The Online Behaviour Taxonomy: A conceptual framework to understand behaviour in computer-mediated communication

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A B S T R A C T

In an Internet-enabled era, we are citizens in a vast array of different online spaces, and the behaviours afforded to these spaces are becoming increasingly complex. Within the study of computer-mediated communication (CMC), there is an assumption that behaviour occurring in CMC is equivalent to that depicted in the communicated message. However, we note that this is not always the case. The purpose of this paper is to elucidate different typologies of "online behaviour" based on our proposed Online Behaviour Taxonomy. Within this, we propose three types of "online behaviour" which are largely distinguishable based on where the behaviour itself originates (online or offline) and how this interacts with internet-enabled technologies. These are: online-exclusive, online-mediated and online-recorded behaviour. Specifically, we assert that the source of behaviour (i.e. whether it occurs online or offline) is currently not explicitly referenced in CMC theory, yet acts as a key indicator to dissect the ambiguity of 'online behaviour' as a generalised concept. This is arguably a critical factor associated with user experiences and effects of CMC. We situate this discussion in the wider context of CMC; specifically how factors such as audience effects are differentially relevant to these three types of behaviour. Finally, we outline the emerging conceptual contributions and practical directions which we assert may be influenced by our proposed Online Behaviour Taxonomy.

1. Computer-mediated communication

Computer-mediated communication (CMC) has a long history in disciplines such as psychology, communication studies, media studies and linguistics, and may be considered a solid starting point to understanding online behaviour from a cyberpsychological perspective. Whilst CMC is not specific to the Internet, the development of Web 2.0 and increased internet-enabled technology has resulted in CMC being a significant area of inquiry when understanding human communication and its intersection with technology. CMC is largely focused on human-to-human interaction which is mediated through the use of two or more electronic devices (Metz, 1994).

A vast amount of early research in CMC focuses on text-based communication (Herring, 2002), and considers the role of specific technological features on resulting behaviour. Factors such as synchronicity/temporality of communication (Johnson, 2006; Ziegler, 2016),

modality (Zhou & Zhang, 2007), persistence/visibility of communication (Treem et al., 2020; Walther et al., 2018), media richness (Daft & Lengel, 1986), media naturalness (Kock, 2011), and social presence (Short et al., 1976) have all been discussed in terms of the nature of CMC and their impact upon user perceptions and behaviour. Indeed, many of these factors have remained a stable part of CMC enquiry to the present day (Petrocchi et al., 2020). Further, many of these features of CMC have underpinned a substantial proportion of cyberpsychology research, often focusing on social effects of these (Walther, 2011). However, due to the array of different platforms, their functionalities and affordances, as well as the complexities of behaviours derived within CMC, studying such social effects can be rather challenging, as these are unlikely to be linear and consistent across platforms. One obvious omission is that CMC theory does not tend to make explicit reference to the source or origin of behaviour. That is, whether the source of behaviour itself actually takes place online (e.g., via a keypad/keyboard to write a social

media post) or is mediated by internet-enabled devices/platforms (e.g., "real world behaviour" displayed via a video call). We assert this as a critical factor in CMC and further, in understanding the psychological and social effects associated with CMC. As such, the behaviour itself may not always be represented equivalently to the communicated message via CMC and so distinguishing types of (online) behaviour is paramount. The purpose of this paper is to propose a conceptual taxonomy which better accounts for the source of behaviour, as well as discussing key theoretical and practical implications which can arise from including this in core CMC theory.

1.1. Previous theoretical efforts to understand (online) behaviour in CMC

Within cyberpsychology, we often use the term 'online behaviour' to refer to any actions we perform online. However, it is important to clarify the key elements which conceptually distinguish this from 'online communication' and 'online interactions' given that such terminology may overlap. Communication refers to actions involving information sharing, which can either be two-way or one-way, but must always consist of an exchange or transmission of information (Collins Dictionary, 2021a). Conversely, interactions refer to actions which affect others and therefore must always be two-way, but do not necessarily need to include an exchange of information (Collins Dictionary, 2021b). Behaviour, however, refers to actions in response to a situation or stimulus (Collins Dictionary, 2021c) and does not necessitate information exchange or directionality of responding. Indeed, behaviour can occur irrespective of whether an "audience" or "receiver" is present. As such communication will also consist of some type(s) of behaviour, but behaviour will not always be communicative as per CMC. However, given the sheer diversity of different behaviours which may be represented with CMC, we assert that current CMC theory may not be fully capturing some key distinctions in the proposed effects which are said to derive from CMC. The following section includes an overview of some of these typically proposed effects and illuminates where additional clarification and conceptualisation is warranted. Following this, we propose how our Online Behaviour Taxonomy may be helpful in this regard.

One critical consideration in CMC is receiver/audience effects (discussed subsequently as "audience effects"). The audience's role is embedded into core theories in communication and social neuroscience, including CMC theory and the development of cyberpsychological theory relating to online forms of communicative behaviour. Audience effects specifically refer to the way an individual changes their behaviour when they believe they are being observed (Hamilton & Lind, 2016). Such behaviour aligns with self-presentation theory (Goffman, 1959), in which awareness of an audience underpins one's impression management efforts.

Whilst online self-presentation has been a cornerstone of much cyberpsychology enquiry, further clarification is needed on how this applies to a range of online audiences, and specifically how this may vary within different types of behaviour. Users may be targeting their behaviour towards a specific receiver (i.e. one-to-one), or multiple receivers (i.e. one-to-many). Behaviours may also be described as 'many-to-one', for instance, in the case of 'public shaming' of an individual's actions through Twitter or Facebook comment threads. However, in the case of a user interacting with Artificial Intelligence (AI) we could classify such behaviours as 'one-to-zero', in which online behaviours incorporate AI as an audience. For instance, this may include communication with a chatbot or a Google search. The user themselves may not anticipate there to be a specific audience, yet the platform may be highly responsive to a user's present and prior behaviours, as is evidenced through recommended search results. As such, although interactivity or bidirectionality with a receiver exists here, it may not be a fully sufficient condition under which audience effects may occur. Largely this may be due to the fact that the user may not be 'mentalising' AI or considering that it holds any perceptual state or beliefs about them (Hamilton & Lind, 2016).

"Mentalising" is relevant to the issue of *anticipated response*, which captures a user's expectations surrounding the interactional consequences of their behaviour. Depending on the platform used, such expectations may not map on to a manifested response. For example, within a one-to-one video call, there would be high congruence between the *anticipated response* and the *actual response* obtained from the receiver, as bidirectional (verbal) interaction would be a standard expectation. However, other types of CMC, such as posting on social media for example, may elicit varied congruence between the anticipated response and actual receiver response. That is, a user may post a status update and expect an interaction with their audience, but this may not necessarily result in further communication. Consideration should also be given to the multiple audiences problem (MAP; Fleming, 1994) which may indeed be relevant for some types of CMC but not others. The MAP refers to the fact that we are often concurrently negotiating how we present ourselves to different types of audiences. Therefore, there are some nuances here to note for various types of CMC and these anticipated responses may form a part of determining the likely audience effects which may occur.

