, six were Telegram users, and only one of them had Snapchat and used it occasionally. To facilitate the opening up and stimulate interaction, we formed homogeneous groups in terms of age (groups 1-4) or other personal characteristics (group 5, see below). The first group (G1) was comprised of five college-age adults (21 to 28 years old, $M = 24.0$; two females; three students and two unemployed); G2 included six young adults (33 to 44 years old, $M = 38.8$; three females; two unemployed and one furloughed due to the pandemic); G3 incorporated four middle-aged adults (48 to 53 years old, $M = 50.7$; three females; one unemployed); and G4 consisted of five old adults (69 to 85 years old, $M = 73.6$; three females; four retired and one never worked). We also created a high-demand group (G5),

whose six members potentially faced more and more varied stressors because they worked full-time, had children at home, and reported high levels of political interest—which may lead to increased use of MIM for news and political discussion—(38 to 54 years old, $M = 47.3$; three females; two private sector workers, one public sector worker, and three business owners or self-employed). Some discussants received help from their family in adjusting the video conference settings, but once the sessions started, participants were alone. Discussions lasted between 49 and 62 minutes and were moderated by the authors and transcribed by the company. The first part of the sessions focused on MIM uses (with no reference to stress) and the second part on participants' views of MIM as a stressor.

Study 2

This second study was also approved by the Ethics Committee of ANONYMIZEDXXX (registration # 2020-0450). We conducted an online survey to assess the applicability of the categories developed from Study 1 (MIM uses and technostressors, RQ1 and RQ2, respectively) to a different sample, as well as to examine the relationship between specific uses of MIM and technostressors (RQ3). Respondents were asked about “a recent experience with MIM that increased or decreased [their] feelings of stress.” We included the option to narrate a stress-reducing experience in order not to force participants to appraise MIM as a source of stress.

Following Karapanos et al.'s procedure (2016), we asked respondents to take a few minutes to recall a single experience and describe its context and the reason why they believed the use of MIM increased or decreased their feelings of stress. This concrete approach to a single experience reduces respondents' recall and selection biases (Karapanos et al., 2016). It also relieves participants from the difficulty of considering a myriad of uses and experiences to provide a *general* view of MIM as a stressor (as in Study 1). We distributed the survey link

through email to a convenience sample of psychology and communication students at the University of ANONYMIZED (Spain) between March 1 and March 23, 2021. We obtained informed consent from all respondents, who voluntarily completed the survey and received course credits for their participation. In addition, respondents were assured of the anonymity of their responses. Out of 313 students who were sent the link, 147 (102 in psychology and 45 in communication studies) returned valid questionnaires. Respondents were predominantly female (76.9%) with ages ranging between 18 and 45 ($M = 20.4$, $SD = 4.0$). Some of them (13.6%) combined their studies with work. Only three students had children. Descriptions of their experiences ranged in length between 9 and 1,881 characters, including spaces ($M = 282.6$, $SD = 231.9$).

Data Analysis

We first created text files that reproduced the conversations in Study 1 and the open-ended responses in Study 2. We then submitted the resulting documents to a combination of deductive and inductive content analysis (Elo & Kyngäs, 2008). In a first, open approach to the data, we attended to the manifest content of the group discussions without imposing preconceived categories. According to guidelines in qualitative research, the first and the second authors generated a coding frame that captured possible MIM uses (RQ1) and possible dimensions of MIM stress (RQ2). The divergences of the coding frame were resolved through a team discussion involving all authors. In a second stage, we compared and—when possible—adapted our labels to those of prior relevant literature on media U&G and technostress. Thirdly, we applied the resulting categories to the different, less diverse sample of Study 2.

Results

MIM Uses

Data from Study 1 revealed five broad uses of MIM (Table 1). First, all five discussion groups indicated that the main MIM use was “to stay in touch [... and] know about the people [they] love” and deep in their relationships with family, friends, or coworkers. This dimension connects with the psychological needs for relatedness and intimacy (Reeve, 2009). It is similar to affection as one of the “intrinsic motives” for using the desktop chat software ICQ detected by Leung (2001), and to relational maintenance as a “social motivator of Snapchat use” among students (Makki et al., 2017, p. 413). We have labeled this set of uses as *relatedness, intimacy, and social interaction*, which includes two main subdimensions: a) *relatedness and intimacy* and b) *planning and coordination of social activity* (examples in Table 1). Most participants of both genders and from all groups referred to MIM as a tool to maintain emotional bonds with close ties: spouse, immediate family, and close friends (bonding networks). Nonetheless, two young male discussants in G1 indicated that they participate in large MIM groups where they interact with weak ties: people they “never met in person” (group #1, male, 26) or “they have only met in person once” (#1, male, 22) (bridging networks). More interestingly, three members of the senior group also referred to these weak tie interactions in large MIM groups: with Pilates and embroidery classmates (#4, female, 74), photography enthusiasts (#4, male, 70), or members of the fitness club (#4, female, 69).

[TABLE_1]

The second dimension comprises *work-, study-, and business-related* (non-social) uses, which includes scheduling working meetings, helping coworkers with problems, coordinating class assignments, distributing “documents, exams, cheat sheets,” etc. This category is analogous

to that of social media use for work-related purposes in the literature on information systems (see, for example, Zhang et al., 2019). From a U&G perspective, this dimension can be interpreted as a response to the quasi-needs for job, money, and a career plan (Reeve, 2009). Based on life cycle, employment status, and other differences among participants, discussions in Study 1 revealed four subdimensions of this domain: c) *work*, d) *study*, e) *advertising and sale/purchase transactions*, and f) *job search*. As expected, this dimension was underrepresented in the older group (G4), while the study-related subdimension was more often reported by younger participants.

Third, participants in most focus groups recounted using MIM for *political and civic purposes* such as “shar[ing] a news story and [starting] some discussion,” informing about demonstrations and protests, or organizing neighborhood-based volunteer activities. This is consistent with related findings alluding to parallel uses such as MIM for political discussion or social media for political participation (Gil de Zúñiga et al., 2021; Kim & Khang, 2014). Political and civic uses of MIM point to acquired social motivations such as affiliation, power (Reeve, 2009), or cognition (Cacioppo et al., 1996). Within this general domain, the analysis of focus group data revealed three more specific subcategories: g) *news and political talk*, h) *political participation*, and i) *civic engagement*.

The fourth dimension includes *domestic and other non-work commitments* such as scheduling the “pick up of [their] granddaughters”, “ordering water bottles,” preparing the grocery shopping list, or coordinating the purchase of family gifts. As with the *work, study, and business* dimension, this category of usages is also a response to “situational demands and pressures” (Reeve, 2009, p. 173) that are at the origin of quasi-needs. Domestic commitments may also be close to certain physiological and psychological needs (e.g., people go to the

supermarket partly based on their need for food, and they buy Christmas gifts in connection with their need for relatedness and intimacy). These uses were reported in all groups except G1 but were undermentioned in comparison with the previous ones.

