Phenomenology and the Cognitive Sciences (2023) 22:1163–1194
https://doi.org/10.1007/s11097-023-09916-z

From tech to tact: emotion dysregulation in online communication during the COVID-19 pandemic

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Accepted: 18 May 2023 / Published online: 1 June 2023

Abstract

Recent theorizing argues that online communication technologies provide powerful, although precarious, means of emotional regulation. We develop this understanding further. Drawing on subjective reports collected during periods of imposed social restrictions under COVID-19, we focus on how this precarity is a source of emotional dysregulation. We make our case by organizing responses into five distinct but intersecting dimensions wherein the precarity of this regulation is most relevant: infrastructure, functional use, mindful design (individual and social), and digital tact. Analyzing these reports, along with examples of mediating technologies (i.e., self-view) and common interactive dynamics (e.g., gaze coordination), we tease out how breakdowns along these dimensions are sources of affective dysregulation. We argue that the adequacy of available technological resources and competencies of various kinds matter greatly to the types of emotional experiences one is likely to have online. Further research into online communication technologies as modulators of both our individual and collective well-being is urgently needed, especially as the echoes of the digital push that COVID-19 initiated are set to continue reverberating into the future.

Keywords COVID-19 · Emotion · Affect · Technology · Dysregulation · Precarity · Mindful design · Tact

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1 Introduction

Embodied approaches to cognitive science highlight how information and communication technologies (ICTs) provide much of the scaffolding of our cognitive and affective lives (e.g., Smart 2017; Krueger & Osler, 2019a, b; Maiese, 2021). Further catalyzed by the digital push brought about by the COVID-19 pandemic, there has been a flurry of theorizing about how ICTs are a crucial source of affective regulation (e.g., Tucker 2022; Osler & Zahavi, 2022). This theorizing builds on: (1) cognitive neuroscience wherein a strict separation between cognitive and emotional processes has been abandoned for a more integrative approach (Pessoa, 2013), and (2) phenomenology and the philosophy of mind, which have been moving toward embodied, embedded, extended, and enactive ("4E") approaches (Newen et al., 2018), and which advocate for the importance of affectivity (Ward & Stapleton, 2012).

In the case of the enactive approach more specifically it has been argued that cognition is best characterized as affectively charged sense-making (Colombetti, 2014), and that this also applies to the social domain (e.g., De Jaegher 2015; Fuchs & Koch, 2014). More generally, the enactive approach argues that all experiences are shaped by affectivity at their core (Varela & Depraz, 2005), which can be usefully conceived of as a form of affective framing[1] (Maiese, 2016). For the enactive approach it is the existential fact of life's precariousness that lies at the root of why we have a lived perspective for which things matter, and why, in turn, we have many of the kinds of affective frames that we do (Froese, 2017; James, 2021).

Yet the enactive approach goes beyond the condition of a person's biological body by highlighting how a person's social and material conditions, through processes of scaffolding and habituation, shape the types of affective frames one is likely to be living through in any given instance (e.g., see Galbusera et al., 2019; Krueger & Colombetti, 2018a, b; James & Loaiza, 2020; James, 2021). As such, we can readily acknowledge a tight coupling between our affectivity and the conditions of what Krueger and Osler (2019a, b) refer to as our techno-social niche, such that changes in one are likely to bring about changes in the other. In the context of the COVID-19 pandemic and its countermeasures, many of us experienced radical disruptions to this coupling. This provided ample opportunities for unique empirical inquiries of all sorts, as many 'natural experiments' were underway the world over that allowed for huge amounts of data collection. One such effort, explicated in more detail below and relied upon throughout this paper, was by Froese et al. (2021) and James et al. (2022). As we will see, the subjective reports collected in these corpora provide rich insights into the ways in which ICTs are sources of emotional dysregulation.

The primary objective of this paper is to clarify these sources and offer evidence in the form of first-person subjective reports to support them. We do not build towards a general claim as such, but rather present a view of the current state of things based on our data. The paper is organized as follows. First, we provide some framing as to why the notion of precarity is central to our discussion and why the so-called "digital

[1] This constitutive role of affectivity has also long been investigated by phenomenological philosophy with the upshot that, ultimately, the way in which reality is disclosed to us depends on our affective state (Ratcliffe, 2008).

push" that the pandemic brought about intensified this precarity for many. We then specify what exactly was involved in the data collection that this paper so heavily depends upon. Having done that, we outline the results of our analysis: i.e., five dimensions of emotional dysregulation in our relationship with ICTs (infrastructure, functional use, mindful design individual, mindful design social, and digital tact). As will become clear, each dimension reflects a precarious source of emotional regulation that deserves its own level of analysis, some of which we do herein. Finally, we offer some points of general discussion that attempt to integrate insights derived from considering the five sources together, as well as some implications for future research.

1.1 Affective precarity in the techno-social niche

The understanding outlined above, concerning the tight coupling between our socio-technical niche and our affectivity, opens some interesting questions for embodied cognitive science. For instance, we might ask about the spatial limits of embodiment and their basis for lived experience (Maiese, 2018; Valencia & Froese, 2020). Specifically, it remains unclear to what extent digitally mediated interaction can *stand in* for direct sensorimotor interaction, especially in social contexts. Consider the following subjective report about online communication technologies during the pandemic. James et al. (2022) asked the question (Q48) *Have you been connecting with others on-line more often than you did before? If so, what has your experience of using online technologies been like?* Respondent C2: EN_UK_0501, replied.

> It is very useful and I'm not sure what life would have been like without it but it is also definitely not the same as real life interactions. It's harder to feel a connection with people. I feel like I have got used to that but I'm aware that it might not be very healthy to feel so disconnected.[2]

Proponents of the enactive approach traditionally contrasted differences in interactions in online social spaces mostly in terms of their negative outcomes, such as reducing the likelihood of participatory sense-making in online learning (Maiese, 2013) and diminishing empathy due to the virtualization of communication (Fuchs, 2014). Yet work with haptic computer interfaces has also demonstrated that people can develop experiences of social touch, including emotional ones, that are consistent with those associated with bodily interaction (Froese et al., 2014; Lenay, 2010). Indeed, enactive and phenomenological approaches have been summoned in support of the possibility that computer-mediated social interaction can give rise to actual "we-experiences" with affective dimensions (Froese et al., 2020; Osler, 2020).

[2] This unique ID identifies the participant of the survey and whether it came from their responses to the first (C1) or second corpus (C2) released by (Froese et al., 2021) and (James et al., 2022), respectively. The first and second pairs of letters identify the original language used (EN - English, ES - Spanish, or JP - Japanese) and the country of residence of the participant (UK – United Kingdom, MX - Mexico, or JP - Japan, or OO - other) For more details on these copora see the section Subjective reports of experiences of the pandemic.

But these richer kinds of social experiences available in online communication do not come for free; there is a growing recognition that they require their own sets of skills and are therefore the product of learning and adaptation (Froese et al., 2014; García et al., 2022; Osler & Krueger, 2022; James & Leader forthcoming). In general, and assuming adequate technologies are in place, it is only once sufficient user skill has been acquired that computer interfaces start to recede into the background of awareness and become qualitatively transparent, and thereby open up a more direct experience of the targets of the interaction process and the kinds of affective relations they make possible. This is not just true of ICT-based affective regulation but of all technologically mediated experiences to some degree (Froese et al., 2012).

Heidegger (2010) famously demonstrated this general mediation of experience with the rudimentary example of hammering. Very briefly, for Heidegger, when the hammer is in good working order and skillfully wielded it remains in the background of experience and one's attention remains on the task. One is, in a sense, experiencing the world through the hammer and not focused on the hammer itself. But if the hammer suddenly malfunctions in some way, the hammer itself becomes the object of attention and the task is disrupted. The same is true in situations with more affective charge: genuine confidence is only available to the hunter that is facing down the wild animal when their skills are well developed, their weapons are adequate to the task and in good working order, and the environmental conditions are right. Only with these ingredients in place can the technologies themselves (e.g., bow) become transparent and the majority of the hunter's attention be brought to the task at hand, e.g., kill the animal cleanly. In other words, transparency in any techno-mediated interaction is contingent upon a particular attunement between agent, technology and task.

But this attunement is precarious at each point: we may simply forget how to perform due to lack of practice; the task itself may become more complicated than expected; our technologies – whether stone tools or smartphones – might malfunction or work differently than anticipated, etc. Any such failure can shift us from a state of transparent pre-reflective engagement into a state of reflective consideration on some aspect of the agent-technology-task relation. These shifts are typically accompanied by dysregulations of affect, e.g., frustration, anxiety, or anger directed at ourselves, the technological implement, or the task itself.