Audience effects theories are therefore important here, but may operate heterogeneously for different types of CMC. They may not be relevant to explain all types of user online behaviour, such as AI interactions. Further, the extent to which there is congruence between an *anticipated* audience and an *actual* audience may also be relevant. For instance, the longevity of online behaviour may influence content interaction at various time points by differing audiences. As an example, a recorded video meeting may be viewed by an unintended audience at a later date. It is currently unclear whether such implications elicit differential audience effects and how users negotiate these in their online behaviours. We argue therefore, that existing CMC theories which explain audience effects may be omitting critical nuance in respect of the diversity of different types or configurations of receivers which may be relevant to CMC in the 21st century.

Alongside audience effects, *social presence* is often a central component of CMC theory. Social Presence Theory (Short et al., 1976) underpins individuals' psychological sense of being "present" with others via different types of CMC. Largely, more synchronous or rich types of CMC such as video chat, are said to promote greater social presence than asynchronous or less rich formats. Related to this are media naturalness (Kock, 2011) and media richness (Daft & Lengel, 1986). Media Naturalness Theory (Kock, 2011) posits that mediums which permit synchrony, non-verbal cues and verbal speech can provide a higher level of naturalness of behaviour than those which do not. Likewise, in line with Media Richness Theory (Daft & Lengel, 1986) we would expect CMC with high naturalness to be equally high in richness. Despite the fundamental nature of these principles within CMC theory, we note that such concepts have limitations within the wider scope of online behaviours. There is an implicit assumption that the behaviour underpinning the communicated message will be an equivalent level of richness and naturalness. Whilst this may often be the case, there may be behaviours which originate offline (highly rich and natural) that may be communicated rather differently online. One such example may be the use of fitness apps in which the behaviour may be entirely natural (e.g., physical activity behaviours) but the communicated message which represents this behaviour may be relatively low in richness (e.g., metrics, graphics). As such we can distinguish here between the behaviour itself and what is communicated about the behaviour. These are conceptual distinctions not currently specified in existing theoretical models of CMC. We assert that this omission may be rectified through explicit discussion of the *source of behaviour* and whether it originates online or offline.

2. A taxonomy of online behaviours

Although the above theoretical principles allow us to explore elements of behaviour relevant to CMC, we assert that the wider sphere of

online behaviour needs further conceptual clarity. Primarily, this relates to the fact that not all "online behaviour" may be native to online settings. The field of cybercrime often has a useful approach to understanding this issue, in respect of conceptualising internet-specific vs internet-enabled cybercrime behaviours (Kirwan, 2016; Kirwan & Power, 2013). That is, some cybercrimes only exist because of the Internet (phishing emails), whereas others are enabled/facilitated by the Internet (e.g., cyber-terrorism). In line with this approach, we recognise that behaviour is not exclusively isolated to one context (i.e.. online or offline). We suggest there to be three distinct types of online behaviour, which we propose within our Online Behaviour Taxonomy (OBT):

- **Online-exclusive behaviour** - behaviours which natively and exclusively take place online for user and/or audience (e.g., social media content interactions, emailing, internet searching, online purchasing, hacking).
- **Online-mediated behaviour**-behaviours which take place offline for user and/or audience but are mediated by internet-enabled platforms (e.g., video calls, live streams).
- **Online-recorded behaviour**-behaviours which take place offline but are concurrently or subsequently recorded online (e.g. Strava, fitness app metrics, accelerometry, virtual assistants).

The source of behaviour (ie., whether it originates online or offline) explicitly underpins these three types of behaviours. Whilst this is proposed to be the distinguishing feature of these types, there are conceivably a number of factors which further characterise these. The first is *offline saliency* which corresponds closely to the source of behaviour in respect of how much the behaviour may be considered by the user themselves as "real world" or online. In the case of "selfies", whilst the source of the behaviour of posting a selfie on social media would be considered online-exclusive behaviour, the act of actually taking a selfie via a smartphone may result in variations in user's levels of offline saliency. On one hand, if they are taking the selfie but not intending to upload it to social media, it may have a greater level of offline saliency than if they take the photo with the primary intention of uploading it to their social media profile. This corresponds with the notion of offline self-regulation in which one regulates their offline behaviour for the sake of subsequent online purposes (Marder et al., 2014). As such, whilst "online self-presentation" may oftentimes be cited in respect of online behaviour, this concept may only be relevant for online-exclusive forms of behaviour whilst offline self-regulation may be relevant for other types of (online) behaviour in our taxonomy.

The notion of *offline saliency* is also relevant to the theoretical principles of Media Naturalness Theory (Kock, 2011). We would expect that any behaviour which originates offline, and characterised by high levels of offline saliency (e.g., online-recorded and online-mediated) are likely to be those which consist more "natural" offline behaviours than perhaps online-exclusive behaviours. However, we note the benefit of the OBT is its ability to draw distinction between the naturalness of the behaviour versus the richness of the communicated message as described above.

Audience effects also underlie the source of the behaviour, and we note that the OBT has merit in distinguishing these to derive differently across types of behaviours. Whilst online-exclusive behaviours may elicit varied levels of audience effects and anticipated vs actual audience responses, other types of behaviours may be more uniform in theorising these effects (e.g., online-mediated). To summarise some of these key features of the OBT, see Table 1. Further discussion of each of these types of behaviours is below.

2.1. Online-exclusive behaviours

Online-exclusive behaviours refer to any behaviours which originate online and would not exist without a technological device and a functional internet platform/connection. Behaviour is evidenced therefore

Table 1
Summary of key characteristics of the OBT.

	Online-exclusive	Online-mediated	Online-recorded
Source of behaviour	Online	Offline	Offline
Offline saliency (of behaviour)	Low	Medium-High	High
Media Naturalness (of communicated message)	Low	Medium-High	Varied based on device/ platform High (e.g., voice commands for virtual assistants) Low (e.g., metrics from fitness apps)
Media Richness (of communicated message)	Varied based on communicated message (e.g., Text, images, video, hyperlinks)	Typically high, but may be varied based on input and message output (haptic, audio-visual)	Varied based on device/ platform High (e.g., voice for virtual assistants) Low (e.g., metrics from fitness apps)
Anticipated audience effects	Varied	Typically high	Typically low
Anticipated vs actual audience response	Varied congruence	Typically high congruence (bidirectional response usually expected)	Varied congruence

through the way users make use of technological functions such as typing, scrolling, clicking/selecting, swiping, and so on. Online-exclusive behaviours are diverse and may include those such as: internet-searches, online purchasing, information seeking on webpages, hacking, etc. In respect of media naturalness and richness, online-exclusive behaviours are proposed to be low in naturalness but may be varied in richness, depending on the modality of any messages (e.g., text, photo, etc). It is conceivable that online-exclusive behaviours will consist of the greatest level of interaction with a device or interface, with an array of physical interactions such as scrolling and clicking perhaps more so than online-mediated or online-recorded.