Finally, some participants use MIM for *pastime and entertainment*: To fill the “many dead times” of the day, beat boredom, talk for the sake of it, sharing some content that one finds constructive, pleasant, fun, etc. This category of uses responds to the innate human curiosity and the intrinsic motivation to seek out (Reeves, 2009, p. 144), and is common in the literature of social media (see Leung, 2001; Quan-Haase & Young, 2010). It also resonates with MIM-related entertainment uses detected among teenagers, especially males, such as playing videogames and “coordinat[ing] the necessary movements during games” (Costa-Sánchez & Guerrero-Pico, 2020, p. 6).

As an initial test of the transferability of this category system, we tried to identify MIM uses on the different sample of Study 2. We content analyzed the 147 open-ended responses and identified some of the uses above in 122 of the reported experiences (i.e., almost 83% of the responses). The rest of the experiences did not provide enough information to assign a specific MIM use. Most of these 122 cases connected with relatedness, intimacy, and social interaction (80, 65.6%) or work-, study-, and business-related uses (32, 26.2%). In fact, as one would expect from the characteristics of the sample, work and business were a relative minority (10), and this category was clearly biased towards study uses such as “organizing [group] assignments from home,” “clarifying [assignment-related] doubts very quickly,” or “discussing with other classmates the syllabus and conditions of an exam.” Two experiences (1.6%) alluded to political and civic uses; another two detailed domestic and other non-work commitments; and one more (0.8%) recounted a pastime- and entertainment-related use. Five cases alluded to a combination

of two uses (study and political, study and relatedness [2], study and domestic, relatedness and pastime) (see more examples in Table 1).

Dimensions of MIM Stress

Data from Study 1 also shed light on the reasons why individuals may evaluate the demands of MIM as taxing on their resources. While previous studies had suggested some of these MIM-specific stressors, the present article expands these perspectives and brings them together under the technostress framework. It should first be noted that the analysis of discussions does not suggest a simple linear association between MIM use and stress. Some participants described situations where using MIM helped them deal with stressful situations, as if it was part of coping responses to other difficulties of the ‘offline world.’ MIM use helped them *finding personally relevant information*—“It is quite reassuring when you forget something and someone mentions it [via WhatsApp], or when you have an urgent doubt, such as a question about the classes” (#1, female, 23)—; *escaping from real-life problems*—“It doesn’t stress me out too much; on the contrary, it helps me escape. Sometimes I must deal with a lot of pressure at work, and I check WhatsApp to relax a bit and giggle at some nonsense” (#2, male, 37)—; or *seeking for social and interpersonal support*—“It really gives me peace of mind to know that I can contact my family anytime, at any time of the day or night” (#4, f, 69).

Senior participants in G4 were the ones who perceived their interaction with MIM more positively in affective terms. “Reassuring” and “relaxing” were the most repeated adjectives spoken by older participants to evaluate their use of MIM. They barely mentioned any situation where MIM use made them feel stress. This may partly be due to their pattern of use of MIM: mostly for relatedness, intimacy, and social interaction, and almost never for work or business. Furthermore, their reported frequency of usage was lower, and they seemed to experience less

pressure to be available online and reply immediately: “The people I contact with are aware that I am not constantly checking WhatsApp; therefore, I do not feel any pressure” (#4, f, 74).

Despite this positive, stress-reducing potential of MIM, the analysis of the focus group data yielded four major dimensions of MIM stress (Table 2). Male and female participants in all groups mentioned difficulties in dealing with the large flow of incoming messages, most of which require attention and action. Following previous studies on work-related technostress and information overload (Misra & Stokols, 2011; Tarafdar et al., 2007), we called this dimension *MIM overload*: “Suddenly you have three people talking to you at the same time” (#1, m, 21); “200, 300, 400 messages [...] you cannot read” (#1, f, 23). This sometimes includes low quality information—e.g., “evident fake news about politics, society...” (#4, f, 74)—that users need to filter or refute, which may be particularly stressful in connection with health news in the pandemic context. Some key features of the MIM apps (notification sound, vibration, etc.) seem to increase the perception of overload: “If I’m always hearing [the notification sound] in the background, there comes a moment when I become overwhelmed” (#5, f, 39). Overload is more likely to arise when participants interact in large MIM groups, and common coping strategies were silencing group chats, ignoring messages or, more rarely, deleting entire conversations.

[TABLE_2]

The second dimension that emerged from our qualitative data is *MIM invasion*, which is similar to invasion in the literature on technostress at work (see, for example, Tarafdar et al., 2007). It mainly refers to the MIM-facilitated permeation of work, study-, or business-related issues into the personal domain: “I finish my workday and I keep receiving work-related instructions” (#1, f, 28). The lockdown and home confinement worsened the situation for some of our discussants because work schedules “are not the same as they used to be”: “[Some

coworkers] connect at night and text you” (#3, f, 48), or schedule work shifts and define tasks without considering that “you are outside working hours” (#1, f, 28). More broadly, not work-related MIM can also invade interpersonal relationships: “Many times I am engaged in a conversation [...] and though the conversation may be super interesting, they may shift their attention to the screen. That’s an invasion of our contact [...]” (#1, m, 26). Following previous literature on technostress (Barber & Santuzzi, 2015; Tarafdar et al., 2019), we also include in this dimension the feelings of pervasiveness, or the perception that MIM technology never gives one a break. It does not refer to the number of messages (as in overload), but to the potential of the technology to interrupt people’s “daily routines” (#5, f, 39) and its power to divide one’s attention: “And one has to constantly keep an eye on the phone and... These new technologies do help a lot, generally speaking. But they are also time-consuming and stress you out, I think” (#2, m, 44). This perceived invasive nature of MIM was associated with both one-on-one and group chat interactions and expressed in all group discussions except G4 (senior).

Thirdly, women and men in all groups except G4 raised concerns about the sense of *urgency of response* associated with MIM use. In the IS literature, expectations of immediate response to work-related demands are part of the techno-invasion stressor (Tarafdar et al., 2019). Some participants and respondents, however, made an implicit distinction between both dimensions, and we have therefore chosen to consider *invasion* and *urgency of response* as separate—but related—stressors. For example, this mother is unlikely to view her daughter’s messages as an invasion of her personal life, but she admits feeling pressured by her impatience: “[My] 11-year-old daughter has now a mobile phone, she has WhatsApp on it and is very impatient [...]: ‘Answer me, now’ [...]; ‘Mom, answer; mom, answer.’ And I say: ‘My God, I can’t right now’” (#5, f, 39). In a similar line, a 37-year-old male participant in G2 points out that

“it is an instant messaging technology, but it does not mean that you have to read [the messages] instantly.” Indeed, some discussants reported turning off the blue ticks (read receipts) in the app as a coping strategy to minimize stress: “[...] Because it is true that I had a certain self-pressure to respond as soon as I got the message. It seemed wrong to me that others knew I had read it and not replied” (#3, f, 48). As for the invasion stressor, feelings of urgency arise in both one-on-one and group conversations.