Crucially, increases in the complexity of technological implements also often demand increases in the complexity of the skills necessary to engage with them[3] and the supporting infrastructure within which they function. In other words, greater complexity often means a higher tendency towards breakdown; more moving pieces means more can go wrong. It follows too that increases in technological sophistication also mean more precarity in the reliability of the emotional regulation they provide. This is particularly relevant in the present era, in which we are collectively dependent upon ICTs throughout much of our personal and professional lives. These are sophisticated assemblages of technologies that mediate our emotional lives in

[3] One can point to button pushes of sophisticated modern tools (e.g., a power drill) as examples in which complexity seems to correlate with simplicity of use. But breakdowns in the power drill case have the potential to be much more demanding and affectively dysregulating than one can expect from more primitive tools (e.g., a hand drill).

multiple and largely hidden ways. Speaking to some of the distinctive features of the affective regulating capacities of these technologies, Krueger and Osler (2019a, b, p. 207) write that

> We are increasingly dependent on our techno-social niches for both negotiating and regulating contours of our own affective life and participating in the affective lives of others. However, unlike many of the other environmental resources we use to regulate affect, we argue that the Internet has several distinct properties that introduce new dimensions of complexity to these regulative processes. First, it is radically social ... Second, it is a radically distributed and decentralized resource. No one individual or agent is responsible for the Internet's content or its affective impact on users … These properties … introduce some new challenges ... [W]hile the Internet can profoundly augment and enrich our affective life and deepen our connection to others, there is also a *distinctive kind of affective precarity built into our online endeavors* as well."[4]

Given that the internet is 'radically social', given that it is 'radically distributed and decentralized', given that it is just so utterly complex, to the extent that it can be used to regulate our emotions, this relationship is a precarious one. Kruger and Osler mostly argue in favor of how the Internet can be a powerful source of positive affective regulation. However, they also point out that this regulation, given its particular precarity, can just as easily be a source of affective dysregulation. They do not go into this in any detail, but they do highlight a few features of the technologies themselves and our relationship to them that lead to affective dysregulation.

For instance, they argue that the *portability* of such technologies means that our niches can more easily intrude on one another, leading to dysregulated emotions, e.g., my work niche can more easily intrude on my home niche if I don't properly configure my notifications. They also highlight how we can develop an *overreliance* on such technologies, i.e., given the portability and adaptability of our phones, we can come to depend on them so much for our emotional regulation across such a variety of situations that when they are absent or malfunctioning, we find ourselves at a reduced capacity to emotionally regulate. Precisely because these technological assemblages are so complex, malfunctions are common and we often find ourselves frustrated with one or another feature or function that stands in the way of us and our task: they run out of battery, fail to get signal, fail to pick up WIFI, update at inopportune times, fail to update when needed, fail to connect, connect incorrectly, fail to login, fail to download, fail to upload; speakers, microphones, headphones, buttons, Bluetooth connections fail. The list is near endless and ever evolving. If we wish to continue using these technologies for all the things they can provide whilst mitigating their dysregulating capacities as best as possible, an instructive starting point will be to further the inquiry that Krueger and Osler have begun and look deeper into the ways in which the precarity of our techno-social niche can be a source of dysregulation.

[4] The italicized words reflect our emphasis.

Importantly, also following Krueger and Osler (2019a, b), when referring to the emotional and affective dysregulation brought about by interacting with these technologies, we are referring in general to any feeling states that characterize our affective lives. The notion of affect is typically understood as an umbrella term for a host of types of feeling states, e.g., emotions (typically short-lived, e.g., anger), moods (typically longer lived than emotions, e.g., gloomy), atmospheres (attached to a particular space, place or event, e.g., tension), and existential feelings (enduring and typically occluded from conscious awareness, e.g., belonging) (e.g., Ratcliffe 2008; Colombetti, 2014). Nevertheless, we will use the terminology of affect and the more common term emotion interchangeably throughout to refer to such feeling states in general, as herein nothing important turns on these more precise conceptual distinctions. And again, following Krueger and Osler, the *regulation* of these feeling states refers to how they are shaped and modulated, when they are produced and for how long they persist, how they are experienced from a first-person point of view, and how they are expressed by the body (2019a, p. 207). Also, importantly, in contrast to accounts of inter-affective processes, shared emotions, and so on (e.g., Fuchs 2014; Luo & Gui, 2022), the target of our inquiry is dysregulation at the individual level, even if at times that dysregulation is emerging from interactions with others.

1.2 Heterogeneity in the digital push

By now, the medical literature testifies to the fact that the calls to mental health action during the early stages of COVID-19 were justified, for the pandemic and attendant counter measures did lead to substantial increases in mental health problems (e.g., Richter et al., 2021; Lowry et al., 2023). Yet there has also been much heterogeneity in people's experiences (Carel et al., 2020). Many people showed great resilience and capacities for coping (Prati & Mancini, 2021). One common coping strategy–although itself multifarious–was to turn to online communication technologies to compensate for lockdown restrictions and social distancing measures (Dimmock et al., 2021). Indeed, during the pandemic the use of many digital communication tools, including video conferencing, became much more widespread (OECD, 2021) for both personal and professional purposes. Blog posts (Manhit, 2021) and opinion pieces (Gallistl et al., 2021) reported widely on this rapid uptick in usership in terms of a 'digital push'. Some were better equipped for this push than others. For the former, these technologies became essential tools in their abilities to cope with lockdowns and social restrictions. As such, physical distancing didn't necessarily entail social distancing, and the restrictions placed on their physical movement during the early phase of the pandemic did not come close to a situation akin to social confinement (Gabbiadini et al., 2020).

Others were not so ready. We do not have the space herein to elaborate on precise breakdowns of demographics, but in general we see that, for instance, communities and individuals living in more rural areas, the elderly, and people in care tend to be both: (1) much less well technologically resourced, and (2) lacking in the skills that would allow them to make full use of technologies that were available (e.g., Byrne et al., 2021; Mujahid et al., 2021, Gallistl et al., 2021; Sen et al., 2022). Often these indi-

viduals are already more isolated than most[5]. As such, the transformative potential of digital communication technologies for them is maybe even more sizeable than it is for other populations. However, the changes that such transformations would require entail not only a broader distribution of infrastructure, but also training in its sensible use, which might happen along several dimensions (Horst et al., 2021a; Stuart et al., 2022; Xie et al., 2021).

For example, skills need to be acquired for dealing with breakdowns in infrastructure, such as working around unreliable connections. Additional skills might also be relevant to the use of particular applications for particular functions. Other skills pertain to things like avoiding the use of video chat for extended periods to minimize fatigue (Bailenson, 2021), or engaging in online social spaces in ways that reduce the risk of, for instance, sharing potentially sensitive materials or information (Krueger & Osler, 2019a, b). More sophisticated still are the kinds of skills that support the quality of social connections in these spaces. As we will explore shortly, lacking skills along any of these dimensions increases the probability that engaging in social life online will be a source of some affective dysregulation.

2 Subjective reports on experiences of the pandemic

As previously mentioned, during the COVID-19 pandemic many researchers leveraged the natural experiments that were underway. One international team of researchers that included the authors of this paper was interested in the ways in which social restrictions impacted various features of people's lived experience (Froese et al., 2021; James et al., 2022). They issued detailed questionnaires that collected subjective reports from nearly two thousand participants. Participants were originally recruited via online ad campaigns that were openly accessible around the world, but the ads were targeted at people living in Japan, Mexico, and the United Kingdom (UK) to capture socio-culturally diverse experiences from regions that were relevant to the research interests of the team. The team was highly interdisciplinary, specializing in psychology, philosophy, phenomenological psychopathology, psychiatry, medicine, computer science, and anthropology. Taking inspiration from phenomenological philosophy (Carel et al., 2020), they crafted 42 questions aimed at eliciting reports of people's experiences of various essential aspects of day-to-day life during the pandemic.

The questionnaire was open for participation at two different moments of the pandemic. Corpus 1 (C1) was collected from June 5 to July 31, 2020, and Corpus 2 (C2) was collected from April 7 to July 31, 2021. The second time it was only accessible to previous participants, resulting in two corpora that permit diachronic analysis. The minimum age to participate was 18 years. C1 includes responses of a total of 1,801 participants, of which 543 participants responded a second time. The questionnaire

[5] This is not to say that they experience more loneliness as such. The relationship between physical and social isolation and loneliness is a complicated one. For an insightful overview and links to much relevant data on loneliness, including during the pandemic, see www.rootsofloneliness.com.

and two corpora are publicly available, see Froese et al. (2021) and James et al. (2022) for full details and links to sources.

In this paper, we are only concerned with answers to Q.48, which asked participants about their experiences using digital communication technologies. It was worded as follows. *Have you been connecting with others on-line more often than you did before? If so, what has your experience of using online technologies been like?* We adopted a mixed methods approach to analyzing responses. We initially parsed our data to limit our focus. Firstly, by focusing only on participants who filled out both questionnaires, resulting in 527 and 482 responses to this question in corpus 1 and 2, respectively. And secondly, using Google Cloud Natural Language API, we carried out sentiment analysis on our data to help us sort the remaining responses into those that contained positive and negative valances. Out of 1009 (C1_527+C2_482) responses, approximately 60% (or 634) are affectively charged, which includes both positive, negative, and mixed responses. This applies to both surveys, meaning that each participant has been included twice. Out of this total of emotionally charged responses, 25% (159) are negatively valanced. Given that our concern for this paper is to consider the dysregulation of affect by ICTs, we focused solely on these negatively valanced responses.