In respect of audience effects, these may be highly varied given the range of functionalities available for interacting, and the likelihood of multiple audiences in any given context. Online-exclusive behaviours may be classed as either one-way behaviour (e.g., updating one's biography within their social media profile, internet searching), or a two-way behaviour (such as a commenting stream derived from the sharing of content). Recent efforts have largely focused on understanding social media behaviours in this regard such as establishing what "social" means when we are referring to different levels of interactivity within social media (Kaye, 2021; Meier and Reinecke, 2021; Shaw et al., 2021; Trifiro & Gerson, 2019; Valkenburg, Beyens, et al., 2022). Specifically, research has focused on understanding the level of interactivity between parties, such as whether it is two-way interactive or more one-way non-interactive (Meier & Reinecke, 2021; Shaw et al., 2021).

Despite the notion of interactivity being well established in the CMC literature (Rafaeli, 1988), active/passive social media use tends to be more commonly discussed within cyberpsychology circles (Escobar-Viera et al., 2018; Valkenburg, Beyens, et al., 2022, 2022b; Verduyn et al., 2017). Beyond social media behaviours, other online-exclusive behaviours such as conducting internet searches may not necessarily involve a direct interaction with a specified audience, but rather a

perceived one-way behaviour with the technology itself. These behaviours may often fall outside the scope of CMC but arguably there is still the presence of a receiver which need not be human. The growing use of AI has arguably influenced online-exclusive behaviour. Traditionally one-way behaviours now allow technology to learn about users' preferences through the digital traces they leave behind. In return, users may be provided with personalised responses such as curated environments. For example, several established social media platforms originally presented users with chronological feeds. Now, "interactions" such as "liking and sharing'' may act as ranking signals which allow platforms to prioritise personally-relevant content for each user. Therefore, user online behaviour may influence their internet-search results, the adverts they see and the news they receive. Thus, audiences of online-exclusive behaviours do not just refer to human-human interactions, but to the understanding of how AI is mentalised as a receiver, holding any proposed audience effects which are said to occur from behaviour in the presence of others.

2.2. Online-mediated behaviours

This form of behaviour is largely included in the CMC literature but not explicitly distinguished from online-exclusive in relation to the source of the behaviour. This may include behaviours which take place offline for both/all parties, but are mediated by internet-enabled platforms (e.g., video calls). As such, this will usually be two-way interactional in nature and synchronous. In this case, the source of behaviour is offline and thus can represent the range of verbal and non-verbal behaviours which are largely representative of the way they would occur in "real-world" face-to-face contexts. As such, these sorts of behaviours would be those typically discussed as being media rich and natural (Daft & Lengel, 1986; Kock, 2011). However, online-mediated behaviours may also be one-way. For example, hosting a live-streaming video session (e.g., a fitness instruction video) to be embedded in a website (in a similar fashion to other one-way media such as television) could be considered a form of online-mediated behaviour given that the source of behaviour is offline. These types of behaviours would be proposed to elicit expected audience effects in line with CMC principles.

Perhaps the most distinguishing feature of online-mediated behaviours relative to others are the range of live sensory elements of connection which are perhaps less evident for the other types of behaviours. Fig. 1 provides examples of such behaviours; for example, the implementation of haptic feedback in internet-enabled devices such as the Apple Watch allows two users to physically 'connect' in real-time through "digital touch", irrespective of physical distance. As haptic technology begins to be integrated alongside live video and audio, the perceived naturalness and richness of these experiences are proposed to increase.

2.3. Online-recorded behaviours

Online-recorded behaviours refer to an individual's offline behaviour which may be captured intentionally online. Here, the user is implementing internet-enabled technology as a conduit to record their offline behaviour. There is little conceptual discussion about these types of behaviours in the CMC literature. The main difference from the other types, is that the user's source of behaviour is fully offline rather than natively online or within the technology. Online-recorded behaviours capture behaviours that derive from the uploading of data to an internet-enabled environment. As noted by Varis (2020), this online data may represent the "finished" communicative product from the offline context in which the digital activity has taken place. This manifests itself online in the form of a record of this behaviour. A distinction to note here may be that these refer to actions that create an 'intentional' record, which would exclude more passive footprint traces such as cookies left in a user's browser, or 'impression', 'view' and 'reach'- based measures. The range of different types of online-recorded behaviours which are often
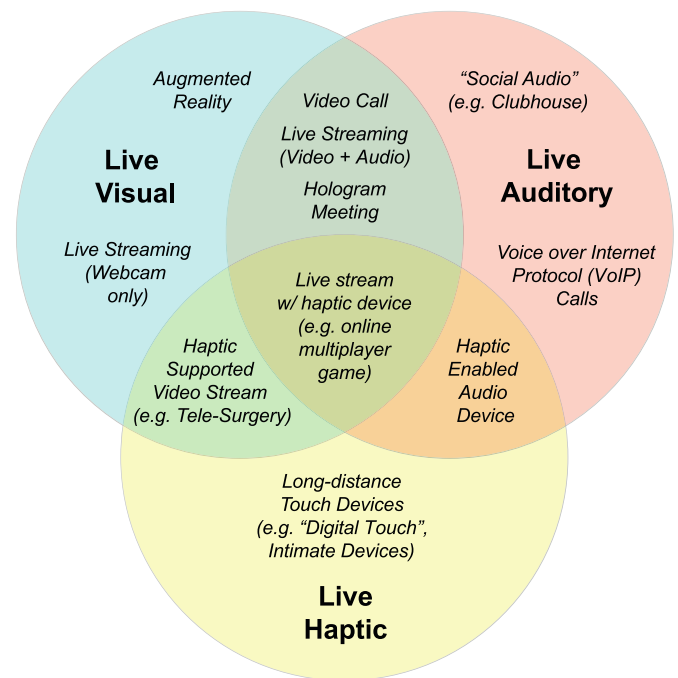

Fig. 1. Examples of online-mediated behaviours by input category.

referred to as "digital data" have been discussed recently in respect of how they reveal insights into human movement patterns and therefore contribute to psychological science (Hinds et al., 2022).