Finally, the last stressor that emerged during the analysis was *MIM ambiguity*. It refers to the lack of human presence and appropriate context (e.g., tone of voice and non-verbal cues that indicate the communicative style and define the intention) that frequently characterize MIM-mediated communication. This loss of intangible elements sometimes leads to misunderstandings and misinterpretations of one-on-one or group conversations: “[...] People writing behind a screen are very brave, or sometimes they say things that are misinterpreted, or etcetera etcetera, don’t they?” (#5, m, 53); “[I have moments] of stress, of saying to myself: ‘Why did they say this? Why did they say that? Why is he now replying in this way?’ This kind of misunderstandings that [...] create some sort of anxiety” (#3, m, 52). Interestingly, none of the participants in G4 expressed feelings of ambiguity related to MIM use.

As with RQ1, we assessed the applicability of these four stressors to a different sample in Study 2. We found that 59 respondents (40.1% of valid responses) recalled an experience with MIM that *reduced* their feelings of stress, which reinforces the idea of a dual relationship between MIM use and stress: “I was stressed out [because] I did not know the date of my exam, and I could ask my classmates via WhatsApp and my stress reduced” (f, 18); “I could talk to my friends and express how I was feeling” (f, 21). Some respondents also mentioned that their use of

MIM allowed them to *ask for advice*: “I talked to a close friend because I needed some advice and, in a matter of minutes, I could solve the issue” (f, 20).

On the opposite side, 88 students (59.9%; 52 psychology and 36 communication students) addressed a stress-provoking experience associated with MIM. Sixty-two of these open-ended responses involved at least one of the four MIM stressors above. In four cases, respondents described online harassment or bullying experiences, which we do not reproduce here to protect their privacy. Although harassment and bullying may relate to some of the MIM stressors in this study (e.g., invasion, overload), we think the issues are complex enough to deserve a separate study, and therefore did not code bullying and harassment as part of MIM stress.

Overload was dominant and evaluated as a stressor in 27 of 62 experiences (43.5%). In 24 experiences (38.7%), respondents pointed to *ambiguity* as a stressor. Feelings of *invasion* were described in 17 cases (27.4%). Finally, *urgency* was mentioned in other 17 experiences (see examples in Table 2). The more anonymous context of Study 2 allowed us to uncover the flip side of urgency (that of the sender perspective): some students confessed that they feel impatient if they do not receive a quick response to their messages: “It was a conversation with my partner that we talked about something important, I was stressed waiting to receive their messages” (f, 18); “I feel the need for the messages I send to be instantly responded to; I do not communicate it to the other person out of respect, but the reality is that when I send a message and they take too long to respond, I get stressed and irritated” (f, 18). Urgency therefore arises from both external pressures to respond quickly and expectations regarding others’ quickness to reply.

Some of the reported experiences involved more than one stressor, especially those related to the urgency category. For example, an 18-year-old female student narrated the

following stressful event that includes elements of *overload* (“kept getting notifications,” “constant stream of messages”), *invasion* (“I could not focus on my things,”), and *urgency* (“why I wasn’t answering the phone”):

I was doing my assignments and I kept getting notifications from family and friends, asking me what I was doing, why I wasn’t answering the phone, etc. It was already night, and I was tired of being all day in front of the computer, and the constant stream of messages stressed me more because I could not focus on my things. I just wanted to finish my assignments and go to sleep.

Different from findings of Study 1, Study 2 suggests gender differences in some of the dimensions of MIM stress—notably urgency and invasion. None of the male students expressed feelings of urgency associated with their stress-producing experiences, whereas 28.8% of women’s episodes (excluding those for which no MIM-related stressor could be assigned) did. In contrast, 38.5% of men’s but only 20.3% of women’s stressing events involved the invasion technostressor.

MIM Uses and Stress

To answer RQ3, we reanalyzed 88 of the open-ended responses in Study 2—those from respondents who recalled a stress-provoking experience, 52 psychology and 36 communication students. We sought to relate MIM uses in Table 1 to specific stressors in Table 2. Figure 1 shows a Sankey diagram of the connections between MIM uses and stressors as reported in Study 2. Work- and study-related uses seem to have the greatest impact in the MIM stress generative process. Work and study uses were placed at the origin of perceptions of overload (17 times), ambiguity (8 times), invasion (7 times), and urgency (3 times). For example, this 27-year-old woman associated study-related uses with feelings of invasion and urgency:

A WhatsApp group for the master’s students where people were discussing issues relating to a certain course while we were having an online class. The discussion [was taking place]

simultaneously with the class, which completely distracted our attention, in addition [the participants] were making decisions about the course without waiting for the approval of all classmates.

More surprisingly, relatedness and interaction uses were connected with MIM stress almost as frequently as work- and study-related uses. Specifically, experiences uncovered a common association of relatedness and social interaction uses with ambiguity (14 experiences).

For example:

I was having an argument with my partner, and communication via WhatsApp is clearly more unsatisfactory than face-to-face communication. We had been talking about the same issue for about 30 minutes and we could not understand each other. We were misunderstanding things. This increased my stress, and I felt overwhelmed (f, 18).

Relatedness and interaction uses were also reported as a source of urgency-related stress (6 cases), invasion (4 experiences) and, more rarely, overload (two cases). Seen from the other side of the process (that of the MIM stressors), feelings of overload and invasion seem to be mainly associated with work and study uses of MIM, while feelings of ambiguity and urgency are more commonly triggered by relatedness and social interaction uses. The remaining uses of MIM (domestic commitments, political and civic uses, and pastime and entertainment) were rarely or never mentioned as stressors—in part because these uses were less common in this second sample.

We also found gender differences in Study 2 regarding the context of these stress-producing experiences. Thus, women tended to report stressing experiences in connection with relatedness, intimacy, and social interaction (52.2% of women's experiences, excluding those for which no use could be assigned), while men were more prone to remember experiences associated with work, study, and business uses (66.7%).