From these responses, after quantitative coding using Atlas.ti, we have the following approximate breakdown of percentages: 25% of respondents responded in ways that we can acknowledge their affective dysregulation in relation to ICTs but have no further insights about the causes of it; 10% of respondents simply complain about being 'exhausted' by such technologies but offer nothing more definitive about the precise causes of this exhaustion; and finally, 65% of the negatively valanced responses actually provide more sufficient details about what the sources of their dysregulation are that they can be further classified. Thus, it is from this 65% of responses that the dimensions of affective dysregulation we highlight in this work come. Having isolated this data, we adopted a reflexive thematic analysis approach (Braun & Clarke 2021), developing and refining our themes in an iterative process of theorizing and data analysis. We are aware that this form of qualitative analysis is not typically carried out in conjunction with the kinds of computational methods just mentioned. However, one question for us in this project was whether the combination of the methods would be fruitful. We hope our efforts go some way to suggesting that they can be.

The five themes that were generated through our analysis are *infrastructure, functional use, mindful design (individual and social)*, and *digital tact*. We do not assume this to be an exhaustive list of possible dimensions; however, we do find that all the reports in our data with enough detail to be interpretable can be accounted for according to at least one of these dimensions. Moreover, we acknowledge that each dimension could be further refined to account for the specifics of a given phenomenon. Indeed, part of the motivation for this paper is to articulate the most common dimensions of affective dysregulation when interacting with ICTs precisely in order to direct more targeted future efforts. Within each dimension, we provide some examples of the types of more targeted analyses that might be made. Herein they pertain to specific forms of technological mediation (i.e., self-view), and types of interactive dynamics (i.e., gaze coordination). It is worth noting that there is no principled reason

for having chosen these precise elements to focus on. Regarding the technological mediation we could have looked at signal latency, the specifics of this or that application, the particularities of smartphones, or any of a multitude of other elements that mediate the dysregulation of affect. Likewise with the interactive dynamics: turn-taking, auditory or gestural coordination, sharing context, or any other interactive dynamic that is relevant to the production of meaning in social interactions could have been up for consideration. That said, there are *some* reasons for having chosen to focus on the self-view and the coordination of the gaze.

The self-view feature of video calling technologies is typically a small segment of one's screen on a laptop or smartphone that allows for viewing what the front-facing camera captures, normally one's face and some environmental background. Although the self-view feature of video-chat technologies has only recently became something of a cultural discussion point, it has been around for some time. The Mitsubishi Luma 2000, first released in 1989, would send black and white stills of your image to whomever you were chatting to (and theirs to you, assuming they also had a Luma phone), while a front-facing camera would capture a moving image of you to be displayed on the screen alongside intermittent snapshots of your interlocutor. Of course, any time the image was being transported the audio from the call would drop out, for six or so seconds, as the image data had to be translated into audio data to then be shuttled across the telephone lines (del Valle, 2020). Video chat technologies have come a long way since and by now the self-view is a "locked-in" feature, i.e., it is expected by default in any video chat software. Indeed, as of the time of writing, for many popular platforms although there are sometimes workarounds, there are no obvious options to toggle the self-view on and off.

Some suggest that the reason the self-view has become so locked in is that it solves the *orientation problem*, it "shows you the image you're presenting to others — whether it's out of frame, unflatteringly angled, or poorly lit." (del Valle, 2020). This makes good sense and there is certainly precedent for it. We look in the mirror before leaving the house or car. We review and curate the still images of ourselves that we allow to be published online. Any such activity might be understood as an example of what the sociologist Erving Goffman calls 'face work', whereby one acts/presents in such a way as to preserve an image/narrative one is trying to project (Goffman, 1955). Whether or not the self-view makes a positive contribution to such work is an open question. For instance, recent research on the modulating effects of self-view suggests that open self-viewing windows can lead to more negative performance appraisals on workplace interactions, reduced satisfaction with conversational outcomes, less accurate appraisals of their conversational partners' liking towards them, and more negative evaluations of their partners (Shin et al., 2022). The self-view, then, seems to be quite a clear and relatively ubiquitous disruption to the expected dynamics of social interaction. Thus, it stands out as a potentially fruitful form of technological mediation within which we can refine our analysis.

By gaze coordination we mean that ability to coordinate the gaze in social interaction through patterns of establishing and breaking eye contact, and directing our eyes to features of our environments. The gaze is a deeply social dimension of our embodiment, serving a dual function in social interactions. It allows us both to signal to others and receive their signals (e.g., Argyle & Cook 1976; Gobel et al., 2015;

Risko et al., 2016), and in doing so facilitates things like perspective taking, sharing intentions, establishing joint attention, and developing rapport and trust (Tomasello 2018). Many social coordinations that employ the gaze have strong affective dimensions. We know much about, for instance, how the gaze is used to signal and perceive things like dominance (Emery, 2000), or social approval (Efran, 1968). Of course, different individuals and different cultures will often have very different habits of gaze coordination, but that it plays a significant role in the regulation of affect is uncontroversial.

One valuable dimension of assessing the gaze here is that from a first-person standpoint, many of us are keenly aware of how we are coordinating our gaze and generally have good intuitions for it (not to say that we are all skilled in its coordination). These intuitions likely play some role in explaining why the gaze in video calls became an object of popular discussion during the early days of lockdowns (e.g., Lovink 2020; Sacasas, 2020; Caines, 2020). This also makes it an available object of study using only the reflective methodologies of phenomenology and thus a good fit for our purposes. Not all the dimensions lend themselves to fruitful analysis of self-view and the gaze coordination, but where it makes sense to do so, we do.

This complex mixture of technological, personal, and social conditions helps us to appreciate why the digital push has evoked mixed feelings (Khoshrounejad et al., 2021; Meier et al., 2021). Some have embraced it, but this enthusiasm is not ubiquitous. For those who are enthusiastic about the possibilities of these spaces, skilled in their navigation, and already deeply entrenched in the full complexity of the relations they enable, the lack of enthusiasm by others may at times be surprising. But this fails to recognize the degree of transformation these technologies bring to people's lives. Consider the following.

> "To be honest, I've started running away from Zoom parties whenever possible. I think everyone must be bored by now, because people I hadn't talked to in over a decade have started coming out of the woodwork to ask me if I want to have drinks over Zoom and I can't figure out for the life of me why they would want to do that" (C2: EN_JP_0018)

This quote reveals that once the necessary infrastructure and basic functional skills have been acquired, the focus of concern shifts to how we work with these technologies to meet our needs and navigate the new social realities they call forth.

Video chat is changing the dynamics of existing social arrangements, such as therapist-patient or teacher-student relations (e.g., García et al., 2022). The norms that organize these relations are deeply embedded in what James (2021) has termed our participatory frames, i.e., habitual normative organizational patterns that tend to be characteristic of pairs or groups with histories of interacting in familiar materially scaffolded spaces e.g., classrooms, workplaces, homes, towns, countries (see Heft et al., 2014 for similar ideas relating to so-called 'behavior settings'). Although manifest in and through the people who inhabit these spaces, these frames have a kind of life of their own, persisting oftentimes beyond the lifespan of any agent that might embody them. When we attune to them within situated social interactions, we incor-

porate their normative dimensions into our bodily dynamics and thus reproduce the existing order, i.e., the culture of that place.

But these frames are heavily reliant on invariant material infrastructures and when we move classrooms and boardrooms into virtual spaces, we are radically altering the material infrastructures that embed our practices. As such, we might expect the norms that govern them to also be challenged. Many whose lives were heavily redirected into online spaces during the pandemic will have had some experience of this. Indeed, even those of us who were 'ready' for the digital push, continue on a relatively steep learning curve, largely by trial and error, of how to co-regulate our interactions in these new virtual spaces. This involves developing sensitivities to the differing norms associated with various online social spaces, and also the wisdom to interact in a way that is considerate of the others' online presence, what has been referred to as 'digital tact' (James and Leader forthcoming). All this transformation, all this flux, all this novelty only adds to the precarity of these techno-social niches, and thus their potential for affective dysregulation.

Particularly for those who remain isolated in the wake of the digital push, it is important that we grasp the various ways in which interacting with these technologies can be emotionally dysregulating. Such dysregulations become barriers to engaging with these technologies for ameliorative ends, or even simply for the pleasure of connecting with our friends or having fun online. Herein we make no strong assertions about the links between affect, ICTs and mental health in general, nor do we make any specific recommendations for ameliorative interventions. We simply aim to elaborate the various dimensions according to which our emotional lives can be dysregulated by our interactions with ICTs. By clarifying these dimensions, we hope that this work will be instructive to those making interventions to support positive mental health outcomes.