Online-recorded is an intriguing category as the behaviour itself may be highly rich and natural (perhaps as would be the case for online-mediated) but the communicative message via CMC may lack richness and naturalness. Also, based on the fact that there is an online record of the behaviour, this may allow an audience to engage in some form of CMC in a similar way to online-exclusive behaviours; although audience effects are unlikely to be prominent for these types of behaviours given that the behaviour is occurring outside of the technology. Similar to online-exclusive behaviours, online-recorded behaviours may be classed as either one-way (such as a user uploading fitness information through an app) or two-way (such as Alexa responding to a voice command). To distinguish such behaviours from online-mediated behaviours, any interaction with others should be represented by a record of behaviour/s which are exclusively "digital" (i.e. which necessitate the use of an internet-enabled digital device to communicate). It is suggested that most interactions with smart devices may fall within this category (e.g., virtual home assistants such as the Amazon Echo and Google Nest). The classification of these behaviours as an "online behaviour" may be contested due to the seemingly real-time transmission of an offline request. However, following the conceptualisation above, a user is interacting with the technology, via the uploading of offline behaviour (i.e. a conversation or request). Thus a user does not have to directly, or perhaps even consciously, upload data to the technology to fall into this classification. Rather such data can be automatically captured as a by-product of its use.

Although we draw out distinctions relating to the source of behaviour regarding this taxonomy, this does not necessarily ensure that this behaviour remains type-exclusive. Indeed, behaviour is complex and fluid, with the potential for smaller behaviours to contribute to larger behaviours. Furthermore, platforms themselves have functionalities which allow users to move between different types of behaviour. Behaviours can also occur concurrently. We discuss this further through the lens of a "tapestry" of behaviours in the following section.

2.4. A tapestry of online behaviours

While the trio of behaviours presented in this taxonomy may be conceptually different, they may not necessarily be discrete. Instead, a "user journey" may involve a tapestry of all three types. Layered or hierarchical approaches to behaviour are often utilised to capture the complexity of human behaviour more generally and allow for scaling. For example, an overarching task may be divided up into a number of temporal abstractions, which in turn feature a series of interrelated actions (Botvinick et al., 2009). One consideration should therefore be whether a combination of the three types of behaviour may occur in any given moment. Taking inspiration from Bowker and Star (2000) who describe the architecture of categories that underpin the nature of human interactions as a network of 'filaments', we propose that the three types of online behaviour may co-exist to produce a richer tapestry representing the user journey as a whole. For example, a video call which strives to replicate offline face-to-face communication would be considered online-mediated behaviour. However, other features in the environment may allow users to engage with online-exclusive behaviour alongside, such as typing in the text chat. A user may also utilise voice command (an online-recorded behaviour) to initiate said video call. Rather than detracting from the online-mediated nature of the video call, these additional behaviours add further textural detail. As such, online behaviours may occur concurrently and co-exist alongside one another within a CMC exchange or set of exchanges. Figs. 2–5 provide examples of such potential tapestries of behaviour and how behavioural subtypes may interact to build larger behavioural patterns.

3. Theoretical directions informed by the OBT

Theoretical principles of CMC typically focus on factors such as modality (video, text etc) and temporality (asynchronous/synchronous) of communication but do not tend to make explicit reference to the source of behaviour. Arguably, whether the source of behaviour itself originates online (online-exclusive) or is mediated by internet-enabled devices/platforms (e.g., online-mediated) is a critical factor in understanding the psychological and social effects associated with CMC, ranging from motivation to behavioural outcomes. Additionally, we
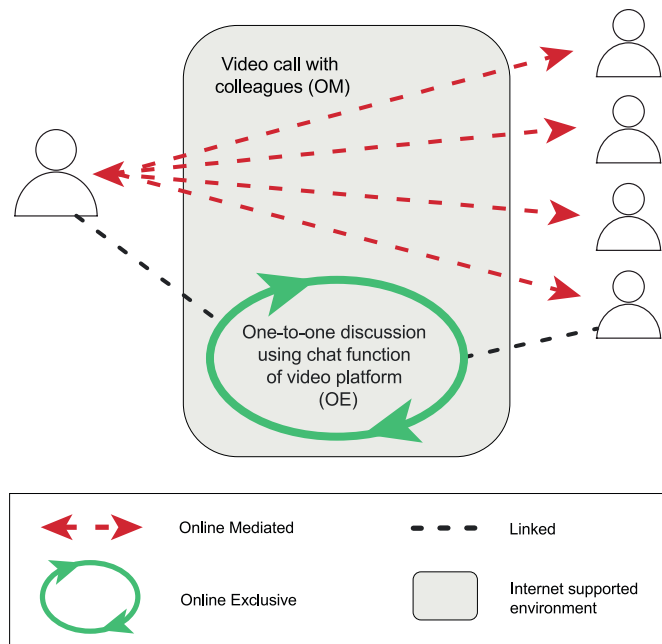

Fig. 3. Fluid example of online behaviours with exercise data uploaded to social media (online recorded) and subsequent viewing of comments made on related post (online exclusive).
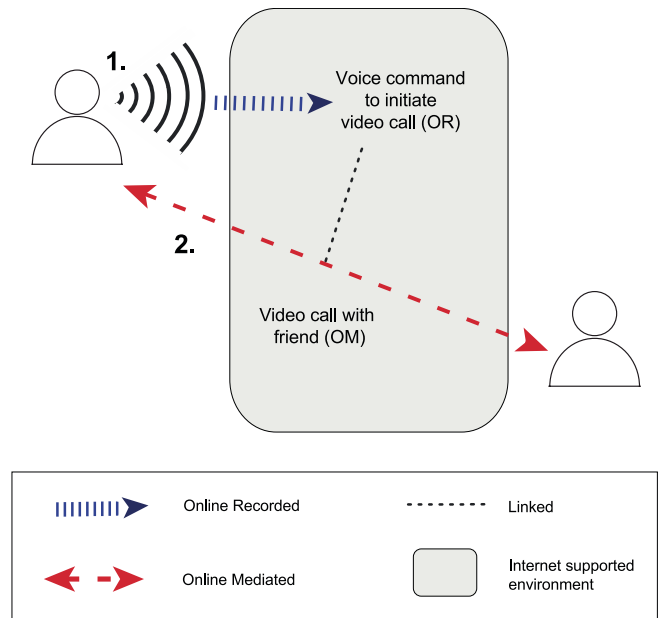
Fig. 4. Fluid example of online behaviours with voice command (online recorded) initiating video call with friend (online mediated).

note that behaviour which underpins CMC may not always be native to the communicative message itself but instead represented differently within the actual communicative exchange. As such, our taxonomy is better placed to identify these distinctions and provide a theoretical contribution to the CMC and wider cyberpsychology literature with regards to the notion that source of behaviour is a critical factor in determining the nature of CMC and likely social and psychological impacts.