[FIGURE 1]

Discussion

This study theorized and explored a model describing how different uses of MIM—not restricted to the work domain—are linked to different technostressors. First, we considered an open approach to develop a wide catalogue of MIM uses that attempts to expand the focus beyond specific social groups (e.g., students, health-care workers, the elderly) and specific tools (e.g., Snapchat, WhatsApp, BlackBerry Messenger). Furthermore, instead of relying on previous social media U&G literature and assuming a correspondence of uses between social media and MIM, we categorized MIM as a distinctive medium, characterized by particular uses that may impact perceived stress differently. Our catalogue of uses also reflects the current state of instant messaging, which is largely a mobile phone- and not a desktop-based technology.

Focus group conversations confirmed the central role of relational maintenance and intimate communication in relationship with MIM use, but also revealed a richness of detail and practices that we categorized in five categories and nine subcategories: *relatedness, intimacy, and social interaction* (with two subcategories); *work-, study-, and business-related uses* (four subcategories); *political and civic uses* (three subcategories); *domestic and other non-work commitments*; and *pastime and entertainment*. With regard to the first category, most participants use MIM to maintain and strengthen close tie relationships (bonding networks). Nonetheless, the conversations also revealed the potential of MIM groups to promote weak tie interaction. Remarkably, it was not only young discussants who connected with weak ties through MIM, but also some of the oldest participants (G4). This suggest a positive role for MIM groups in connecting people with different backgrounds (bridging networks), which may be particularly

beneficial for the elderly. We successfully applied the MIM use categories to a different sample (Study 2), which speaks in favor of their transferability.

Second, we also address recent calls for the examination of the model of technostress outside the work environment (Tarafdar et al., 2019). In this regard, we identify and integrate (within the technostress framework) four MIM-specific dimensions of technostress: 1) *MIM overload* was already suggested by previous qualitative and quantitative work (Blabst & Diefenbach, 2017; Shin et al., 2018). It refers to difficulties in dealing with group and individual chats that become overcrowded with messages, most of which require feedback from the recipients but are nearly impossible to fully read. Furthermore, some messages contain low quality information that users frequently need to filter or refute. 2) *MIM ambiguity* connects with a lack of human presence and appropriate conversational context, which sometimes leads to misunderstandings, misinterpretations, and communication problems. 3) *Invasion* stems from constant (24/7) connectivity, which elicits the feeling that MIM never gives one a break and interrupts one's routines. It relates to the consideration of MIM as a real nuisance, "especially when one is engaged in another activity," as reported in Fondevila-Gascón and colleagues' (2014, p. 9) survey study. Some participants keep receiving work-related instructions after their workday and perceive that work- or study-related issues 'spill over' into the personal domain (see Schieman & Young, 2013). Likewise, MIM conversations with friends or family can invade other personal spaces, such as a face-to-face conversations where conversational partners may shift their attention to the screen. Finally, 4) *MIM urgency* covers feelings of pressure resulting from impatience or expectations for a quick response. This appraisal may emanate from either the sender or the receiver of the message, and connects with Blabst and Diefenbach's (2017) findings regarding the direct association between active use of 'last seen' and 'read receipts' and

levels of perceived stress. Our four-dimensional measure of MIM stress proved to be applicable to a different, less diverse sample (Study 2), and may guide the development of future quantitative instruments.

Our study also examined the link between MIM uses and dimensions of MIM stress. Consistent with the mixed picture described in the literature review (e.g., Bano et al. 2019; Beyens, et al., 2020; Chan, 2015; Shin et al., 2018), participants' comments in both studies suggest that users do not necessarily (or always) appraise MIM as a stressor. More specifically, MIM may also help users deal with stressful situations of daily life and mobilize coping resources: finding personally relevant information, escaping from real-life problems, seeking for social and interpersonal support, or asking for advice. Some of the stress-reducing potential of MIM may therefore be connected to the mobilization of social resources for emotional and problem-oriented support (Chan, 2018; Yeshua-Katz, 2021).

By contrast, other participants' comments suggest that some uses of MIM contribute to different dimensions of MIM stress. Expectedly, work- and study-related uses seem to be important sources of MIM stress, especially via feelings of overload, ambiguity, and invasion. This is consistent with previous research that has shown that work-related communication outside working hours predicts stress, work-to-family conflict, and even sleep problems (Schieman & Young, 2013). Considering these negative health-related consequences, organizational practices should evolve to avoid job pressures after hours and, complementarily, promote assertive communication to reject work-related MIM communications during non-working time.

The results of this study also suggest a less obvious connection between relatedness and social interaction uses of MIM with stress. These more personal uses seem to be appraised, at

least sometimes, as a source of (stressing) ambiguity, urgency-related issues, invasion of one's offline reality and, to a lesser extent, overload. These findings may relate to individual differences in cognitive processes and coping strategies that may be associated with positive or negative consequences of MIM use. For instance, according to attachment theory, insecurely attached individuals are more prone to experience an increased need for intimacy and fear of rejection (Mikulincer & Shaver, 2012), which seems to foster a more frequent (and, we venture to say, more ambiguous and urgent) MIM-mediated interaction with close ties (see Weisskirch, 2012). On the contrary, individuals with an avoidant attachment style tend to show higher levels of emotional detachment and self-sufficiency (Mikulincer & Shaver, 2012), which may be linked to stress when the number or intensity of MIM-mediated exchanges are perceived as excessive. Future research should better examine individual differences to provide a better understanding of risk and protective factors for healthy, stress-free use of MIM.

Of particular interest are some age and gender differences in the MIM-stress process, which would deserve further exploration beyond the scope of the present investigation. In Study 1, the older age group (G4) seemed to perceive MIM use more as a stress-reducing activity and be relative immune to MIM-related stressors—except for exceptional feelings of overload. In the second study, we detected that female students were more prone to remember stress-provoking experiences in a context of relatedness, intimacy, and social interaction, while males reported more experiences connected with work, study, and business. Also in Study 2, women seemed more affected by feelings of urgency than men, while male students felt invaded more often than females. These findings could be explained by traditional gendered socialization.

The findings of this study should be interpreted carefully in the light of its limitations. We deliberately used a qualitative approach with non-probability samples that are not

representative of the characteristics of the country's (Study 1) or the university students' (Study 2) population. We tried to minimize this limitation by selecting a fairly diverse sample for Study 1 and by evaluating the applicability of our category systems to the less diverse sample of Study 2—where most respondents were psychology students, belonged to a similar age bracket, were females, childless, and did not work. However, it should be recalled that our findings regarding the association between MIM uses and stress (RQ3) were not inferred from the Study 1 sample, but from the less diverse sample of Study 2. The literature indicates that female psychology students may be particularly open-minded in their attitudes toward mental health problems—such as the outcomes of technostress—, but psychology undergraduates may also have more difficulties in managing daily life stressors—such as those triggered by MIM use—than other students (see Franzen et al., 2021; Kotera, Green, & Sheffield, 2019).