In the sections that follow, we draw on select quotes from the previously mentioned corpora to offer a deeper analysis of each dimension and the relations between them. Something to keep in mind is given that our questionnaires were carried out online, it is fair to say that our data and analysis is not representative of any complete population. Anyone taking it has at least some access to the internet and at least some basic skills in the functioning of these technologies. As such, dysregulations according to our first two dimensions (infrastructure and functional use) are likely significantly underrepresented in our data. Moreover, there may well be other dimensions of dysregulation characteristic of individuals with even less access and skills than any reflected herein, e.g., technological alienation.

3 Five dimensions of ICT-based emotional dysregulation

As implied in Fig. 1, when we move from the consideration of dysregulation at the dimension of infrastructure through to dysregulation at the dimension of tact, we are also moving towards ever smaller populations of users. To be part of the sociotechnical niche is necessarily to be engaged with its infrastructure and its functional use. Yet developing tact in these spaces, or even a sensitivity to the tact of others, is by no means guaranteed, even after months or years of use. We do not suggest that

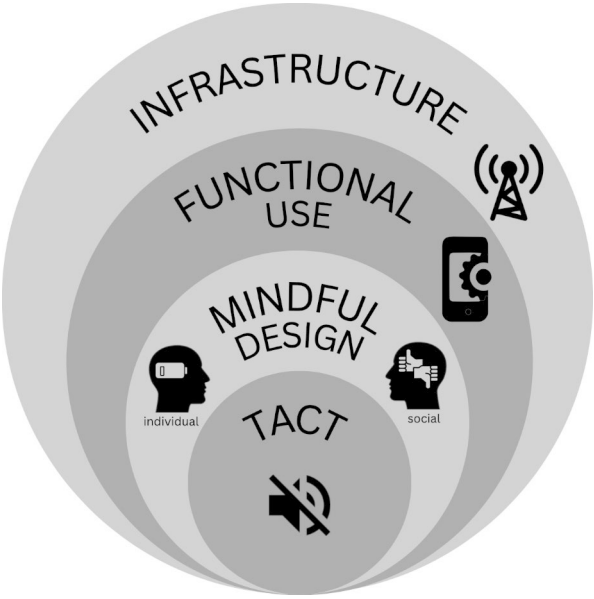

Fig. 1 This graphic depicts the nesting of five dimensions of affective dysregulation that are associated with the use of digital communication technologies

there is a perfect nesting of these dimensions, such that one necessitates or directly follows from another other. But as a general scheme we can say that as sources of affective dysregulation, *technological infrastructure* is the most primary, followed by *functional use*, after which comes *mindful design individual* and *mindful design social*, and lastly *digital tact.*

3.1 Technological infrastructure

This dimension relates to the availability and adequacy of technological resources necessary for enabling fluid communications and immersion in online spaces, e.g., having a smartphone with a video camera and video chat applications installed and updated; being in an area with sufficient cellphone coverage or Wi-Fi signal; having a good mic and headphones.

Out of the 5 dimensions, complaints about technological infrastructure are amongst the most common, even though, as we have already said, they are likely underrepresented[6]. Most concern issues with Internet bandwidth. For example, respondent C1: EN_UK_0037 writes, "I have done several Zoom meetings for work and it has been disastrous due to weak internet connection. One of my daughters has had tuition online and it did not work - it was a waste of valuable time when she could have been learning with me." Given the networked nature of these technologies, even when we ourselves are well infrastructurally resourced, others we engage might not be, which

[6] Of course, there are also positive reports, especially from people who invested in quality infrastructure, as this example illustrates: "Love it - I bought better tech just before lockdown - while others were panic buying toilet paper I was panic buying a good webcam, tripod, extension leads and mic!" (C1: EN_UK_0104).

can equally lead to frustrations and affective dysregulation, e.g., 'Internet connectivity issues have had an impact on communication with those family members who are either less tech-savvy or have less bandwidth." (C1: EN_UK_0173). Such interactions can be terribly frustrating and there is often a tendency within them to direct blame not only at the technology itself, but their proprietors (e.g., we get annoyed with the person on the other end of a bad line, even though they have no control over it) which can lead to cascades of negative affect.

Following previous surveys (e.g., Byrne et al., 2021), negative sentiment within this dimension is particularly salient in more rural and economically disadvantaged areas. C1: EN_UK_0506 writes, "yes, but our rural internet provision is poor, so that has been a barrier". Likewise, C1: ES_MX_0389 reports, "Yes, I have connected with them, but in my town online communication is poor and has made it difficult.". We cannot say much about the extent to which these limitations are affectively dysregulating for these participants beyond generating negative sentiments, but more frequent breakdowns and greater precarity likely means higher degrees of dysregulation. It may be, however, that overall, the kinds of affective dysregulation breakdowns in infrastructure lead to, albeit acute, are generally quite short-lived, e.g., bursts of frustration, anger, or momentary stresses and anxieties. Within the cyberpsychology literature this is sometimes referred to as 'technostress'.

Technostress typically results from some form of digital overdose: too many tasks, too much connectivity, too much information, too many upgrades and technical glitches (Brod, 1984; Tarafdar et al., 2010). Of course, 'too much' or 'too many' is a relative term, and so technostress, like all stress, relates to both the source or stimuli (technologies and their malfunctions), and one's capacities and self-appraised capacities to cope. Although these stresses may typically be quite minor, if one is expected to use these technologies in, for instance, remote working contexts, this ongoing precarity may add-up to more prolonged dysregulations of affect, e.g., experiences of exhaustion and burnout. There has been some empirical work looking at the impact of this kind of stress within organizational contexts. Reporting on such work, Vidolov (2022, p.5) writes that

> Different technostress creators result in strains that can be either psychological or behavioral. The psychological strains are emotional reactions to stressor conditions and include, among others, dissatisfaction with the job, depression and negative self-evaluation, whereas the behavioral strains include reduced productivity, increased turnover, absenteeism and poor task performance (Tarafdar et al., 2010).

At the time the data referenced here was collected, technostress was mostly a concern within work contexts. One could, by and large, avoid most such stresses if one's job was not dependent upon them. But in the pandemic and post-pandemic world, where we are so ubiquitously dependent upon smartphones, technostress is a feature of life well beyond the workplace.

Self-view The most obvious way the self-view is a source of affective dysregulation within this dimension is when the self-view fails to work as advertised even though

one has come to rely upon it in some way. For instance, the dissonance that comes from a frozen self-view, when one's projected image is suspended in a typically less-than-flattering pose whilst they are left to get on with their presentation/conversation. Or when, for some reason, it fails to work at all, and one cannot confidently align their camera with a desirable presentation of themselves and their space.

Gaze-coordination Even when our present technologies are readily available and functioning as advertised, coordinating the gaze in digital spaces remains severely disrupted. Two primary elements of the technologies are at work here, one spatial and one temporal, and both introduce new forms of precarity. Firstly, the positioning of the camera relative to the gaze of the other on screen. On the one hand, we tend to gaze periodically at the other's face and eyes when speaking to them, but within their view this is seen as gazing off to the side or top. On the other hand, if we wish to be seen looking directly at them, we must look straight at our cameras. But our cameras are off screen, and thus when looking at our cameras we no longer see the gaze of the other looking back. This kind of disrupted spatiality is even more so the case in group calls. Multiple participants are typically displayed in a tile view that is arranged differently for each viewer. As such, the coordination of the gaze proves impossible, as one can never be sure where any other participant is presently looking (see Jackson 2021 for a more thorough analysis of multi-person online interactions). This is very different from co-located group interactions, wherein we can scan and meet the gaze of others in the context of an ongoing conversation.

Secondly, the timescales within which our gaze coordination functions are often more rapid than technological mediation can support. This comes down to lag or latency brought about by the limitations of digital technologies, in which video lag is common even when working well. A respondent in our data reflects on how such disruptions contribute to affective dysregulation: "used zoom - is ok but exhausting and unwieldy- poorly synchronized talking and lack of eye contact makes speaking in a group difficult …" (C1: EN_UK_0302). Using these technologies sometimes seems to demand more cognitive resources and energy than we might expect from comparable interactions offline, leading to what has been termed 'Zoom fatigue'. Although it is yet to be investigated empirically, some suggest that the frustrated coordination of the gaze might have a role to play here (e.g., Sacasas 2020; Lovink, 2020).