We assert that the OBT supplements other recent conceptual efforts in the CMC literature including a review outlining different levels of CMC interactions by channel vs communication-centred components

Fig. 2. Concurrent online behaviours of video call meeting with group of colleagues (online mediated) and private text chat with a specific individual (online exclusive).
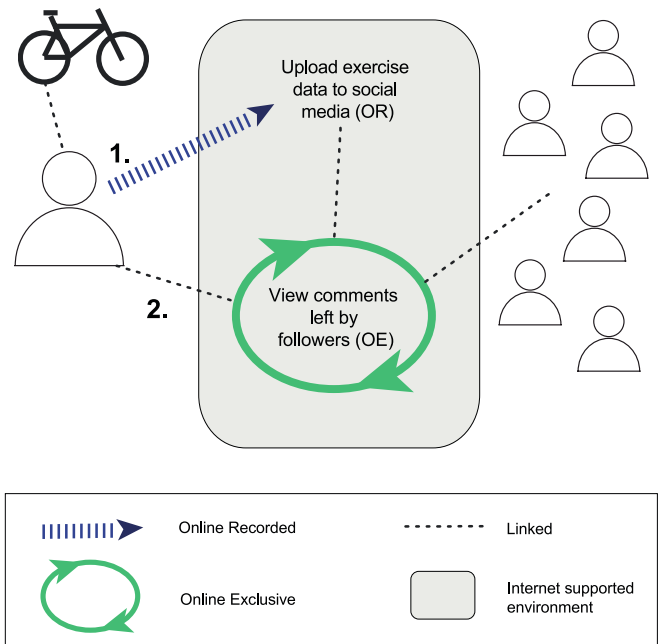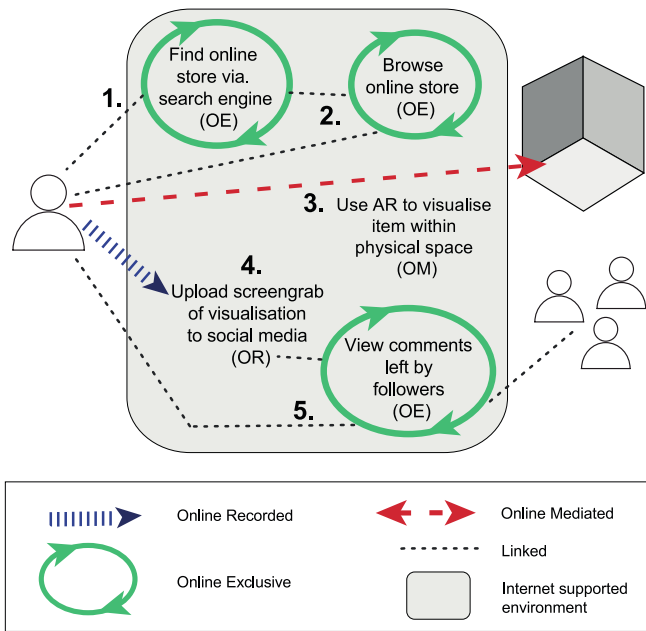
Fig. 5. Complex fluid example of user journey incorporating all online behaviours types.

(Meier & Reinecke, 2021). Here channel-centred communication refers to interactions with i) devices, ii) type of applications (e.g., email, SNS), iii) branded applications (e.g., Instagram), and iv) features/functions of applications (e.g., Facebook status, Messenger). Communication-centred level however includes a breakdown of the more traditional elements of CMC enquiry, through an exploration of, i) the interaction(s) (how, with whom) and ii) the message level (e.g., modality of message, bandwidth). Whilst this model is useful for understanding interactions at the various levels, the OBT adds further nuance here specifically to the upper levels of communication-centred interactions. Namely, we assert it could benefit from including *source of behaviour* as a named factor in the "interaction level", and in the "message level" include acknowledgement that "messages" may not be native to the platform itself. Here, there is a distinction between the behaviour itself and the message which is transmitted within CMC. That is, some behaviour may resemble typical "offline" behaviour but the

communication of this may be represented in the form of digital traces such as metrics. We assert therefore that *source of behaviour* is a critical element relevant to CMC which largely has been overlooked and in some cases distinguishes *communication* from (online) *behaviour*. We provide an indicative example of how Meier and Reinecke's (2021) CMC taxonomy may be afforded additional nuance when breaking down the level by the three types of online behaviour as per our OBT (see Table 2 below). This includes examples per level in respect of online-recorded, online-mediated and online-exclusive behaviours.

As can be seen from Table 2, the OBT provides a level of specificity on respective behaviours which may be situated at different levels of CMC interactions. Distinguishing this by our taxonomy provides a helpful basis to consider differential characteristics and social effects which may arise from these varied types of behaviours. Therefore, as well as extending existing CMC conceptual efforts, we now discuss a number of specific theoretical areas and practical directions which we feel the OBT may contribute to this field and wider discourse.

3.1. Moving beyond the online vs offline dichotomy

The OBT provides greater conceptual clarity to the intersection of online and offline behaviour and citizenship. That is, whilst most discussion about CMC or "online behaviour" tends to discuss this with the implicit assumption that the behaviour itself is exclusively online and distinct from "face-to-face", our taxonomy illuminates that behaviour within CMC is more diverse than this. Namely, that some behaviour represented online (e.g., online-recorded) does not consist of behaviours which are native to that context. Therefore the distinction between online and offline (face-to-face) is not clean-cut. Overall, the taxonomy illuminates the complexities when distinguishing behaviour as being solely exclusive to online or offline when this involves internet-enabled devices or platforms. We therefore propose that discussions around online vs offline behaviour instead move more towards terminology such as the three types we outline in the OBT.

3.1.1. User and technology-centred perspectives on online behaviour

Rather than making discrete distinctions between online vs offline behaviour, there are perhaps other lenses which may be useful, such as understanding how functionalities of Internet-enabled devices and platforms shape our various types of (online) behaviour. This is where an integration of both technology-centred and user-centred approaches can be helpful (Meier & Reinecke, 2021). User-centred approaches, for

Table 2
Extension of Meier and Reinecke's (2021) CMC taxonomy by OBT behaviour type.

Level of interaction	Online-recorded	Online-mediated	Online-exclusive
Device (Internet-enabled)	Smartphone, smartphone watch, tablet, smart TV, smart speakers	Smartphone, tablet, laptop, PC	Smartphone, tablet, laptop, PC
Type of application	Fitness apps, virtual assistants	Social networking sites, video call/conferencing	Social networking sites, email,
Branded application	Strava, Amazon Alexa, Apple OS Siri, Amazon Echo, Google Assistant	Skype, Teams, Zoom, Facebook, WhatsApp	Facebook, WhatsApp, Twitter, Instagram, Outlook, Discord
Features/functions	Voice activation commands, record activity function	Facebook Messenger, WhatsApp video call, Join Meeting	Timeline posts, Direct/Private Messages, Like/Favourite, Scrolling, Stories, Photos, Friends/Followers list
Interaction/s	**Virtual Assistants** Synchronous: One-to-zero interaction **Fitness Apps** Behaviour is one-to-zero but the communicated message may elicit additional one-to one or one-to-many interactions with others (humans) once it is transmitted in an online-exclusive fashion	Synchronous: Two-way interactive One-to-one, one-to-many, many-to-one (live streaming)	Asynchronous Two way interactive/reactive One-way non-interactive (broadcasting, observing) One-to-one, one-to-many, many-to-one, one-to-zero
Message	**Virtual Assistants** Relatively high media richness; Voice **Fitness Apps** Low media richness; Text, graphics (progress lines, statistic charts)	High media richness; Audio and/or video	Varied media richness within any given branded application and function. Text, static image (photos, memes), dynamic image (GIFs), one-way video, symbols (reactions)