All in all, our study suggests that MIM-associated technostress is a multidimensional construct, that not all uses of MIM are equally associated with stress, and that relatedness and social interaction—and not only work- and study-related—uses of MIM may be a source of technostress. More importantly, MIM characteristics are not systematically appraised as threatening, and some uses of MIM may facilitate coping strategies that help to alleviate stressful situations of daily life. The latter be especially true and relevant for (some) older users. Given the negative consequences of technostress on health and well-being (Lee et al., 2016; Misra & Stokols, 2012; Schieman & Young, 2013), research should call for quantitative designs and replication of these findings in other populations. In this sense, our typology of MIM uses and stress may provide a guide for future development of quantitative measures.

Declaration of Interest Statement

There is no actual or potential conflict of interest in relation to this article.

References

- Bano, S., Cisheng, W., Khan, A. N., & Khan, N. A. (2019). WhatsApp use and student's psychological well-being: Role of social capital and social integration. *Children and Youth Services Review, 103*, 200-208. <https://doi.org/10.1016/j.chilyouth.2019.06.002>
- Barber, L. K., & Santuzzi, A. M. (2015). Please respond ASAP: Workplace telepressure and employee recovery. *Journal of Occupational Health Psychology, 20*(2), 172-189. <https://doi.org/10.1037/a0038278>
- Beyens, I., Pouwels, J. L., van Driel, I. I., Keijsers, L., & Valkenburg, P. M. (2020). The effect of social media on well-being differs from adolescent to adolescent. *Scientific Reports, 10*(1), 1-11. <https://doi.org/10.1038/s41598-020-67727-7>
- Blabst, N., & Diefenbach, S. (2017, July). WhatsApp and wellbeing: A study on WhatsApp usage, communication quality and stress. In L. Hall et al. (Eds), *Proceedings of British HCI - Digital make-believe* (pp. 1-6). <https://doi.org/10.14236/ewic/HCI2017.85>
- Bucher, E., Fieseler, C., & Suphan, A. (2013). The stress potential of social media in the workplace. *Information, Communication & Society, 16*(10), 1639-1667. <https://doi.org/10.1080/1369118X.2012.710245>
- Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in the need for cognition. *Psychological Bulletin, 119*(2) 197-253. <https://doi.org/10.1037/0033-2909.119.2.197>
- Canavilhas, J., Colussi, J., & Moura, Z. (2019). Desinformación en las elecciones presidenciales 2018 en Brasil: un análisis de los grupos familiares en WhatsApp. *Profesional de la Información, 28*(5), e280503. <https://doi.org/10.3145/epi.2019.sep.03>

- Cathcart, W. [wcathcart]. (2020, October 29). This year we've all relied on messaging more than ever to keep up with our loved ones and get business done. We are proud that @WhatsApp is able to deliver roughly 100B messages every day and we're excited about the road ahead. [Tweet]. <https://twitter.com/wcathcart/status/1321949078381453314>
- Chan, M. (2015). Mobile phones and the good life: Examining the relationships among mobile use, social capital and subjective well-being. *New Media & Society*, 17(1), 96-113. <https://doi.org/10.1177/1461444813516836>
- Chan, M. (2018). Mobile-mediated multimodal communications, relationship quality and subjective well-being: An analysis of smartphone use from a life course perspective. *Computers in Human Behavior*, 87, 254-262. <https://doi.org/10.1016/j.chb.2018.05.027>
- Chou, M. C., & Liu, C. H. (2016). Mobile instant messengers and middle-aged and elderly adults in Taiwan: Uses and gratifications. *International Journal of Human-Computer Interaction*, 32(11), 835-846. <https://doi.org/10.1080/10447318.2016.1201892>
- Costa-Sánchez, C., & Guerrero-Pico, M. (2020). What is Whatsapp for? Developing transmedia skills and informal learning strategies through the use of Whatsapp—a case study with teenagers from Spain. *Social Media + Society*, 6(3), 1-11.
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>
- Fondevila-Gascón, J. F., Carreras Alcalde, M., Mir Bernal, P., Del Olmo Arriaga, J. L., & Pesqueira Zamora, M. J. (2014). El impacto de la mensajería instantánea en los estudiantes en forma de estrés y ansiedad para el aprendizaje: Análisis empírico. *Revista Didáctica, Innovación y Multimedia* (30), 1-15.

- Franzen, J., Jermann, F., Ghisletta, P., Rudaz, S., Bondolfi, G., & Tran, N. T. (2021). Psychological distress and well-being among students of health disciplines: the importance of academic satisfaction. *International Journal of Environmental Research and Public Health*, 18(4), 2151. doi: 10.3390/ijerph18042151
- Gil de Zúñiga, H., Ardèvol-Abreu, A., & Casero-Ripollés, A. (2021): WhatsApp political discussion, conventional participation and activism: Exploring direct, indirect and generational effects. *Information, Communication & Society*, 24(2), 201-218. <https://doi.org/10.1080/1369118X.2019.1642933>
- Gil de Zúñiga, H., Molyneux, L., & Zheng, P. (2014). Social media, political expression, and political participation: Panel analysis of lagged and concurrent relationships. *Journal of Communication*, 64(4), 612-634. <https://doi.org/10.1111/jcom.12103>
- Karapanos, E., Teixeira, P., & Gouveia, R. (2016). “Need fulfillment and experiences on social media: A case on Facebook and WhatsApp.” *Computers in Human Behavior* 55(B), 888-897. <https://doi.org/10.1016/j.chb.2015.10.015>
- Kim, Y., & Khang, H. (2014). Revisiting civic voluntarism predictors of college students’ political participation in the context of social media. *Computers in Human Behavior*, 36, 114-121. <https://doi.org/10.1016/j.chb.2014.03.044>
- Kircaburun, K., Alhabash, S., Tosuntaş, Ş. B., & Griffiths, M. D. (2020). Uses and gratifications of problematic social media use among university students: A simultaneous examination of the Big Five of personality traits, social media platforms, and social media use motives. *International Journal of Mental Health and Addiction*, 18(3), 525-547. <https://doi.org/10.1007/s11469-018-9940-6>.

Lazarus, R. S. (1990). Theory-based stress measurement. *Psychological Inquiry*, 1(1), 3-13.

https://doi.org/10.1207/s15327965pli0101_1

Lazarus, R. S. (1991). *Emotion and adaptation*. Oxford University Press.

Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality*, 1(3), 141-169.