3.2 Functional use

Functional use relates to the appropriate knowledge and engagement with available technological infrastructures to facilitate online communication, e.g., knowing how to connect to a Wi-Fi signal; how to access the proper applications; how to set up a video call; how to invite others to a call; how to share one's screen. For those of us who developed this kind of literacy as part of our schooling or cultural immersion, it is easy to underestimate the depth of knowledge that is at work here. Such skills are sedimented in the background of our habitual relations to the socio-technical niches we occupy and share with others. Our sense of having a grip on these niches, and even the most seemingly basic affordances they support, is a consequence of hav-

ing incorporated multiple layers of culturally attuned capacities. These capacities minimize the friction we experience when we interact with these technologies and navigate novel developments. But not everyone has benefited from such learning, e.g., older generations or individuals and groups who actively chose to limit engaging them. For such individuals, this dimension of the digital push has likely been even more affectively dysregulating than for most. Indeed, like with any learning experience that is poorly designed, (Maats & O'Brien, 2013) the frustrations experienced trying to get to grips with these technologies for the first time have likely led to many adaptive responses in the other direction, e.g., justifications for why they needn't get to grips with this or that piece of technology (James 2020).

Because these people have not engaged deeply with these technologies previously, some of the precarity comes from lacking any sort of principled understanding of relatively generic interface architectures. As such, they will tend to rely on memorized steps for using individual apps. But this kind of knowledge is highly fragile to deviations from the prescribed path (Mayer, 2002). Consequently, they are likely to often find themselves out of bounds and disoriented, or experiencing anxiety at the sense that they will be out of bounds with one false step. All of this limits their technological self-efficacy (Pan, 2020). We get a sense for this kind of precarity in the following quote from a 57-year-old support worker in the UK (C1: EN_UK_0287) responding to Q.48. In the first corpus they write: "I have watched church services online. I have avoided all other live posts and anything involving a camera or microphone, as I would struggle to use them." In response to the same question a year later, they contend, "Slightly more, via already existing technologies. I find "live" technologies involving cameras and microphones impossible to use." (C2: EN_UK_0287).

Without more details it is impossible to say with any real certainty what is going on here. But the way in which they admit to using 'existing technologies' more, but contrast these with 'live technologies', seems relevant to our discussion. This individual is clearly able to make use of these technologies on a limited basis, watching "church services" or using "existing technologies". However, their abilities seem not to generalize, and they admit to struggling and being avoidant with 'live' technologies. Given the emphasis they place on the "camera and microphone" we expect they are referring to video conference calling apps like Zoom or Skype. As one of our anonymous reviewers pointed out, it may be that this person simply feels alienated from these technologies, that they are somehow 'not for them'. This is very possible, likely even. But even if it is true, we expect that they also have a relatively rote understanding of the functionality of these technologies such that they remain, even after one year, uncomfortable with "anything involving a camera or microphone". Cameras and microphones can be difficult to navigate and configure even for those of us well-versed in their usage. However, with a more principled understanding of these interfaces, one can more easily navigate and troubleshoot issues that do arise. Success in this regard is part of what it means to develop technological self-efficacy. In this case, one has the sense that this individual has not been educated with such a principled understanding.

Self-view Within this dimension the self-view acts as a form of affective dysregulation in the ways in which one can manage its appearance, including whether one can

turn it on and off. It is part of the default interface in most applications, and while some do allow for repositioning on the screen and toggling between on and off, others do not. The ambiguity around this function across platforms can also lead to dysregulations of emotion, feelings of frustration, anxiety, anger and so on, where, for instance, one may assume that it is toggleable where it is in fact not; or know that it is but not quite know how to toggle it when necessary, maybe because it differs from one they are more familiar with.

Gaze coordination Within the standard setup of a screen-mounted off-display camera, simply understanding the basic dynamic–that your partner is seeing you from the point of view of your camera and not from the point of view of their eyes–is part of the basic functional configuration of the socio-technical niche. Many of us will have encountered the side view of our conversation partner when their webcam is mounted on their laptop which is positioned off to the side, while they view us on a monitor assuming they are speaking straight to our faces. The self-view is, at least in part, intended to help mitigate these kinds of functional misuses; it is there not just so that we can see ourselves but that we can see what our partner sees. But one needs to know to use it for this purpose, rather than, say, as if one were looking at the mirror. The general insight is that even if we are not coordinating our gaze in ways that support eye contact, there is still value in at least having a sense that one knows where the other is looking. Future empirical work will help clarify these kinds of insights, where they hold and where they need to be adjusted.

3.3 Mindful design - individual

The intersection of notions of mindfulness and technology has been gathering steam in recent years (e.g., Martin 2021). This is not the place to wade into the many intricacies of the debates that lie at this intersection. However, with the phenomena of affective dysregulation in mind certain distinctions that emerge therein are valuable. Martin (2021) makes some helpful distinctions regarding various types of mindfulness and uses of the term. The most common contemporary Western usage derives from the work of John Kabit Zinn, who understands mindfulness in the context of psychotherapeutic intervention and is well known for developing so-called Mindfulness-Based Stress Reduction (MBSR), a treatment program for helping people to cope with stress. Zinn defines mindfulness as "awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally to the unfolding of experience moment by moment." (Kabat-Zinn & Zinn, 2013 p.21). Conversely, Martin views mindfulness more as a virtue than a precise state of mind, or, more accurately, a virtuous state of relating to oneself and one's surroundings. For Martin being mindful means "paying attention to what matters in light of relevant values." (2021, p. 98). This allows for quite different expressions of mindfulness and can thus be accommodated within various systems of value, both religious and secular. Part of what Martin is getting away from with this account is any sense that states of attention can be value-free. Thus, this is much more in line with embodied approaches that see all sense-making as value-laden (e.g., Varela et al., 1991; Thompson, 2007).

The notion of design at play here originates in the work of Winograd and Flores (1986) in their text, *Understanding Computers and Cognition: A New Framework for Design*. Inspired by the philosophy of Martin Heidegger, their basic insight is that when we design, whether its 'objects, structures, policies, expert systems, discourses, even narratives' we are 'creating ways of being' (Escobar 2018, p.4). We design our worlds and they design us back in ongoing reciprocity. Design, in this sense, is not just in the formal activities of architects and graphic designers but is a ubiquitous practice; "it is literally everywhere; from the largest structures to the humblest aspects of everyday life, modern lives are thoroughly designed lives" (Escobar 2018, p.2). Indeed, Ezio Manzini defines design as a "culture and a practice concerning how things ought to be in order to attain desired functions and meanings" (2015, p.53). In other words, the culture and practice of design is in all of us, not just as a process of material reconfiguration, but as one of reconfiguring our being-in-the-world, often through the modification of our material environments. In this sense, design has an ontological dimension. Indeed, the positions outlined above are sometimes collected under the notion of *ontological design*.

James (2020) has recently brought this perspective into conversation with enactive approaches to cognitive science. He argues that a thorough understanding of the nature and practice of ontological design needs to also appreciate the processes of individuation that support the emergence of the habitual structures that undergird our individual and collective behaviors, affects and identities. Moreover, he offers a formal naturalistic definition of design as a spatiotemporally extended form of adaptivity, whereby *an agent (individual or collective) regulates their own activity in the local present with the intention of supporting the regulation of some variable(s) at more distal timescales*. This can involve socio-material reconfiguration, but it can also encompass elements of learning, practice and rehearsal.

Drawing upon this framing *mindful design* pertains to the ways in which we engage with our technologies such that we can mitigate against their potential downsides whilst amplifying their possible advantages (as we understand them to be). There are a couple of broad ways this can be interpreted: (1) the way we engage as everyday users of these technologies and the degree to which our engagement with them reflects our values, and (2) our development, manufacturing and implementation of these technologies and the ways in which these might reflect some shared values. Given that our focus herein is on how different individuals relate to the same technologies in often very different ways, we elaborate only on the former category. This is, of course, not to say that the latter is somehow less important. Indeed, from a utilitarian calculus, one would have to admit it is of far greater importance. However, such higher-order interventions will be most effective when they are made considering the kinds of analysis we are developing here. As such, this work may be understood as one small step in that direction also.

Mindful design is very much an embodied affair and one that is spatiotemporally extended. Importantly, it has at least three general elements that need to be understood in relation. The most obvious dimension is being present to the ways you are using a particular technology so that use is in line with what matters to you, e.g., the times and ways you do and do not use it, and so on. What mindful design includes that is not explicit in the general notion of mindfulness that Martin develops, is the

idea that paying attention to what matters, or acting or configuring our environment in line with what matters, is shaping the future conditions within which we pay attention, act and configure. Every act of paying attention is in a sense an act of design, thus every act of mindfulness is an act of mindful design, whether understood in those terms or not. When we act in particular ways in particular conditions, we are setting up the conditions for how we are likely to act in future similar circumstances through processes of habituation.

But to be present in this way also means having previously discerned how your interactions with these technologies can be aligned with what matters to you, e.g., avoiding excessive technostress. Thus, mindful design also entails an ability to recognize these patterns, e.g., those that emerge between particular features of your techno-material environment and particular emotions. In this sense, it means building up a base of knowledge within which one can demonstrate the presence of mind described above. Finally, it means being able to configure the kinds of scaffolds that make the above two elements more probable. This can mean everything from where we position our technologies in our living spaces, to how we set up their functions, to the language we use to talk to ourselves when acting in these contexts. And so, understanding and establishing scaffolds of various kinds, and continually iterating on the design of these is part of acting mindfully in these spaces.