example, can draw in insights about motivations through perspectives such as Uses and Gratifications theory (U&G theory; LaRose & Eastin, 2004; LaRose et al., 2001), whilst technology-centred can outline device or software functionalities and affordances which may be used to fulfil such actions. U&G theory helps us understand how our choices of online behaviours are driven by need fulfilment. For any given behaviour, there may be multiple motivations driving such actions; and conversely, a range of different online behaviours may derive from a common type of motivation (Orchard, 2019). One of the benefits of U&G theory is its ability to be flexible in approach. Thus we propose that researchers using this framework consider the context of the behaviour within the OBT and how this overlaps the conceptual distinctions of the U&G model. For instance, when considering user motivations of selfie-taking, this could be an online-exclusive behaviour if being taken using an Instagram camera for the purpose of auto-uploading it to that platform. However, if a selfie is being taken using a smartphone camera and not uploaded, this would not feature within the OBT. Therefore, the OBT enhances U&G to further consider gratifications sought and obtained for an individual's behaviour without limiting such ideas to an online-only context.

We assert that there is merit in integrating user and technology-centred perspectives, in which internet-enabled devices and their functionalities (technology-centred) can allow us to fulfil certain behaviours, and user motivation (user-centred) may influence our decisions around enacting certain behaviours based on our understanding of social norms and other context-specific considerations. As an example, selfies rely upon societal cues and a representation of one's self-production, yet the spaces in which selfies occur, such as clothing choices and the expressions of an individual, can vary depending on the context in which they are shared (Barker & Rodriguez, 2019; Roberts & Koliska, 2017).

Therefore focusing solely on technological functionality (technology-centred) whilst disregarding motivation would be rather reductionist. However, a caveat here from the perspective of U&G theory as a way of understanding "user motivation", is that our taxonomy identifies the need for theoretical advancement on its principles. That is, in the case of online-recorded behaviour for example, a "user" may not be seeking any form of media at all, but instead undertaking the (offline) behaviour for non-media related motivations (e.g., to increase physical activity). Thus, there needs to be some distinction afforded in this theoretical perspective, in order to acknowledge that communicated messages represented in online behaviours may often be the outcome of a behaviour having already taken place rather than exclusively a behaviour which is fulfilling a media-related need.

3.2. Media richness and media naturalness theory

Media Richness Theory (Daft & Lengel, 1986) and Media Naturalness Theory (Kock, 2011) have been widely used to underpin CMC and how this may relate to social effects. However, we assert that the OBT draws out much-needed nuances with regards to "naturalness". Arguably, online-recorded behaviours such as recording one's walk on a fitness app may mimic the greatest level of naturalness with regards to the nature of the behaviour itself, yet the communicated message may not always be "rich". On the other hand, online-mediated behaviours (e.g. video calls) will always consist of an offline source of behaviour which will be high in naturalness, with the communication message itself being equally rich. Online-exclusive may typically be considered the least "natural" of all these behaviour types but of course these will vary considerably in their levels of richness given the specific functions, features and affordances being used. That aside, we assert that the OBT adds conceptual clarity to theoretical models on media richness and media naturalness by distinguishing that the behaviour enacted is not always represented to an equivalent level of richness or naturalness as the communicated message itself. As such distinguishing the behaviour itself from the elements of communication are important here and currently not explicitly distinguished in core CMC theory.

3.3. Audience effects, self-presentation and regulation of behaviour

A major theoretical focus in cyberpsychology is online self-presentation to underpin our impression management efforts in an attempt to "save face" in social contexts (Goffman, 1959). In cyberpsychology, a significant focus of discussion suggests we are better equipped to manage self-impressions in online relative to offline contexts (Hancock & Dunham, 2001), largely because it is proposed that we have greater ability to edit our behaviours, and reduce non-verbal "leakage" in this environment. However, in relation to the OBT, there are some intriguing nuances to draw out; specifically in relation to online-exclusive behaviour whereby the principles of so-called enhanced impression management efforts may be most relevant. This, of course, may vary as a result of factors such as permanency of content and public vs private/protected account (Davidson & Joinson, 2021). Furthermore, such audience effects as noted previously are not likely to hold true when considering all types of online-exclusive behaviours, especially in cases where we are interacting with AI. Therefore, core theory relating to audience effects, such as social presence theory and self-presentation are unlikely to be uniformly relevant to all types of (online-exclusive) behaviour. This is especially relevant given that there may be a varied level of congruence between anticipated audience response and actual response experienced.

There is also an interesting notion relating to audience effects about online-recorded behaviour, which may correspond more to a related issue of offline-self-regulation (Marder et al., 2014). This refers to offline behaviour which may be regulated for the sake of online purposes. Offline self-regulation is discussed far less in relation to "online behaviour" and we propose that this may be in part due to the absence of discussion about behaviours which may sit under our taxonomy of online-recorded behaviour. Therefore, discussions around "online self-presentation" largely omit to consider the fact that many behaviours which are available online do not necessarily originate there, so may in some cases be better considered as "offline self-regulation".

A final consideration here may be online-mediated behaviour, such as video calls, and the longevity of such content. Video calls are often considered in the context in which they were captured. However, it is possible that such content may be viewed by an additional audience that is different or extended from the natively-present one. There is scant discussion about the nature of audience effects in this type of instance, and therefore we posit that the OBT could be theoretically useful for aiding further academic discussion in this regard. That is, how does a user's knowledge of a secondary non-native audience impact differentially on presentational efforts compared to when only the natively-present audience is the expected audience?

3.4. Anonymity, disinhibition and collective action

There are wide societal questions about whether or not we should be afforded anonymity when online. Here, discussions usually seem to implicitly originate around social media comments and similar, representing forms of online-exclusive behaviour. However, there are key questions about what anonymity actually looks like when we consider the range of different behaviours which may exist online. For example, it is unlikely that full anonymity could be achieved for some types of online behaviour such as online-mediated behaviour when one may typically be engaging in a video chat with others. Thus, anonymity may not always be categorically present or absent when online. In some cases, one may be anonymous from some but not all users, such as joining a webinar where only the host or panelists have access to delegate/participant names and details. In this case, anonymity is not discrete or uniform even in one given experience. Therefore societal discussions should avoid making reference to CMC as unidimensional and instead be clear on the specific source of behaviour which underpin this (as per our taxonomy) to make more specific recommendations around anonymity-related issues. We see here some key policy and practical implications in

respect of these issues as well as some theoretical considerations. Specifically, this has implications for theoretical discussions relating to online disinhibition, norm regulation, and collective action discussed in the subsequent sections.