<https://doi.org/10.1002/per.2410010304>

Lee, A. R., Son, S. M., & Kim, K. K. (2016). Information and communication technology overload and social networking service fatigue: A stress perspective. *Computers in Human Behavior*, 55, 51-61. <https://doi.org/10.1016/j.chb.2015.08.011>

Leung, L. (2001). College student motives for chatting on ICQ. *New Media & Society*, 3(4), 483-500. <https://doi.org/10.1177/14614440122226209>

Martínez-Comeche, J. A., & Ruthven, I. (2021). Informational features of WhatsApp in everyday life in Madrid: An exploratory study. *Journal of Information Science*. Advance online publication. doi: 10.1177/0165551521990612

Makki, T. W., DeCook, J. R., Kadylak, T., & Lee, O. J. (2017). The social value of Snapchat: An exploration of affiliation motivation, the technology acceptance model, and relational maintenance in Snapchat use. *International Journal of Human-Computer Interaction*, 34(5), 410-420. <https://doi.org/10.1080/10447318.2017.1357903>

Misra, S., & Stokols, D. (2012). Psychological and health outcomes of perceived information overload. *Environment and Behavior*, 44(6), 737-759.

<https://doi.org/10.1177/0013916511404408>

Mobasheri, M. H., King, D., Johnston, M., Gautama, S., Purkayastha, S., & Darzi, A. (2015). The ownership and clinical use of smartphones by doctors and nurses in the UK: A

- multicentre survey study. *BMJ Innov*, 1(4), 174-181. <https://doi.org/10.1136/bmjinnov-2015-000062>
- Newman, N., Fletcher, R., Kalogeropoulos, A., & Nielsen, R. K. (2019). *Reuters Institute Digital News Report*. Reuters Institute.
- Newman, N., Fletcher, R., Schulz, A., Andı, S., & Nielsen, R. K. (2020). *Reuters Institute Digital News Report*. Reuters Institute.
- Pont-Sorribes, C., Besalú, R., & Codina, L. (2020). WhatsApp como canal de información política en España: credibilidad, perfil de usuarios y compartición de contenidos. *Profesional de la Información*, 29(6), e290619. <https://doi.org/10.3145/epi.2020.nov.19>
- Quan-Haase, A., & Young, A. L. (2010). Uses and gratifications of social media: A comparison of Facebook and instant messaging. *Bulletin of Science, Technology & Society* 30(5), 350-361. <https://doi.org/10.1177/0270467610380009>
- Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research*, 19(4), 417-433. <https://doi.org/10.1287/isre.1070.0165>
- Reeve, J. (2009). *Understanding motivation and emotion* (5th Ed.). John Wiley & Sons.
- Reinecke, L., Aufenanger, S., Beutel, M. E., Dreier, M., Quiring, O., Stark, B., Wölfling, K., & Müller, K. W. (2017). Digital stress over the life span: The effects of communication load and internet multitasking on perceived stress and psychological health impairments in a German probability sample. *Media Psychology*, 20(1), 90-115. <https://doi.org/10.1080/15213269.2015.1121832>

- Rosales, A., & Fernández-Ardèvol, M. (2016). Beyond WhatsApp: Older people and smartphones. *Romanian Journal of Communication and Public Relations*, 18(1), 27-47. <https://doi.org/10.21018/rjcpr.2016.1.200>
- Rubin, A. M. (2009). Uses-and-Gratifications perspective on media effects. In J. Bryant & M. B. Oliver (Eds.), *Media effects: Advances in theory and research* (pp. 165-184). Routledge.
- Schieman, S., & Young, M. C. (2013). Are communications about work outside regular working hours associated with work-to-family conflict, psychological distress and sleep problems? *Work & Stress*, 27(3), 244-261. <https://doi.org/10.1080/02678373.2013.817090>
- Shin, I. G., Seok, J. M., & Lim, Y. K. (2018, April). Too close and crowded: Understanding stress on mobile instant messengers based on proxemics. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (pp. 1-12). <https://doi.org/10.1145/3173574.3174189>
- Tarafdar, M., Cooper, C. L., & Stich, J-F. (2019). The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research. *Information Systems Journal*, 29, 6-42. <https://doi.org/10.1111/isj.12169>
- Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, 24(1), 301-328. <https://doi.org/10.2753/MIS0742-1222240109>
- Thomas, K. (2018). Wanted: A WhatsApp alternative for clinicians. *BMJ*, 360(k622), 1-3. <https://doi.org/10.1136/bmj.k622>
- Valeriani, A., & Vaccari, C. (2017): Political talk on mobile instant messaging services: A comparative analysis of Germany, Italy, and the UK. *Information, Communication & Society*, 21(11), 1715-1731. <https://doi.org/10.1080/1369118X.2017.1350730>

- Vidales-Bolaños, M. J., & Sádaba Chalezquer, C. (2017). Adolescentes conectados: La medición del impacto del móvil en las relaciones sociales desde el capital social. *Comunicar*, 25(53), 19-28. <https://doi.org/10.3916/C53-2017-02>
- Weisskirch, R. S. (2012). Women's adult romantic attachment style and communication by cell phone with romantic partners. *Psychological Reports*, 111(1), 281-288. <https://doi.org/10.2466/21.02.20.pr0.111.4.281-288>
- WhatsApp. (n. d.). *About WhatsApp*. <https://www.whatsapp.com/about/>
- Yeshua-Katz, D. (2021). The role of communication affordances in post-traumatic stress disorder Facebook and WhatsApp support groups. *International Journal of Environmental Research and Public Health*, 18(9), 1-13. <https://doi.org/10.3390/ijerph18094576>
- Zhang, X., Ma, L., Xu, B., & Xu, F. (2019). How social media usage affects employees' job satisfaction and turnover intention: An empirical study in China. *Information & Management*, 56(6), 1-12. <https://doi.org/10.1016/j.im.2018.12.00>