Mindful design is, in effect, a practice of care, one in which we are continually iterating to attune our affective niches to our values and needs and avoid slips into dysregulation. However, given the nature of these spaces–the vast array of affordances at our fingertips, their rapid evolution, how they have been engineered to capture and control our attention and agency, and their decentralized and highly networked character, etc.–any attunement is ultimately precarious and only ever a temporary one.

The opposite of being mindful is being mindless, which is to say not paying attention to what matters, even though you might be aware–were you to stop and reflect–what that is. The source of dysregulation in this dimension really comes from a kind of mindlessness in the ways in which we interact with and through our technologies. This is not to say that the 'mindless' person is being "lazy". The conditions within which one is more likely to be mindful are complex and relate to everything from energy levels and sleeping habits, to environmental conditions of all sorts. Indeed, given the character of these spaces, mindlessness is almost inevitable for most of us at least some of the time and is only ever a flash, beep, click, scroll or swipe away. As Krueger and Osler (2019a, b) point out, when we are entrenched within our sociotechnical niche, many agencies organize the space within which we act, and we are subject to all sorts of forces that can both empower and diminish us.

Although this mindlessness may be difficult to pin down and define, we know it when we see it, or, more commonly, feel it–typically after the fact. After a mindless instance we might have the sense of waking in ourselves, acknowledging that for some period our attention had been captured by something which had we been given the 'choice' we would have preferred to avoid. We get sucked down a video rabbit hole; lost in a click-bait spiral; entranced by the infinite doom of scrolling through our news feed. We find that we haven't stood up from our desk in hours even though our body aches; that we are staring into our screen way past our bedtime despite the

throbbing in our heads; that we are grabbing for our phones first thing in the morning even though we woke up feeling anxious.

What it means to be mindful or mindless with the use of these technologies will be different for different people, but one universal way to gauge some of our mindlessness, at least as it impacts ourselves, might be to ask to what extent our interactions are generating technostress. When we do not set proper boundaries when using these technologies and continually reinforce them–even employing other technological scaffolds to help us do that (e.g., reminders, blockers)–we are much more subject to a kind of mindless engagement, and in turn having our agency and attention jostled and jolted in ways that are emotionally dysregulating. Of course, the types of affective dysregulation possible within this dimension run the gambit, from mild annoyances (e.g., I fail to set the notifications on my desktop), to life-altering addictions (e.g., internet gambling or pornography).

Evidence for emotional dysregulation in the absence of value-aligned designs is abundant in our everyday lives, e.g., when we stare at our phones past our bedtime or find ourselves adding stuff we don't need to our online shopping carts. But it is also present in our data. For instance, C1:EN_UK_0070 writes "I've been spending a lot of time unnecessarily scrolling on my phone and not particularly messaging people. Feel as if people don't keep in touch anymore." The language of "a lot of time unnecessarily scrolling" suggests that this respondent recognizes that their phone is a source of dysregulation when used in certain ways, but nevertheless they persist with such actions. Most of us are well versed in these experiences and the feelings of shame, stress, anxiety, frustration and even anger that accompany them. Mindful design here entails attuning to the ways in which we are being dysregulated by these technologies, the presence of awareness that allows us to mitigate such dysregulations in the moment, and the ability to act on this basis with the skills appropriate to mitigate the dysregulation.

Of course, it is worth noting that the latitude we have for mindful design is not dictated by us as individuals. I might know that another Zoom interaction is going to leave me feeling exhausted but be compelled by my employer (situation, etc.,) to be present nevertheless. It is impossible to claim with any certainty, but this kind of thing might be behind the following response from participant C1:EN_00_0177, who writes that "I have been seeing 8 clients a day 5 days a week for psychotherapy. This is more online contact than I've ever had personally or professionally before. I am exhausted by it and struggle to find the energy to be fully present with my children in our home…". Here, we sense some tension for this individual between various kinds of value guided actions: responsibility towards clients and the need to make money is in tension with a desire to have the energy to be present with their kids.

In a sense, we are all acting within such limitations all the time, albeit to varying degrees. This kind of thing tempers our ability to be mindful in all the ways that we might like to be, even when we have the knowledge and relevant skills. In such instances, part of being mindful might also be to recognize the ways you relate to yourself, e.g., not beating yourself up over the fact that you can't meet all your commitments. Moreover, many of the applications we access for catching up with the news, our friends and so on, have been optimized to hijack our attentional systems in ways that prove difficult to resist, and just as we figure out how to limit the destruc-

tive effects of one invasive application, the seeds of another are extending their roots. Within such conditions, mindful design needs to be understood as an ongoing and iterative process that allows us to not only be more flexible and adaptive to a rapidly changing landscape of affordances, but also, to maintain a course of action even amidst this change.

Self-view When acting mindfully one is continually developing and applying abilities that allow them to act in ways attuned to their needs, e.g., one realizes that if the self-view is on they tend to look at it too much and find themselves being overly self-critical, or, indeed, overly self-flattering, and so will turn it off entirely, hide it on their screen, or employ it only for a quick initial assessment of their presentation on screen. Dysregulation in this dimension can result when one either fails to pay attention to the patterns in the interaction between certain forms of mediation and certain affective states and thus repeatedly engages in dysregulating practices (i.e., even with repeated use fails to see that some configuration has a dysregulating effect), or, losses sight of what one already knows about these patterns (i.e., knows that the self-view is dysregulating but forgets to turn it off). This can function at longer timescales also. Here it relates to the notion of over-reliance that Krueger and Osler (2019a, b) highlight. If we become too attached to needing the functioning self-view, we leave ourselves vulnerable to dysregulation in its absence. Sensing that we might be over-reliant (or even just reliant), or becoming so, we might take actions to minimize or negate this over-reliance, or, alternatively, ensure the reliability of the self-view in situations that matter to us.

Gaze-coordination Analysis of the interpersonal coordination of the gaze is not relevant to this dimension.

3.4 Mindful design - social

This dimension can be assumed to have the same structure of recognition, enskillment and present awareness, but it focuses on the ways in which mindless design in our interactions with others in online spaces can be a significant source of dysregulation. Dreyfus (2013) has argued that because of the reduced dimensionality of digital spaces in comparison to co-located interactions, they lack a certain risk or vulnerability. Of course, Dreyfus was writing some time ago and it is not clear what he would think about our current digital spaces. But what is clear by now is that whatever vulnerability is negated by our digital mediation and our not being full-bodily present to one another, more than enough vulnerability rushes back in to fill the gap, albeit of a different kind. Indeed, relations to others in these spaces have become notoriously precarious, which leaves us vulnerable in ways Dreyfus couldn't have imagined.

For instance, we get 'ghosted' by romantic partners we may have invested non-trivial amounts of time in or anxiously ruminate over the reasons for why our friend read our text but hasn't got back to it in over a day; we harbor inflated expectations of online communications which lead to disappointment or obsess over the impact our words have on another because we do not have direct access to their response;

we read the comments under the post we made and the one negative one sends us into a tailspin of self-doubt; we reveal private details about ourselves only to realize the form we were filling in was a scam and we are left wondering what has happened to our details; we become addicted to the likes on our posts, comments and tweets, such that in the absence of a 'hit' we experience disappointment, frustration, anxiety, craving and disruptions to our self-worth. The list goes on.

Many such dysregulations are apparent in our data. Respondent C1:ES_MX_0160, writes that "I only use the Facebook network, but not much Messenger. I think it is a good tool if used wisely, in my case, I have tended towards addiction and the search for likes to my poems and photographs that I upload, when before I did not give importance to it, it is like a showcase to express myself: Hey I'm here, do not ignore me." This is an interesting example as we can see that this individual has quite a developed sense both of the value of these technologies and how they should be interacting with them given their dispositions, but nevertheless is falling short of those ideals.

Of course, it is not unreasonable or mindless to search for likes to one's poems and photographs. But we can see from their statement that this respondent feels some tension with the extent to which they lack agency around this practice, a reflection of their "tending towards addiction". We sense a kind of outsourcing of the regulation of their affect to outcomes over which they have very little control, even though they realize this leaves them vulnerable. We are all subject to this on occasion. Even when we 'know' what we should be doing we are continually slipping into mindless activities of this kind. Indeed, often it is an excess of dysregulation that reminds us that we have fallen off the wagon, so to speak. This might happen multiple times over. Indeed, developing mindfulness in these spaces often demands such iterations before one can adequately locate a source of dysregulation and design the scaffolds that will mitigate its negative potential or the probability of its recurrence.