A significant concern of some scholars and often the general public about anonymity within "online behaviour", is the likelihood that this can lead to harmful behaviour towards others. This is often discussed in the context of the online disinhibition effect in CMC (Suler, 2004). In respect of the OBT, effects which may derive from online disinhibition may be relevant only to some types of online-exclusive behaviour. In the case of online-recorded or online-mediated behaviour, in which the behaviour originates offline, it is less likely to elicit an opportunity for the principles of disinhibition to occur.

In addition to this, it is important to note that the *level* of anonymity may also differ to *perceptions* of anonymity by individuals. This has been demonstrated within theoretical discussions of group identity, suggesting that individuals may feel shielded by the subjective norms of others, which can result in collective action and behaviour (Postmes, 2007; Spears et al., 2001). This may present itself as collective online shaming of a target or through forms of collective activism and socio-political activity (Bonilla & Tillery, 2020; Ince et al., 2017; Reyes-Menendez et al., 2020). It is pertinent to consider how a wider range of collective behaviours transcend across the three types of behaviour outlined in the OBT. Focus has been given to online-exclusive behaviours (such as the strategic use of hashtags, e.g. #MeToo) but it is questioned how such actions differ from online-mediated actions, such as a live video broadcast supporting a specific cause, where boundaries of anonymity are much lowered.

As well as more specificity needed in understanding the contextual influences of online collective action, further insight is needed on the origins of how collectivity develops, based on different types of (online) behaviour. Online-exclusive behaviour is perhaps somewhat unique in respect to online collectivity given the role of AI in behaviour facilitation. Examples may include the use of algorithms developed to enhance contagion/transmission of content, and the compilation of behavioural indicators such as "likes" that may signal social consensus and thus influence perceptions surrounding collectivity or social norms. The role of AI bots is also relevant, which may be programmed to "like" or even create content on mass as a vehicle for promoting certain messages. Additionally, algorithms and tracking mechanisms such as cookies are more commonly associated with online-exclusive behaviour and can present a reinforcement tool for social norms, which may not occur to the same extent in other types of behaviours represented online. These are key principles which underpin digital marketing practices such as through search engine marketing (SEM) and search engine optimisation (SEO) campaigns. Despite these being useful aids for developing collectivity, concerns relate to how these may amplify and/or reinforce norm compliance for antisocial behaviour such as dissemination of misinformation (Borges & Gambarato, 2019), fraudulent behaviours (Dove, 2021), or cyberbullying (Amichai-Hamburger & Etgar, 2019). Therefore, when discussing online collective action, there are many distinctions the OBT identifies which may vary any likely outcomes associated with this including: origin of collective identity (online or offline), norm establishment, and norm regulation within contexts.

4. Practical directions informed by the OBT

4.1. Digital footprints and online safety

The OBT provides scope for developing more specific types of online safety provision. Online safety is often overly simplified to a greater awareness surrounding personal disclosure and one's digital footprint. Whilst these are both pertinent concerns, we assert that the OBT can provide some greatly needed nuance here. That is, much of the work on online safety appears to implicitly relate to online-exclusive behaviour but does not tend to explicitly note considerations or indeed risks

associated with other types of behaviour which is represented online. As an example, online-recorded behaviours such as a record of walking via a geo-located fitness app is potentially risky in leaving digital traces of one's "real world" personal information (home address, current location etc). Furthermore, online-mediated behaviours such as a video chat, may not leave the same sort of digital footprint as other types of online behaviour in the taxonomy, but still have the potential to be recorded and subsequently uploaded. In this case, such content translates from being online-mediated within the period that the behaviour itself actually took place, to being online-recorded as a retrospective record of this behaviour. Thus, the notion of a tapestry of behaviours becomes critical to understand the implications of this.

In addition, different types of online behaviours may vary in the extent to which digital traces are permanent. For instance, certain platforms offer the opportunity for the user to post an image or video ephemerally, which is automatically deleted after a short time (Mandau, 2020). One of the most popular 'disappearing' applications is Snapchat, which offers users the opportunity to send a message that will self-destruct a few seconds after the receiver opens it (Starr & Lavis, 2018). Similarly "fleets", "reels" or "stories" allow users to share content in a time-limited manner. The short-lived nature of such technological features may entice users to exchange more "risky" content, such as sexually explicit messages (Handyside & Ringrose, 2017). Despite the marketisation of ephemeral media as 'private', privacy is by no means guaranteed given that footprints can be reproduced through screenshots of content. Similar consideration may be given to online-mediated behaviour, where the behaviour itself exists only for the time in which users are connected via an internet-enabled device on a given platform. In cases where these types of behaviours are "recorded" (by static screenshot or video recording), it is intriguing to consider i) to what extent this is appraised as a valid digital footprint and ii) how appraisal of this impacts on the nature of the user's interactions and disclosures when they are made aware this footprint is currently being forged.

4.2. Using online behaviour as online data

Related to digital footprints is the issue of online data in the context of online behaviour. Cyberpsychology scholars have developed a great deal of interest in using online data within research enquiry. In line with internet-mediated research practices (British Psychological Society, 2021), this can include unobtrusive use of public online data as research data. However, based on the OBT, there are some distinctions on the extent to which these behaviours manifest themselves into online data and thus, the manner in which they may be appropriate for researcher use. To better understand these distinctions, one would perhaps need to define data and juxtapose the definition to online behaviour. Martone et al. (2018, p.111) define data as 'the measurements, observations or facts taken or assembled for analysis as part of a study and upon which the results and conclusions of the study are based.' This definition is influenced by Borgman (2016), who suggests that whilst anything can be considered data, they are defined as such only when they are used as evidence to research endeavours. On the contrary, most behaviours in everyday life are not used for research purposes. However, what is used as evidence is often dependent on the context of the research endeavour. Thus, what constitutes data and behaviour can be tackled through many perspectives, such as the cultural context or current legislation. Due to the pragmatic nature of psychology, which involves (either directly or indirectly) human participants, it is a definition that should be tackled from an ethical viewpoint. Thus, it would be safe to conclude that online data often represent online behaviour(s), while the product of online behaviours do not always constitute datasets we can analyse unless issues such as ethics are considered.