Table 1. Categories and Subcategories of MIM App Uses

<i>Main category</i>	<i>Sub-categories^{i/a}</i>	<i>Examples of comments (with focus group or Study number, participant's sex, and age in parentheses)</i>
1. Relatedness, intimacy, and social interaction	a. Relatedness and intimacy	(#5, f, 47): [I use WhatsApp] with friends [...] to keep up to date, because each one has their own life and, sometimes, it is not easy to see each other. [...] It is a way to stay in touch, to be permanently... To know about the people you love. (S2, f, 20): [One time] I was emotionally bad, and thanks to WhatsApp I could talk with my best friend, who calmed me down. We talked for an hour or more, and it helped a lot.
	b. Planning and coordination of social activity	(#4, m, 85): Rather, it is about personal conversations: "Listen, what are you doing?" "Where are you going?" "Listen, let's meet for a coffee." "Listen, let's do something. I will do such-and-such thing and I'll call you later." (S2, m, 20): Because I was talking with friends about taking a walk together.
	c. Work uses	(#3, m, 52): [At my work] there is a high turnover rate. People join and leave the [WhatsApp] group. Sometimes they ask things at 11 pm [...] in the group: "How is this done?" "What should I do about that?" (S2, f, 24): With regard to my job, there was this crisis moment because I hadn't addressed an issue—it was my day off—and, suddenly, I had several messages from different people that required my attention.
	d. Study-related uses	(#2, m, 37): Not too long ago I was doing a master's degree and we shared everything [via WhatsApp]: documents, exams, cheat sheets... (S2, f, 18): [...] in the class WhatsApp group, they never stopped texting. Even though I had the group muted, I used to enter the conversation to check if they had shared something important about the exams. But there were so many messages that I got overloaded.
	e. Advertising and sale / purchase transactions	(#3, f, 53): As I speak with you, there are like 8 WhatsApp [messages] waiting [...]. I know these are from people that are interested in products from my website. I'll make money with that. (#2, m, 37): [I use WhatsApp] for the sale and purchase of second-hand [goods]. Sometimes they give you their mobile number and then we switch to WhatsApp, which is like more immediate.
	f. Job search	(#3, f, 50): I'm a member of two Telegram groups of Spanish language teachers. It's kind of a chat where we talk to students of Spanish from all over the world. It is also a way to find students for online lessons. (#2, m, 43): [I'm in a group] where you can inscribe [...] and they send you job vacancies [...]. You can even share your own vacancies, of which you may be aware and have not been previously shared.
2. Work-, study-, and business-related uses		

		(#4, f, 70): We talk about politics in the [group] for former college classmates. In other groups it is best not to talk [politics]. It can lead to uncomfortable moments because everyone does not think alike and there is no respect, or people insult each other, and one should try to avoid these things.
	g. News and political talk	S2, f, 20): When the news [of the epidemiological alert] broke, my family and friends started to send me [text] messages. Many of them were contradictory [...].
3. Political and civic uses	h. Civic engagement	(#1, m, 26): Some of my relatives [...] used WhatsApp to provide [community] services. Older neighbors could order food instead of going to the store themselves and risking exposure to the [Covid-19] virus. (#3, f, 53): [I'm in a WhatsApp group] of an animal welfare organization [...]. We are always vigilant for abandoned or mistreated animals. In this [group] we chat every day because there are sadly lots of abandoned or mistreated animals.
	i. Political participation	(#3, f, 48): [In the neighborhood] they have protested, blocked the street, and things like that. For instance, public health-care advocacy groups contact you [via WhatsApp] and say: "A gathering will take place in front of the health center at such-and-such a time, on such-and-such a day." (#2, m, 44): I'm registered as a member of a political party and [...] we use [the WhatsApp group] to share information, organize the meetings, attend [face-to-face or virtual] meetings [...].
	4. Domestic and other non-work commitments	(#4, f, 70): For me it is reassuring to be able to contact [...]. If, for example, something arises and I have to go and pick up my granddaughters... These things bring me peace of mind. (S2, f, 19): I was packing my stuff because I was going to my town. My boyfriend was picking me up, but at the last minute he decided to reschedule for an hour earlier. He was [texting] to tell me that he was picking me up right at that moment [...].
5. Pastime and entertainment	(#2, m, 37): I use [WhatsApp] mainly for leisure [...]. To exchange trivialities, many memes and stuff, and videos. (S2, f, 18): I tried to keep my mobile phone away during exam time so that I could focus, but every time I took a break and picked up my phone, it somehow made me escape from and release the stress caused by the exams.	

Notes. Hashtags indicate the focus group number in examples from Study 1. S2 indicates that the example is taken from Study 2. Superscript i/a: If applicable.

Table 2. Dimensions of MIM technostress

<i>Dimension</i>	<i>Examples of comments</i> (with focus group or Study number, participant's sex and age in parentheses)
1. MIM overload	<p>(#2, m, 44): What stresses me out [...] is to see a lot of red numbers [in the notification badge], you know? And I like to reply immediately and get rid of them. So, what stresses me out is that, seeing [those] red [numbers] [...].</p> <p>(S2, f, 19): [...] many times I take my mobile phone after studying and I find thousands of messages that I am not able to read fully, so I remain uninformed.</p>
2. MIM invasion	<p>(#5, f, 47): [...] We can receive a WhatsApp [message] at 2 am from our boss with instructions for the next day, you know? [...]. No, no, maybe not at 2 am, but at 10 pm. I'm trying to control that. I mean, I think that's not OK [...].</p> <p><i>Moderator:</i> But you read them. And [...] maybe those messages are not always pleasant, some work-related messages may be unpleasant. Don't they cause [...] some discomfort before going to bed, for example?</p> <p><i>Participant:</i> Yes, it may stress me out when I think: "Damn it! Tomorrow morning, I have to do that". But I don't lose any sleep over it.</p> <p><i>M:</i> And what about the weekends [...].?</p> <p><i>P:</i> I read them as well, yes. [...] Depends on the content of the message, but I try, eh... If it's a Saturday, it's a Saturday and no, I am not working. Some weekends I do have to work, but come on, if I'm....</p> <p>(#5, f, 39): Also [at home], if I have to cook for my kids or bathe them or, I don't know, if I'm busy. So, if I do not hear [the WhatsApp sound], I feel happier to continue doing my daily routines. Maybe if I'm continuously hearing it as a background noise, then I reach a point where I feel overwhelmed. If I don't hear it, I don't feel overwhelmed. I tend to silence [... WhatsApp] to ensure that it does not make me... I would not say anxious but nervous. I don't know how to explain it [...]. In order not to hear it continuously, because it interrupts me. And when I get interrupted, I get nervous because I want to do things well.</p> <p>(#2, m, 44): [...] They send you the message, and if it's 10:30 or 11 at night they send it to you anyway, and they don't care. And I like reading the messages and not leaving them unread, so I tend to read them at any time... Well, of course not at 2 am. But if they send me one at 11:30 or 12 at night, which is not that common, I use to read it. And one has to constantly keep an eye on the phone and...</p> <p>(S2, m, 26): I was the communication link [...] and therefore I had to pass on every single message, wait for replies and reproduce them, and make decisions sequentially [...]. This led to me not being able to focus on other activities such as studying or watching a film.</p>
3. MIM urgency	<p>(#3, f, 48): I think that [MIM apps] are a little stressful [...]. [I] removed the popular blue ticks so that people cannot see if I read [the messages] or not. Because I felt a personal pressure to reply as soon as I read it; it seemed wrong to me to read them and not reply—with people noticing. I think [MIM] is a very good thing, because it helps you to have an immediate relationship and so, but it also has a side that makes you nervous.</p> <p><i>M:</i> You mentioned a personal pressure. Is it explicit [from others] or is it only yours?</p>

3. MIM
urgency
(cont.)

P: It's personal [self-imposed], but I think it's also social. Because sometimes, some people, not everyone, say: "You've read it and haven't replied", "It took you two hours to reply to me". Then I think it's a bit of both things [...]. Therefore, in order to take pressure off yourself, you have to remove these [blue ticks].