The kinds of emotions that more commonly result from dysregulations within this dimension tend to be emotions related to, for instance, experiences of reputation, belonging, affiliation, and so on. Such emotions are often intensely felt. Indeed, there is much evidence to suggest that we process experiences of social rejection on par with experiences of physical pain (Eisenberger et al., 2003). Moreover, such emotions are difficult to regulate in the absence of others. But given the characteristics of life online, common interpersonal regulatory possibilities are often absent or diminished. Thus, dysregulations along this dimension can be both intense and difficult to resolve.

Self-view Sartre (2018) and other thinkers in the phenomenological tradition have written about the power the gaze of the other has to organize our subjectivity. At the extreme end, the other's gaze can make us feel like our subjectivity is being denied, that we have become a mere object for them. But more minimally, the gaze triggers self-consciousness, whereby we become keenly aware of our actions and the fact that they have public meaning. Vidolov (2021, p.20) has written about this in the context of the self-view, suggesting that the typical "self-consciousness or self-learning through the other" is "completely transformed by involving an additional mirror (self-view) that disrupts the circularity of expression–impression preventing the simultaneous

mutual adjusting of gazes and reactions. Such a form of self-monitoring, whether by one or more interlocutors, introduces a degree of self-consciousness and regulation of one's self-expression that inevitably leads to different self-feelings." It is not clear here what might lead to emotional dysregulation as such and how it might be mitigated through mindful social design. But one can certainly imagine cases in which, for instance, some individual knows they tend to be distracted by the self-view, and that their conversation partner tends to pick up on it and get frustrated by it. This may produce tension in the relationship, and thus anxiety relating to experiences of belonging, closeness and so on. Mindful design in this case, much like in the above cases, may mean repositioning of the self-view window, turning it off, or being more present with one's actions to avoid excessive engagement.

Gaze coordination We often mindfully employ the coordination of the gaze in interactive situations in ways that mitigate affective dysregulation. If someone's gaze is so intense that we feel vulnerable or exposed by it, we might only periodically return to it. Likewise, if we sense that someone is dysregulated by our gaze we might avert or soften it. As we have already explored, all sorts of gaze dynamics are disrupted in video chat environments, e.g., eye-to-eye contact is impossible, lag and camera positioning make coordination difficult. Nevertheless, our sense of the gaze of the other/s can be intensified in virtual environments. Although not in our data (Froese et al., 2021; James et al., 2022), there has been reports of individuals designing their techno-social niches to negate these kinds of dysregulations. For instance, Vidolov reports on several individuals he interviewed for a paper on the affective affordances of videoconference technologies who disliked the feeling of being looked at. One respondent, (R 3) shares, "I came to find out that when I'm not looking at their faces, I'm more articulate and can express better. So when I speak I just either stare at my desktop background and the Zoom window is minimized or have a document covering it." Another respondent (R1) shared that "[…] dimming my computer screen during presentations was particularly helpful" (2021, p.1794). Such individuals have been able to locate some of the source of their affective dysregulation and are mindfully designing their environments to mitigate the worst of it.

3.5 Digital tact

The notion of digital tact we refer to here was originally developed by James and Leader (see forthcoming for discussion). In short it is an extension of the notion of tact as articulated by the philosopher Richard Kearny, for whom it is a form of 'carnal wisdom'. Tact, writes Kearney,

> … denotes the skill of people who have a way with people. Tact expresses a "common touch" in our way of heeding, humouring and handling others. It senses the subtle difference between variations of touch–gentle or firm, light or charged, sensitive or insensitive, healing or hurting.

For Kearney, tact is a synesthetic ability that draws upon all senses in an interactive situation in attuning to what the needs of those in the situation might be and acting to respond to them. In the digital domain, his account can be extended to refer to the bodily resourcing of the mediating components available in a digital environment to meet the needs of the interaction and the people who comprise it. In a sense then, tact is also a dimension of mindful design and a way of organizing our bodies with care. Like the previous dimensions, it requires sensitivity, enskillment, and presence of awareness. This time, however, it is being mindful for the sake of the others that share the space with you. What we are concerned with here is how digital tact, or its absence, can also be a source of affective dysregulation.

Digital tact, like the other forms of mindful design, will mean different things in different spaces, largely dependent upon what the shared values of that space are. Crucially then, it is not adequate to consider it solely at the level of the individual, as a capacity they do or do not have, but as an emergent attunement between individuals within shared socio-technical niches. The socio-technical niches characteristic of modern knowledge work cultures (e.g., those in English speaking academia) are sufficiently well matured at this point that we can, for instance, say that digital tact in such settings might include not talking over someone in a video chat; making turn-taking in conversations more explicit; striving to ensure that everyone is heard and that there is shared interest and reciprocity in the interactions; ensuring that if you are in a noisy space that your microphone is muted when possible; ensuring that your background is not too distracting, busy or brash; being focused on the shared task and not splitting your attention between a number of things, etc. In short, demonstrating digital tact relates to acting in accordance with norms of care and competence specific to a given socio-technical niche. Given the relative maturity of these spaces as affective niches, deviations from these norms can be quite dysregulating, as one is likely to experience such deviations as an absence of care.

Importantly, since digital tact is an emergent attunement between the socio-technical niche and the people that share it, it also means that different norms will apply to different people in the space. For instance, in any co-located interaction we do not expect children or newbies to accord with the norms of a workspace in the same ways we might expect from our colleagues. So too in these online spaces. When we hold the wrong expectations for the wrong people, again we leave ourselves in a precarious situation. For instance, when we get overly concerned with the fact that our grandparent is shouting even though they have the speaker phone function turned on; or we get angry at our partner for their signal cutting out while they chat to us on a drive even though we know they are passing through an area with patchy signal.

As such, there are two primary modes of dysregulation within this dimension; one where you expect people to act in a way that they are not equipped to and thus your own lack of tact is a source of dysregulation (imagine if you expected toddles to act like college students in the classroom); and one where people who should know better act in these spaces without according with the norms of care and competency that characterize them, and those are sources of dysregulation. However, before exploring these, it is worth mentioning that there is also a secondary mode of dysregulation, whereby one might be generally aware that there are forms of tact operative in these spaces but not have–or feel like they do not have–the resources to develop them. This

might lead to feelings of alienation, that one is 'out of their depth' or that a particular space is 'not for them', and thus negative self-evaluations and the emotions that follow from that. We do not have evidence of this form of dysregulation from our data, but we were helpfully alerted to this possibility by an anonymous reviewer and wanted to include it here.

The examples in our survey data (given the open-ended nature of the question) are not always informative as to where a lack of tact is coming from. But that it exists is apparent. For instance, respondent C2: EN_UK_0123 writes "… I get very annoyed when the person I am talking to starts to do other things at the same time." In this instance it is difficult to say who the other person is precisely, and thus whether the lack of tact pertains to the respondent or their interactant. If the latter is equally experienced in these spaces, we might conclude that the fault lies with them. If, on the other hand, their interactant is barely even competent in the functional use of these technologies, it might be their own lack of tact that is the source of dysregulation. There are other examples in which the source is a little less ambiguous.

For instance, respondent C2:EN_JP_0162 writes that, "I have been connecting with others online more often than I did before, but maybe only by ~50% or so. I estimate that for some people their online interactions increased multiple times over what they did before. My experience has been fairly seamless because I'm quite used to it. It has been a bit frustrating at times to deal with others who don't know how to best use the technologies, but overall, it's been good." Also, participant C1:EN_UK_0050 writes that "It has been frustrating at times when one person has tech issues and can't connect to a voice chat. There are more options available so it's easier to move to something else that works. I got an old webcam working again and it has connected to all the things I've used so far." Given the additional details these individuals share, we can see in both instances that they themselves are highly literate in these technologies. But both demonstrate a lack of digital tact when they express 'frustration' with their less competent partners.

Regarding the other mode, in which the actions of someone who should know better are dysregulating, C2:EN_UK_0321 writes that "Some peoples' grasp of the basics, such as muting their mic, is very frustrating, especially after a year of use!!". This person is frustrated with the other's lack of digital tact. They are aware that their interlocuter has had sufficient time to develop certain skills but have failed to and are upset, much like we might be with a work mate who carelessly leaves a mess in the office even after we have asked them to address it.

It is important to say though, that what constitutes effectiveness in online contexts is often not specified explicitly, and it therefore requires a more general form of digital tact to navigate these newly emerging social spaces and extract the norms that are operative therein without too much disruption. Digital tact then may reflect a particular set of sensitivities to a given socio-technical niche, but it also pertains to the general stance one adopts when navigating new niches with the awareness that there will be some set of norms already organizing the space therein. This is very much in alignment with the ideas of mindful design already articulated above, in which it needs to be understood as an ongoing and iterative practice of attuning to relevant patterns and flows of activity, developing necessary competencies and having the presence of mind to apply them under the right conditions.