In respect of the OBT, the distinction between online data vs online behaviour can vary based on the different types of behaviour of interest. For online-recorded behaviour for example, this is easier to distinguish as the behaviour is not native to the online platform, yet it should result

in the intentional creation of online data. Said data would therefore typically be considered online "data" rather than "behaviour". However, this distinction is not as clear for other types of behaviour such as online-mediated, in which any recorded "data" may capture, with great detail, the online "behaviour" itself. Whereas, footprints left by online-exclusive behaviours may not be wholly representative, although validity will vary between direct and indirect footprints. Behaviour will always be more than the online data which may manifest as a result, and from an ethical and practical perspective, therefore, consideration is needed here to weigh up how purposeful the online data is to inform insights into human behaviour. In some cases the data may not be that informative. The OBT draws out distinctions here for different types of behaviour. That is, resulting online data from online-mediated behaviour such as video calls may be highly reflective of the nature of these behaviours, whereas other types of behaviours may not leave traces that serve useful purposes for researchers. As such, the OBT may aid researchers who use online unobtrusive methods to consider the extent to which the types of behaviours they are interested in can be represented by data, and indeed whether any data should be interpreted as "online behaviour" at all.

4.3. Digital literacy and inclusion

The OBT is a useful framework to understand how online behaviour may differentiate across user demographics and life circumstances, to inform practical considerations surrounding digital inclusion. Livingstone et al. (2021) conducted a systematic review surrounding digital skills in children, raising a pertinent implication that 'digital divides' are more complex than solely physical access to the internet. From this it is posited that digital skills encompass four dimensions including 'technical', 'creative', 'communication' and 'information' (Livingstone et al., 2021). Throughout the COVID-19 pandemic, internet use across all age groups has increased, specifically in relation to communication and searching for health-related information (Nguyen et al., 2020; Subudhi et al., 2020). Older age groups, typically aged 65 and above, have been found to be less able to access content (Subudhi et al., 2020) due to negative social attitudes towards technology, skills divides and computer-related anxieties (Lovarini et al., 2019). Moreover, online accessibility for younger age groups is found to be influenced by a broad range of factors such as parental influence and peer group norms resulting in preferences for different social media platforms (Micheli, 2016; Wilkin et al., 2017). Herein, all three behaviours are highlighted as being multifaceted and complex across age groups. Therefore, consideration of such detail offers a greater understanding of digital inclusion than simply ascribing users a 'native' or 'immigrant' status based upon a generational divide (Kaye, 2022). The OBT echos such distinctions and demonstrates how digital literacy skills need to be considered in greater depth. All three subtypes of behaviour within the OBT require access to a device and an internet connection. However, subtypes vary in regards to accessibility when considering the skills needed to negotiate and manage such behaviours. For instance, online-exclusive behaviours require social, critical and emotional skills in accordance with the specific activity being undertaken. As an example, platforms such as Twitter require succinct and persuasive writing skills due to the fast-paced, character-restricted nature of the platform (Duncombe, 2019). Therefore, such online spaces may become inaccessible to specific users. In comparison, online-mediated behaviours may be considered more accessible given a stronger reliance on naturalness in the form of directly mimicking offline behaviour. The interwoven nature of subtypes however becomes evident when dissecting platform features further. An individual may be comfortable talking via a video-call, but may not have the digital literacy required to initiate the call or use additional features such as chat or background filters. Distinguishing behaviours in such a way may help to identify barriers and develop future strategies for fostering inclusivity.

In addition to this, the OBT can help understand the personal and societal preferences and individual motivations underlying behaviours. For instance, user affect may play an important role in determining the impact of online-exclusive spaces that can often foster enhanced emotional responses through emotional contagion (Kramer et al., 2014.). This is often heightened by social media algorithms that have been found to formulate bias in the content presented to users (Huszár et al., 2022). Consequently mental and physical health may play a role in determining preferences within subtypes of behaviour. For instance, individuals with social anxiety may show a preference for online-exclusive behaviours or online-recorded behaviours due to their enhanced control in communication, over online-mediated behaviours, which often rely on a visual real-time element. Such ideas coincide with the U&G framework (LaRose & Eastin, 2004; LaRose et al., 2001) to suggest that individuals can purposefully access behaviours within technology that fulfil their own needs.

OBT subtypes may also be reliant on the availability of assistive technology to underlie such behaviours for those with disabilities. For instance, online-exclusive behaviours, specifically, may rely upon access to voice-over internet protocol (VOIP) software; whilst websites need to comply with regulatory guidelines such as the Web Content Accessibility Guidelines (W3C., 2018; Fernández-Díaz et al., 2020). Preferences can also be drawn based on the usability of technology to address specific needs. For instance, those with certain disabilities may make use of online-recorded behaviours more frequently given that the technologies that facilitate such behaviours can enhance accessibility in distinctive ways. As an example, home assistants may replace online-exclusive behaviours through voice-commands, allowing such behaviours to become more readily available. Furthermore, all three types of online behaviour may be contingent upon devices. For those with physical disabilities, touch screen devices such as tablets may be preferred over traditional keyboards, and this may construct different behaviours, such as opting for a video call over text-based communication. Therefore, types of physical disabilities may impact on choice of device which in turn, may be associated with the types of online behaviours which are used more readily. The OBT provides scope to identify which behaviours may be impacted by individual differences and provides suggestions for understanding barriers and facilitators to increase digital accessibility.

5. Conclusion

It is important to distinguish between native online behaviours and those behaviours which are represented online. That is not to say that the latter is not readily facilitated by the internet, enabling users to engage in behaviours which may otherwise be inaccessible or costly. However, humans have shopped, dated, networked, shared images and stories long before the internet was created. The strength of the OBT is its ability to clarify what makes these behaviours unique when elements are supported (or indeed undermined) by the presence of an internet connection.

Theoretical areas of CMC allude to the behaviours which take place via internet-enabled technology. Whilst CMC theories have included a wealth of relevant factors, we assert that additional conceptual clarity is needed when drawing in nuances about the diversity of (online) behaviours which may be represented via CMC. Indeed, although CMC will always consist some type(s) of behaviour, not all (online) behaviours will be communicative as per CMC. This is where cyberpsychology extends from CMC to acknowledge the diversity of (online) behaviours which may not always be communication in nature. We present the Online Behaviour Taxonomy as a conceptual basis from which to better underpin different types of "online behaviour" and how these are situated in CMC. We advocate that current theoretical areas, often within the CMC literature do not make explicit reference to the source of the behaviour, which our taxonomy illuminates as being paramount to understanding issues associated with CMC. Specifically, the OBT illuminates that the nature of a behaviour underpinning a communicative exchange is not necessarily equivalent to the nature of the transmitted

message. There may be distinctions in naturalness and richness, and the associated audience effects and regulation of behaviour which occur as a result. We therefore intend our taxonomy to be pragmatically useful for scholars in CMC, cyberpsychology and other related disciplines, but also practitioners and policy makers when considering the practical implications of "online behaviour". We could reinforce the notion of such taxonomies being a response to current technological development and constitute a cutting-edge, contemporaneity-focused approach that constantly redefines itself the more technology grows.

Author contributions

Conceptualization: LK, AR, LCJ, LAFB, LJO. Writing - Original Draft: LK. Writing - Review & Editing: LK, AR, LCJ, LAFB, LJO. Visualization: LCJ. Project administration: LK

Declaration of competing interest

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