(S2, f, 18): WhatsApp increased my stress because the messages I sent about the organization of upcoming university assignments were read or not, and for hours I did not get a response.

(#1, m, 26): Since [MIM] lacks proper context, sometimes the message that is transmitted... There is a misinterpretation of the message. And some topics are intense and may stress individuals out. And then...

M: Elaborate a bit more on this. When you talk about lack of context and stressing topics, what are you thinking about specifically?

P: I'm thinking that when I send a message, I send it with a certain intention, don't I? But in fact, the other person misunderstands my intention. They start to mull it over.

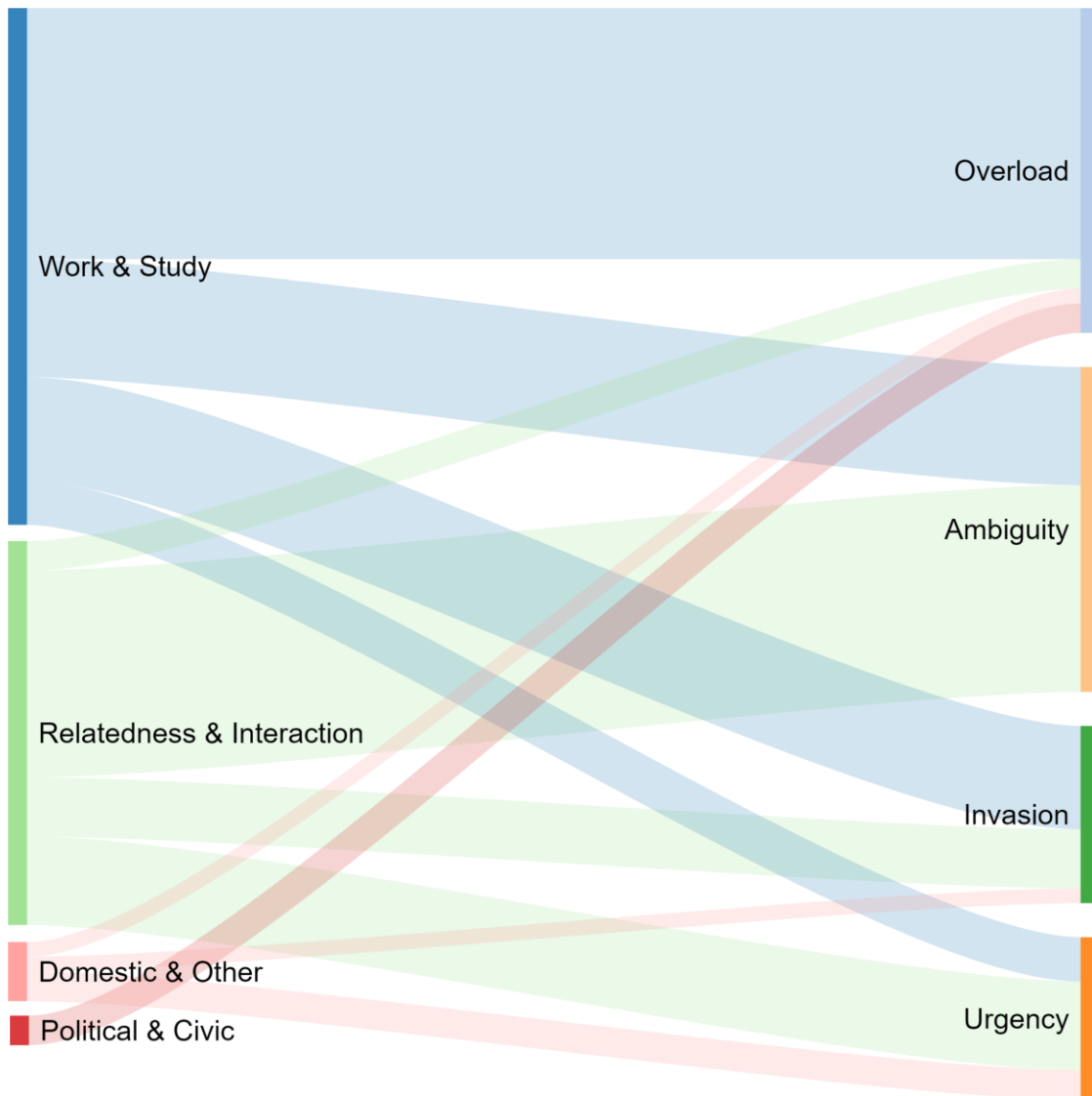
4. MIM
ambiguity

M: Maybe you say something in good faith, but they interpret that you want to aggravate them.

P: Exactly. Or I may simply reply with 'OK,' and I am really paying attention. However, the other person may interpret it as me wanting to finish the conversation, it's this kind of things [...].

(S2, f, 18): [...] when you chat [...] you cannot express everything you want to say without being interrupted. Furthermore, they cannot see, as they would in person, whether what they are saying is hurting you.

Notes. Hashtags indicate the focus group number in examples from Study 1. S2 indicates that the example is taken from Study 2.

Figure 1. Association between MIM uses (left) and MIM stressors (right)

Note. The width of the bands is proportional to the frequency of the association between a specific MIM app use (left) and dimension of MIM stress (right). The associations were coded from the open-ended responses in Study 2. The diagram was created using SankeyMATIC online diagram builder.

Author Bios

Dr. Alberto Ardèvol-Abreu is assistant professor (*contratado Viera y Clavijo*) at the Department of Cognitive, Social, and Organizational Psychology at the University of La Laguna (ULL, Spain). He is also the principal investigator of the research group ‘Laboratorio de Investigación sobre Medios y sus Efectos’ (LIME).

Dr. Patricia Delponti is assistant professor at the Department of Communication Sciences and Social Work (ULL). She is also a member of the LIME research group. For more than twenty years she worked as a journalist as well as a PR professional at public and private institutions.

Dr. Helena Bonache is assistant professor at the Department of Cognitive, Social, and Organizational Psychology (ULL). Her research interests include attitudes and social decision making from a feminist perspective. Helena’s most recent studies focus on gender discrimination and attitudes towards different groups of women.

Prof. Carmen Rodríguez-Wangüemert is professor at the Department of Communication Sciences and Social Work (ULL). She is also a member of the research group ‘Género y Salud’ and the director of ‘Calima, Red Investigadora en Comunicación y Cultura Canarias-África,’ focused on research cooperation with African scholars and universities.