Self-view There are at least two ways in which the self-view can serve as a source of dysregulation within this dimension. First, a lack of patience and sympathy with less competent users who may be confused by the self-view and why at all it is present when they are on a call with someone else. With such users, toggling between the primary view being the self-view (front facing camera), the view of the other, or the back-facing camera on one's own phone can be something of a minefield to navigate, as the uses of such functions are not always immediately obvious. Tact in such instances, typically means a sensitivity to the limits of the other's capacities, and where possible, instructions about how to properly configure the cameras in line with the desired function. Second, and less common but not unheard of, is when one's interactant (who should know better) is so focused on their own image in the self-view that their care for what is going on in the shared space and the needs of the others that share it is diminished.

Gaze coordination Here again, we see the same dynamic as was operative in the self-view example. If, for instance, I hold too strongly to the expectations that my elderly relative who is barely functionally capable with video chat, to have even the basic skills of gaze coordination in these spaces, I leave myself vulnerable to technostress. We have all encountered situations in which our interactant is simply being mindless with the positioning of their phone, monitor or webcam, and thus, either had to sit with the strange or uncomfortable angle, or be forced to ask them to adjust it to accommodate our needs. Alternatively, Garcia et al. (2022) report on how in telemedicine practices, therapists are demonstrating great tact by learning to adjust to the ways the gaze is modified by video chat technologies, and thus continue using the gaze for therapeutic purposes having incorporated the mediating components.

4 General discussion

The above five dimensions build on each other in a somewhat nested fashion, such that dysregulations along the latter dimensions will depend upon satisfying some or all the former. For instance, you are unlikely to develop much in the way of digital tact if your functional or even mindful use is limited, and thus are unlikely to be sensitive to and thus dysregulated by its breakdowns too. Moreover, as a person's concerns move from tech to tact, the techno-social niche will tend to become more deeply implicated in their social life, including via more extensive recruitment into emotion regulation. At one extreme, an elderly person in a rural area who only periodically accesses online social spaces will generally remain unaffected by them. At the other, an urban city-dweller who habitually relies on their techno-social niche to regulate their emotions will be hyper-sensitive to people's tactless use of them. For the former, most of the affective dysregulation will come from infrastructural and functional precarities and the later dimensions will remain opaque. For the latter most dysregulation is likely to come from the later dimensions, but they are maybe even more vulnerable to breakdowns in the earlier dimensions too, for they are more likely to habitually rely on its use ((Krueger & Osler, 2019a, b).

What is more–and as was mentioned briefly already–as a person's concerns shift from dimensions (1) to (5), this goes hand in hand with a transformation of the expectations that are placed on them. In the case of a novice user, their inadequate internet connection could be attributed to technological circumstances outside of their control, and their struggles to share their screen may be attributed by others to a badly designed user interface. But as skill levels increase, some of the responsibility for such technical difficulties will become re-attributed to the user: why did that participant of the online meeting not ensure that they were in an area with a better internet connection, or test their laptop's function for sharing content in advance? There is a sense then in which the types of affect that are most relevant to each dimension also complexifies as one moves through the dimensions, whereas mere frustrations are more likely in the earlier dimensions, the full gambit of social emotions opens once we are at the level of tact. Thus, the precarity of affective regulation stemming from these techno-social niches appears to increase the more one is invested in them too. This seems to paint a somewhat bleak picture for the future of our affective lives in our techno-social niches, but this position needs to be significantly tempered.

For one, although the focus of the present work was affective dysregulation, Krueger and Osler (2019a, b) have made a strong case for the extent to which the internet can be a positive source of emotional scaffolding. Oftentimes, the very things that make them dysregulating under breakdowns make for highly effective emotional scaffolds when working as hoped, e.g., because they are so portable and because the niches they give access to can bleed into each other, means they allow access to certain regulatory resources in moments when previously this might not have been possible. The present work should not, then, be taken as a purely critical assessment of our relation to these technologies. Rather, our hope is that it helps us get a better grasp on the ways in which our affectivity is modulated by these technologies and the interactions we have through them so that we can better understand who is most vulnerable and how we should design both the technologies themselves and the practices that surround them to limit (we can never eliminate them, and it is not clear that we should want to) their dysregulating effects.

Moreover, we believe this work can help us develop sensitivities to both the differences and similarities of online and offline spaces. There is often a tendency to make comparisons between online and offline space and the inabilities of the latter to replace the former. Indeed, this is perhaps the most common single sentiment from people in our survey data (Froese et al., 2021; James et al., 2022). There is, however, some growing recognition (Krueger & Osler, 2019a, b; Osler & Zahavi, 2022) that rather than thinking about these technologies as replacements to more traditional forms of interactions, we should be thinking about them as opening new possibilities. Just like human-computer interfaces more generally (Froese et al., 2012), computer-mediated embodied intersubjectivity can be empowering or disempowering, substantially depending upon the ways in which it is engaged and/or designed.

Understanding our relations to these technologies through the dimensions we have elaborated herein can help us see that developing these discriminating capacities is part of the individual and communal development of digital tact. As one respondent highlighted, this sensitivity to the differences between online versus offline interaction is an essential component of successful emotion regulation: "Online commu-

nication is not comparable to face-to-face communication. If we do not accept the difference, inconvenience and dissatisfaction are easily produced in the online environment." (C1: JP_JP_0277). As we continue to evolve along with these technologies it is likely that we will become ever more sensitive to the kinds of interactions they enable and evermore skilled in designing the conditions of our digitally mediated interactions for more and more specific outcomes.

There is another potentially positive consideration to keep in mind when thinking about the precarity that accompanies these dimensions. Although precarity generally sounds like something that should be eradicated, this may not be a realistic or even desirable goal. According to enactive cognitive science, it is the very precariousness of life and the structures of our identity that gives our lives meaning (Varela et al., 1991; Thompson, 2007; Di Paolo et al., 2017), and its complete loss in digital online spaces would be counterproductive (Froese, 2017). Just like adapting to complex interactions with human-computer interfaces could help to generalize to more flexible movement (Dotov & Froese, 2018), it is possible that managing this precarity, in all its variability, may positively contribute to a more generalizable affective flexibility. As one progresses through the dimensions there is a sense in which, in order to get a better grip, one must relax one's grip and continually open it up to new degrees of freedom to manage the growing complexity and the precarity that comes with it. It would be fascinating to inquire into whether such progress generalizes to affective interactions in offline spaces.

One other point to make along these lines is that according to the enactive approach, becoming too entrained in the spontaneous dynamics of social interaction can be detrimental for the self-regulation of affect (Galbusera et al., 2019). Better understanding these dynamics might eventually inform the design of digital infrastructures that either increase or decrease degrees of interpersonal synchronization, such that one could tailor their niche to support self-regulation of affect, depending upon their needs and the needs of the interaction. For instance, if one was having a difficult conversation with a more dominant other, maybe one could configure a virtual space to minimize the degree of interpersonal synchronization and retain their own capacities for affective self-regulation.

5 Outlook

The "digital push" has increased the reliance on information and communication technologies in our lives as we move into the post-pandemic era. Our research is consistent with other calls for greater design considerations of the various affective dimensions of these technologies (Riva et al., 2020). The ambition to improve these online communication technologies should go hand in hand with more research into how their capacity for affective dysregulation differs compared to in-person embodied interaction, for example in terms of the dangers of overreliance on techno-socially scaffolded regulation of affect (Krueger & Osler, 2019a, b), or interactional impairment of self-regulation of affect (Galbusera et al., 2019). Moreover, this kind of research could add scientific guidance to current theoretical work about what are the best practices in the use of various online communication platforms in the context

of affective regulation. For instance, work by Tomprou et al. (2021) has highlighted that in the absence of visual cues in virtual environments people are better able to synchronize vocal cues and turn-taking, and consequently do better in tests of collective intelligence. Could similar studies be designed to test for effects on emotional intelligence or interpersonal affectivity?

Looking ahead, we should not view the variety of interactive modalities in competition but rather as complementary: online communication has a positive role to play in the future, but that should not lead us to overlook important differences even as we are becoming accustomed to them. People can maintain a diversity in the modes in which they act and interact. If anything is good for enhancing affective flexibility, it is probably this. And so, ideally, the guiding design principle for the next generation of ICTs should not be the technological substitution of in-person meetings but rather the technological diversification and even empowerment of our digital embodied sociality. In diverse populations, diverse solutions for affective regulation are paramount.

Acknowledgements We thank Jamila Rodrigues, Morgan Montaya, Ekaterina Sangati, and Federico Sangati, as well as two anonymous reviewers, for their extensive helpful comments.

Authors contributions TF and MJ conceptualized the research and wrote the first version of the manuscript; NK conducted the qualitative analysis and coding; MJ and NK wrote the revised version of the manuscript. All three authors finalized the manuscript.

Funding This work was supported by JSPS Topic Setting Program to Advance Cutting Edge Humanities and Social Sciences Research (Grant Number JPJS00120350377).

Availability of data and materials Not applicable.

Declarations

Ethics approval and consent to participate Not applicable.

Informed Consent Not applicable.

Competing interests The authors declare that they have no conflicts of interest.

Research Involving Human Participants and/or Animals Not applicable.

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